Marine Technology

Cable for offshore applications

The Quality Connection

LEONI

The LEONI Group

Cable competence for different industrial markets.

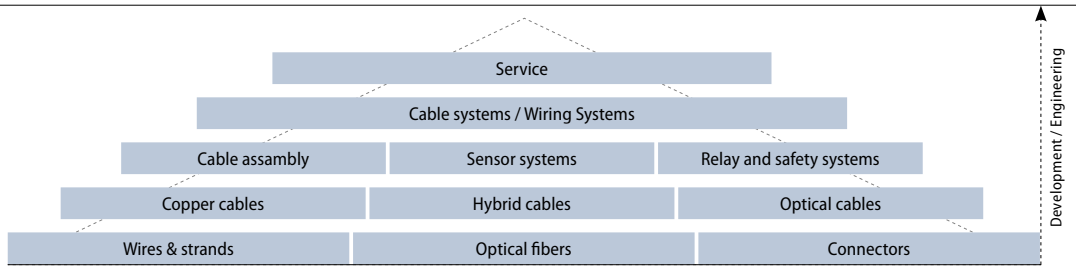
LEONI is a leading supplier of cable systems and related services for the automotive industry and various other industrial sectors.

Our group of companies employs more than 60,000 people in 32 countries. Corporate vision, highest quality and innovative power have made us one of the leading cable manufacturers in Europe. LEONI develops and produces technically sophisticated products ranging from wire and optical fibers to cables through to complete cable systems and also offers the related services. Moreover, the product portfolio comprises strands, standardised cables, hybrid cables, glass fiber as well as special cables, cable harnesses, wiring systems components and fully assembled systems for applications in various industrial markets.

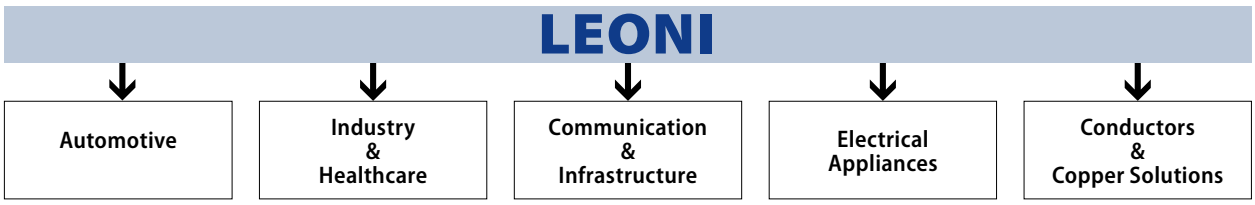
Your markets – our strength.
As diverse as our product and service range are the markets and sectors LEONI is supplying. We focus our activities on customers in the fields of Automotive, Industry & Healthcare, Communication & Infrastructure, Electrical Appliances and Conductors & Copper Solutions.

We are among the leading European suppliers in the Communication & Infrastructure market to which at LEONI, as a cable manufacturer, also belong activities in the fields of infrastructure & data communications, industrial plant projects, solar- and wind power, energy & telecommunications, irradiation cross-linking and traffic engineering. Our customers benefit from innovative as well as reliable and long-lasting products of high quality worldwide. LEONI – we create the best connection for your future. *for further information www.leoni.com*

Products and services portfolio at a glance



LEONI's core markets



Contents

LEONI Business Unit Industrial Projects –

your expert for a market that requires maximum reliability

Please visit our website www.leoni-industrial-projects.com

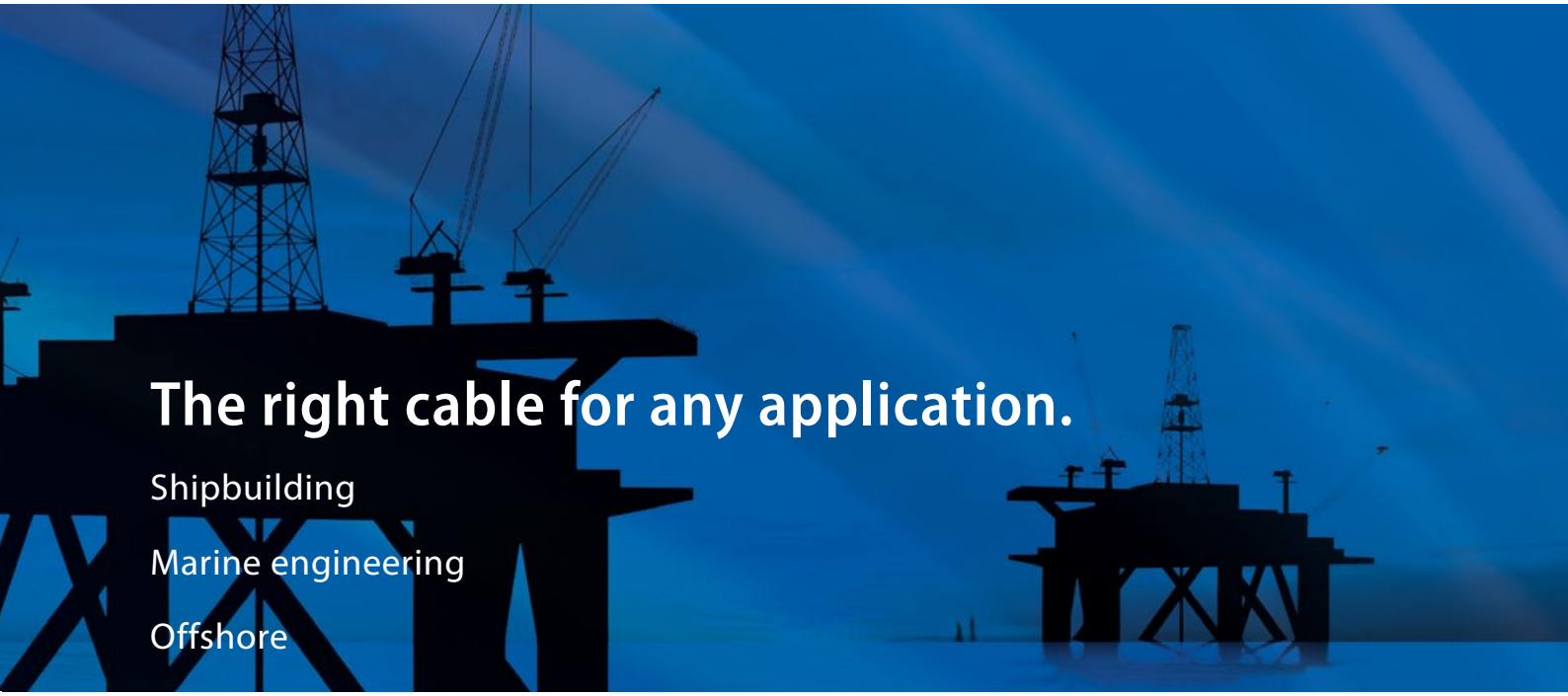
LEONI is one of the leading suppliers of standardised and customer-specific special cables and pre-assembled cable systems worldwide.

The Business Unit Industrial Projects allows us to give our customers access to the entire competence of a worldwide corporation, focused to meet the needs of industrial applications. We supply our products and solutions wherever everything depends on maximum reliability, quality and durability, such as in oil and gas extraction and processing as well as in the petrochemical and energy production industries. LEONI products are to be found in many other applications such as the pulp and paper, cement and pharmaceutical industries and in waste management, in which processes have to run in a controlled way via sensors and actuators.

For us reliability doesn't just mean keeping the right product avail-able for you as a standard product or developing a project solution for you – it also means supplying it at precisely the agreed time.

Safety, availability and reliability are vital in industrial plant engineering and energy provision. This is because these are fields in which unexpected breakdowns are very expensive and have critical effects on the environment.

Companies are asking for solutions which are perfectly tailored to meet the application in question as well as the plant itself. 70 % of the cables leaving our company are developed, manufactured and assembled according to customer specifications. We produce quantities depending on the requirements of the projects and supply according to cable drumming schedules. We are also equipped to provide project quantities in a considerable two-digit million euro range. We take company-specific standards as well as all important industrial and environmental standards on the national and international level into account.



The right cable for any application.

Shipbuilding

Marine engineering

Offshore

Offshore platforms

- Instrumentation cable
- Power and Control cable
- Bus cable
- Fire resistant cable
- Coaxial cable
- Communication and LAN cable
- CCTV camera cable
- Special solutions

Naval technology

- Laterally watertight cable
- Laterally and longitudinally watertight cable for outboard applications
- Inboard cable
- Self-extinguishing submarine cable
- Spiral cable
- Special solutions
-

Commercial shipbuilding

- Instrumentation cable
- Power and Control cable
- Bus cable
- Fire resistant cable
- Coaxial cable
- Communication and LAN cable
- CCTV camera cable
- Special solutions

Oceanography

- Towing cables with either steel or armide cores for rated loads of several tons
- Neutrally buoyant and floating cable for marine research
- Cable for fixed installation

LEONI – The Quality Connection

One of LEONI's most important success factors is the globally consistent high quality of its products.

LEONI quality management

The quality management of LEONI's wire and cable facilities around the world is ISO 9001:2000 certified. Furthermore, we concentrate on preventive quality assurance in which error-preventing tools like FMEA as well as machinery and process capability analyses have their firm places.

During the manufacturing process we constantly measure, monitor and control the diameter and the properties of the insulation of our cables and conductors using state-of-the-art equipment. Production control carries out regular examination of random samples to ensure that the stipulated tolerances are observed.

All quality assurance measures combined enable ongoing optimisation in line with our ambitious quality targets.

LEONI environmental management

Business success and ecological responsibility are no contradiction in terms for us. As a company engaged in production around the world, we acknowledge that we share a special responsibility for safeguarding the natural essentials of life. It is our aim to strike a balance between environmental concerns and the interests of our company. Environmental protection consequently is a mandatory element of our business activity. We encourage our business partners to follow environmental guidelines comparable to our own and we advise our customers on environmentally friendly ways to handle and dispose of our products.

We ensure, with our DIN EN ISO 14001 certified environmental management system, that our environmental policy is applied effectively.

LEONI products are tested in accordance with customer requirements as well as national and foreign regulations:

- the behaviour of the cable and conductors under extreme temperature conditions
- operational reliability after artificially-induced aging resistance to fuels, lubricants, seawater and other environmental stresses
- jacket and insulation resistance to elongation, abrasion and tensile strength
- mechanical and electrical properties of the conductor
- flex life, resistance to torsion and vibration


CERTIFICATE

The Certification Body of TÜV SÜD Management Service GmbH certifies that

LEONI

LEONI Kerpen GmbH
Zweifaller Straße 275-287
D-52224 Stolberg

has established and applies a Quality Management System for

Development, production and sales of cables, cords and compounds

An audit was performed, Report No. 70770193
Proof has been furnished that the requirements according to

ISO 9001:2008

are fulfilled. The certificate is valid in conjunction with the main-certificate until 2014-04-22
Certificate Registration No. 12 100 39456/20 TMS

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The Certification Body of TÜV SÜD Management Service GmbH certifies that

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Development, production and sales of cables, cords and compounds

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Proof has been furnished that the requirements according to

ISO 14001:2004

are fulfilled. The certificate is valid in conjunction with the main-certificate until 2014-04-22
Certificate Registration No. 12 104 39456/20 TMS

Quality and Performance

Inside our cables

Our development engineers ensure that only those materials are used for LEONI-SeaLine cables that have been carefully optimised for the special demands of ship and marine engineering. For instance, we use specially adapted polyethylene (PE), thermoplastic copolymers (FRNC/LSZH), polypropylene (PP) and polyurethane (PUR), SHF1 and SHF2 for the sheath.

Depending on customer requirements, LEONI cables can be made with the following properties:

- resistant to seawater
- flame retardant
- zero halogen, non-corrosive
- neutrally bouyant
- chemical resistant
- transversally water blocked
- oil reistant
- fire resistant
- pressure resistant
- applicabel for towing
- longiditually water blocked
- resistant to process of hydrolysis
- for intrinsically safe systems

Using a variety of shielding technologies and special materials provides optimum **EMC screening properties:**

- foil, braided and served wire shields that can be combined
- sheathing materials: bare, tin-plated and silver-plated copper wires

High tensile strength due to either steel or aramide strain relief elements

Cables designed as …

- round, flat or profie-extruded cables
- hybrid cable integrating control, data and power cables; integration of fiber optic cables and media hoses
- spiral cables with powerful recoil action and extension lengths of many time the closed block length
- fiber optic cables
- coaxial cables for video and data recording

Approvals

We test the electrical, mechanical and chemical properties of our cables using highly sophisticated testing equipment and methods. Upon customer request, we have our products certified to national and international standards by well-known classification bodies such as:

Germanischer Lloyd

Lloyds Register of Shipping

ABS Europe LTD

Bureau Veritas

Det Norske Veritas

VDE Prüf- und Zertifizierungsinstitut

You will find an up-to-date overview on our website **www.leoni-industrial-projects.com**

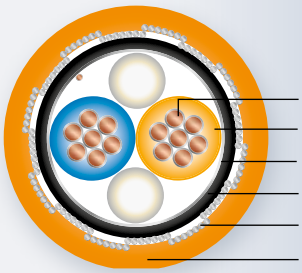
Fieldbus Cable

Fieldbus Foundation H1 100 Ω

Low Smoke, Zero Halogen, Flame Retardant

IEC 60092-376, IEC 61158-2
90 °C / 300 V

FB-v2X(St+Ce)HQH



Abbreviations

FB-	Fieldbus cable
v	tinned
2X	XLPE insulation
(St+Ce)	collective screen
H	LSZH inner sheath
Q	steel wire braid
H	LSZH outer sheath

Application

Fieldbus cable, Type A, for bus-systems Fieldbus Foundation acc. to IEC 61158-2 in offshore and shipboard applications, where people are potentially endangered in case of fire. Suitable for use in hazardous classified locations class I and class II division 2 acc. to NEC 501.10(B) and NEC 502.10(B) or zone 1 and zone 2, group II, acc. to IEC 60079-14, resp.
Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	tinned annealed copper wire, stranded, size: AWG 16 , AWG 18
Insulation	cross-linked polyethylene XLPE
Colour code	(+)-core: orange, (-)-core: blue
Collective screen	plastic coated aluminium tape, metallic surface outside, in contact with tinned copper drain wire and tinned copper wire braid
Inner sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Armour	galvanised steel wire braid, opt. coverage (min.) 82%
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), ● orange
Cable marking	LEONI KERPEN ICON FIELDBUS CABLE IEC 61158-2 100Ω FF H1 SIZE 300V TEMPERATURE SUN RES PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	
during operation	–40 °C up to +90 °C
during installation	–5 °C up to +50 °C
Minimum bending radius	10 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section	AWG 16	AWG 18
Conductor resistance loop) max	31 Ω/km	47 Ω/km
Screen resistance nom.	30 Ω/km	
Mutual capacitance nom.	70 nF/km	
Inductance nom.	0.7 mH/km	
Capacitance unbalance to earth max.	4 nF/km	
Impedance at f = 31.25 kHz	100 Ω ± 20 Ω	
Attenuation at f = 39 kHz max.	3.0 dB/km	
Propagation delay change (f = 7.9 kHz - 39 kHz) max.	1.7 µs/km	
Test voltage U_{rms} (core : core)	1500 V	
Test voltage U_{rms} (core : screen)	1500 V	
Operating voltage	300 V	

Geometrical data

Elements	Dia. of core [mm]	Dia. over inner sheath [mm]	Dia. of armour wire [mm]	RT of outer sheath [mm]	Outer dia. [mm]	Weight [kg/km]	Part No.
	approx.	approx.	nom.	nom.	approx.	approx. / kg	Colour orange
AWG 16/7 1	3.3	9.4	0.2	1.2	12.7	224	LKX 82850001
AWG 18 /7 1	2.7	8.3	0.2	1.2	11.6	192	LKX 82850000

RT = Radial Thickness

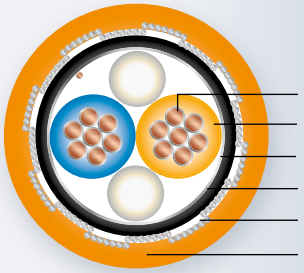
* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Fieldbus Cable

IEC 60092-376, IEC 61158-2
90 °C / 300 V

Fieldbus Foundation H1 100 Ω
Low Smoke, Zero Halogen, Flame Retardant

FB-vHX(St+Ce)HQH



Abbreviations

FB-	Fieldbus Cable
v	tinned
HX	XLPE insulation
(St+Ce)	collective screen
H	LSZH inner sheath
Q	steel wire braid
H	LSZH outer sheath

Application

Fieldbus cable, Type A, for bus-systems Fieldbus Foundation acc. to IEC 61158-2 in offshore and shipboard applications, where people are potentially endangered in case of fire. Suitable for use in hazardous classified locations class I and class II division 2 acc. to NEC 501.10(B) and NEC 502.10(B) or zone 1 and zone 2, group II, acc. to IEC 60079-14, resp. Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	tinned annealed copper wire, stranded, size: AWG 16 , AWG 18
Insulation	flame retardant, cross-linked polyethylene XLPE (XHF 90)
Colour code	(+)-core: orange, (-)-core: blue
Collective screen	plastic coated aluminium tape, metallic surface outside, in contact with tinned copper drain wire and tinned copper wire braid
Inner sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Armour	galvanised steel wire braid, opt. coverage (min.) 82%
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), ● orange
Cable marking	LEONI KERPEN ICON FIELDBUS CABLE IEC 61158-2 100Ω FF H1 SIZE 300V TEMPERATURE SUN RES PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	
during operation	–40 °C up to +90 °C
during installation	–5 °C up to +50 °C
Minimum bending radius	10 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section	AWG 16	AWG 18
Conductor resistance (loop) max.	31 Ω/km	47 Ω/km
Screen resistance	30 Ω/km	
Mutual capacitance	80 nF/km	
Inductance	0.7 mH/km	
Capacitance unbalance to earth max.	4 nF/km	
Impedance at f = 31.25 kHz	100 Ω ± 20 Ω	
Attenuation at f = 39 kHz max.	3.0 dB/km	
Propagation delay change (f = 7.9 kHz - 39 kHz) max.	1.7 µs/km	
Test voltage U_{rms} (core : core)	1500 V	
Test voltage U_{rms} (core : screen)	1500 V	
Operating voltage	300 V	

Geometrical data

Elements	Dia. of core [mm]	Dia. over inner sheath [mm]	Dia. of armour wire [mm]	RT of outer sheath [mm]	Outer dia. [mm]	Weight [kg/km]	Part No.
	approx.	approx.	nom.	nom.	approx.	approx. / kg	Colour orange
AWG 16 /7 1	3.9	10.8	0.2	1.3	14.7	308	LKX 82860001
AWG 18 /7 1	3.8	10.5	0.2	1.3	14.4	291	LKX 82860000

RT = Radial Thickness

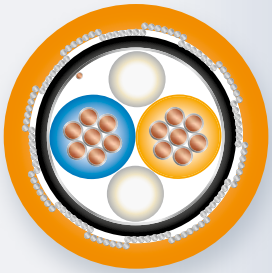
* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Fieldbus Cable

IEC 60092-376, IEC 61158-2
90 °C / 300 V

Fieldbus Foundation H1 100 Ω
Low Smoke, Zero Halogen, Flame Retardant

FB-v2X(St)HQH



Application

Fieldbus cable, Type A, for bus-systems Fieldbus Foundation acc. to IEC 61158-2 in offshore and shipboard applications, where people are potentially endangered in case of fire. Suitable for use in hazardous classified locations class I and class II division 2 acc. to NEC 501.10(B) and NEC 502.10(B) or zone 1 and zone 2, group II, acc. to IEC 60079-14, resp.
Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	tinned annealed copper wire, stranded, size: AWG 16 , AWG 18
Insulation	cross-linked polyethylene XLPE
Colour code	(+)-core: orange, (-)-core: blue
Collective screen	plastic coated aluminium tape in contact with tinned copper drain wire
Inner sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Armour	galvanised steel wire braid, opt. coverage (min.) 82%
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), ● orange
Cable marking	LEONI KERPEN ICON FIELDBUS CABLE IEC 61158-2 100Ω FF H1 SIZE 300V TEMPERATURE SUN RES PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	
during operation	–40 °C up to +90 °C
during installation	–5 °C up to +50 °C
Minimum bending radius	10 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section	AWG 16	AWG 18
Conductor resistance (loop) max.	31 Ω/km	47 Ω/km
Screen resistance nom.	30 Ω/km	
Mutual capacitance nom.	70 nF/km	
Inductance nom.	0.7 mH/km	
Capacitance unbalance to earth max.	4 nF/km	
Impedance at f = 31.25 kHz	100 Ω ± 20 Ω	
Attenuation at f = 39 kHz max.	3.0 dB/km	
Propagation delay change (f = 7.9 kHz - 39 kHz) max.	1.7 µs/km	
Test voltage U_{rms} (core : core)	1500 V	
Test voltage U_{rms} (core : screen)	1500 V	
Operating voltage	300 V	

RT = Radial Thickness

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

Elements	Dia. of core [mm]	Dia. over inner sheath [mm]	Dia. of armour wire [mm]	RT of outer sheath [mm]	Outer dia. [mm]	Weight [kg/km]	Part No.
	approx.	approx.	nom.	nom.	approx.	approx. / kg	Colour orange
AWG 16 /7 1	3.3	8.9	0.2	1.2	12.2	201	LKX 82870001
AWG 18 /7 1	2.9	8.1	0.2	1.2	11.4	176	LKX 82870000

Abbreviations

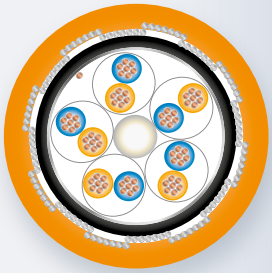
FB-	Fieldbus cable
v	tinned
2X	XLPE insulation
(St)	collective screen
H	LSZH inner sheath
Q	steel wire braid
H	LSZH outer sheath

Fieldbus Cable

Fieldbus Foundation H1 100 Ω

Low Smoke, Zero Halogen, Flame Retardant

IEC 60092-376, IEC 61158-2
90 °C / 300 V



FB-v2X(St)HQH PiMF

Application

Fieldbus cable, Type A, for bus-systems Fieldbus Foundation acc. to IEC 61158-2 in offshore and shipboard applications, where people are potentially endangered in case of fire. Suitable for use in hazardous classified locations class I and class II division 2 acc. to NEC 501.10(B) and NEC 502.10(B) or zone 1 and zone 2, group II, acc. to IEC 60079-14, resp.
Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	tinned annealed copper wire, stranded, size: AWG 16 , AWG 18
Insulation	cross-linked polyethylene XLPE
Colour code	(+)-core: orange, (-)-core: blue, element identification with numbered tapes
Individual screen	plastic coated aluminium tape in contact with tinned copper drain wire
Laying up	cores twisted to pairs, screened pairs twisted to cable core; (if necessary with filling element(s))
Collective screen	plastic coated aluminium tape in contact with tinned copper drain wire
Inner sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Armour	galvanised steel wire braid, opt. coverage 82% (min.)
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), orange
Cable marking	LEONI KERPEN ICON FIELDBUS CABLE IEC 61158-2 100Ω FF H1 SIZE 300V TEMPERATURE SUN RES PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	
during operation	–40 °C up to +90 °C
during installation	–5 °C up to +50 °C
Minimum bending radius	10 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section	AWG 16	AWG 18
Conductor resistance (loop) max.	31 Ω/km	47 Ω/km
Screen resistance nom.	30 Ω/km	
Mutual capacitance nom.	70 nF/km	
Inductance nom.	0.7 mH/km	
Capacitance unbalance to earth max.	4 nF/km	
Impedance at f = 31.25 kHz	100 Ω ± 20 Ω	
Attenuation at f = 39 kHz max.	3.0 dB/km	
Propagation delay change (f = 7.9 kHz - 39 kHz) max.	1.7 µs/km	
Test voltage U_{rms} (core : core)	1500	
Test voltage U_{rms} (core : screen)	1500	
Operating voltage	300	

RT = Radial Thickness

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

Elements	Dia. of core [mm]	Dia. over inner sheath [mm]	Dia. of armour wire [mm]	RT of outer sheath [mm]	Outer dia. [mm]	Weight [kg/km]	Part No.
	approx.	approx.	nom.	nom.	approx.	approx. / kg	Colour orange
AWG 16 /7 2	3.3	14.2	0.3	1.4	18.3	409	LKX 82870005
AWG 16 /7 5	3.3	18.4	0.3	1.6	22.9	642	LKX 82870006
AWG 16 /7 10	3.3	24.7	0.3	1.8	29.6	1040	LKX 82870007
AWG 18 /7 2	2.7	12.2	0.3	1.3	16.1	332	LKX 82870002
AWG 18 /7 5	2.7	15.8	0.3	1.5	20.1	512	LKX 82870003
AWG 18 /7 10	2.7	21.1	0.3	1.7	25.8	823	LKX 82870004

Abbreviations

FB-	Fieldbus cable
v	tinned
2X	XLPE insulation
(St)	collective screen
H	LSZH inner sheath
Q	steel wire braid
H	LSZH outer sheath
PiMF	pair in metal foil

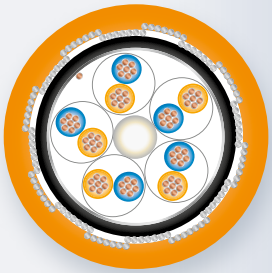
Fieldbus Cable

IEC 60092-376, IEC 61158-2
90 °C / 300 V

Fieldbus Foundation H1 100 Ω

Low Smoke, Zero Halogen, Flame Retardant

FB-vHX(St)HQH PiMF



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Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	tinned annealed copper wire, stranded, size: AWG 16 , AWG 18
Insulation	flame retardant, cross-linked polyethylene XLPE (XHF 90)
Colour code	(+)-core: orange, (-)-core: blue, element identification with numbered tapes
Individual screen	plastic coated aluminium tape in contact with tinned copper drain wire
Laying up	cores twisted to pairs, screened pairs twisted to cable core; (if necessary with filling element(s))
Collective screen	plastic coated aluminium tape in contact with tinned copper drain wire
Inner sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Armour	galvanised steel wire braid, opt. coverage 82% (min.)
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), orange
Cable marking	LEONI KERPEN ICON FIELDBUS CABLE IEC 61158-2 100Ω FF H1 SIZE 300V TEMPERATURE SUN RES PRODUCTION LOT CODE LENGTH MARKING

RT = Radial Thickness

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	–40 °C up to +90 °C (during operation)
	–5 °C up to +50 °C (during installation)
Minimum bending radius	10 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section	AWG 16	AWG 18
Conductor resistance (loop) max.	31 Ω/km	47 Ω/km
Screen resistance nom.	30 Ω/km	
Mutual capacitance nom.	80 nF/km	
Inductance nom.	0.7 mH/km	
Capacitance unbalance to earth max.	4 nF/km	
Impedance at f = 31.25 kHz	100 Ω ± 20 Ω	
Attenuation at f = 39 kHz max.	3.0 dB/km	
Propagation delay change (f = 7.9 kHz - 39 kHz) max.	1.7 µs/km	
Test voltage U_{rms} (core : core)	1500 V	
Test voltage U_{rms} (core : screen)	1500 V	
Operating voltage	300 V	

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

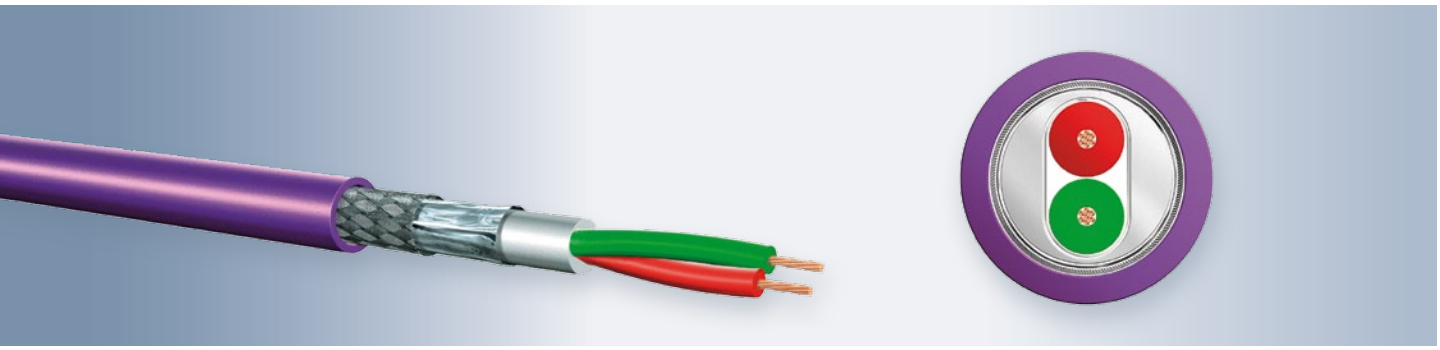
Geometrical data

Elements	Dia. of core [mm]	Dia. over inner sheath [mm]	Dia. of armour wire [mm]	RT of outer sheath [mm]	Outer dia. [mm]	Weight [kg/km]	Part No.
	approx.	approx.	nom.	nom.	approx.	approx. / kg	Colour orange
AWG 16 /7 2	3.9	16.4	0.3	1.5	20.7	500	LKX 82740006
AWG 16 /7 5	3.9	21.4	0.3	1.7	26.1	813	LKX 82710007
AWG 16 /7 10	3.9	29.3	0.3	2.0	34.6	1389	LKX 82740008
AWG 18 /7 2	3.8	16.0	0.3	1.5	20.3	473	LKX 82740003
AWG 18 /7 5	3.8	20.9	0.3	1.7	25.6	756	LKX 82740004
AWG 18 /7 10	3.8	28.5	0.3	2.0	33.8	1283	LKX 82740005

Abbreviations

FB-	Fieldbus cable
v	tinned
HX	XLPE insulation
(St)	collective screen
H	LSZH inner sheath
Q	steel wire braid
H	LSZH outer sheath
PiMF	pair in metal foil

PROFIBUS Cable



Application

Flexible installation on and below deck of commercial ships without constant exposure to oil, grease and other lubricants. The cables meet the technical requirements of IEC 60092-350, IEC 60029-351, IEC 60092-352, IEC 60092-353, IEC 60092-359, IEC 60092-370, IEC 60092-376.

Construction

Conductor	Copper bare, 7 strands
Insulation	Foamed PE with skin
Inner jacket	1. Thermoplastic copolymer (FRNC) 2. Thermoplastic copolymer (FRNC) 3. Special thermoplastic copolymer (FRNC)
Screen	Alu-laminated foil, , applied longitudinally
Shield	Tin-plated copper braid
Outer sheath	SHF1/SHF2/mud res, ● violet
Cable marking	1. Continuous meters LEONI SeaLine Profibus 02YSH(ST)CH 1x2x0,75/2,55-150 LI VI FRNC 2. LEONI Sealine Profibus 02YSH(ST)CHX 1x2x0,75/2,55-150 LI FRNC 3. LEONI SeaLine Profibus 02YSH(ST)CH 1x2x0,75/2,55-150 LI MUD RES

Technical data

1. Flame retardant acc. to IEC 60332-1-2 and IEC 60332-3-22, smoke density acc. to IEC 60754-1, halogen free acc. to 60754-1, sunlight resistant
2. Flame retardant acc. to IEC 60332-1-2 and IEC 60332-3-22, smoke densitiy acc. to 61034, halogen free acc. to IEC 60754-1, oil resistant acc. to EN 60811-2-1 (24 hours / 100 °C), sunlight resistant
3. Flame retardant acc. to IEC 60332-3-24, halogen free acc. to IEC 60754-1, sunlight resistant, mud resistant acc. to NEK 606

Temperature range		
during operation	–25 °C to +80 °C	
during installation	–10 °C to +50 °C	
Bending radius	1. during operation	10 x D
	during installation	5 x D
	2. during operation	20 x D
	during installation	10 x D
	3. during operation	5 x D
	during installation	10 x D

Electrical data

Loop resistance	≤110 Ω/km
Insulation resistance	≥16,000 MΩ · km
Charac. impedance [3–20 MHz].	150 ± 15 Ω
Capacity [1KHz]	≈28.5 nF/km
Operating voltage	≤60 V
Testing voltage (core/core/sheath)	1000 V

Geometrical data

Designation	Core Dia.	Cable dia.	Weight	Colour code	Part. No.
	[mm] nom.	[mm] nom.	[kg/km] nom.		
1. 02YSH(ST)CH 1x2x0.75/2.55-150 LI VI FRNC	2.55	8.0	84	■ ■	L45467-G17-C46 (SHF1)
2. 02YSH(ST)CHX 1x2x0.75/2.55-150 LI VI FRNC	2.55	8.0	84	■ ■	L45467-G17-C56 (SHF2)
3. 02YSH(ST)CH 1x2x0,75/2,55-150 LI VI *	2.55	8.0	77	■ ■	L45467-G17-C106 (mud res)

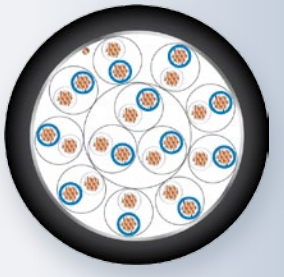
* not certified / approval ongoing

Instrumentation Cable

IEC 60092-350, IEC 60092-376
90 °C / 250 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Single & Multi-Pair, XLPE-Insulation, Collective Screen, LSZH-Sheath



M-2X(St)H

Application

For transmission of analogue and digital signals in offshore and shipboard applications, where people are potentially endangered in case of fire; allowed for use in zone 1 and zone 2 group II classified areas (IEC 60079-14); not allowed for direct connection to low impedance source, e.g. the public mains electricity. Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire, stranded, size: 0.5 mm², 0.75 mm²
Insulation	cross-linked polyethylene XLPE
Colour code	blue, white, continuously numbered on white core (1, 2, 3..) for multi-element, two pairs are designed as quad and are marked clockwise (bl1, bl2, ws1, ws2)
Wrapping	at least 1 layer of plastic tape
Collective screen	plastic coated aluminium tape in contact with tinned copper drain wire
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Cable marking	LEONI KERPEN SEALINE SIZE 250V IEC 60092-376 PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Temperature range	–40 °C up to +90 °C during operation –5 °C up to +50 °C during installation
Minimum bending radius	7.5 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section	0.5 mm²	0.75 mm²
Conductor resistance max	36.7 Ω/km	25.0 Ω/km
Mutual capacitance max		
single element:	150 nF/km	150 nF/km
2 to 4 elements:	150 nF/km	150 nF/km
above 4 elements:	150 nF/km	150 nF/km
Inductance max	1 mH/km	
L/R ratio max	25 µH/Ω	
Test voltage U_{rms} (core : core)	1500 V	
Test voltage U_{rms} (core : screen)	1500 V	
Operating voltage	250 V	

Abbreviations

M-	Marine Technologies - Instrumentation
2X	XLPE insulation
(St)	collective screen
H	LSZH outer sheath

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

No. of elements	RT of insulation	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	black
0.5 mm²/7					
1	0.40	1.0	5.7	44	LKX 81610000
2	0.40	1.0	6.4	58	LKX 81610001
4	0.40	1.1	9.5	103	LKX 81610002
7	0.40	1.2	11.4	156	LKX 81610003
8	0.40	1.2	12.1	174	LKX 81610004
10	0.40	1.2	13.6	208	LKX 81610005
12	0.40	1.3	13.6	245	LKX 81610006
14	0.40	1.3	15.3	277	LKX 81610007
19	0.40	1.4	17.6	361	LKX 81610008
24	0.40	1.5	19.5	453	LKX 81610009
37	0.40	1.6	23.7	648	LKX 81610010
0.75 mm²/7					
1	0.50	1.0	6.5	56	LKX 81610011
2	0.50	1.0	7.4	77	LKX 81610012
4	0.50	1.2	11.4	147	LKX 81610013
7	0.50	1.2	13.4	216	LKX 81610014
8	0.50	1.3	14.5	249	LKX 81610015
10	0.50	1.4	16.6	315	LKX 81610016
12	0.50	1.4	17.3	352	LKX 81610017
14	0.50	1.4	18.5	399	LKX 81610018
19	0.50	1.5	21.2	523	LKX 81610019
24	0.50	1.6	23.7	648	LKX 81610020

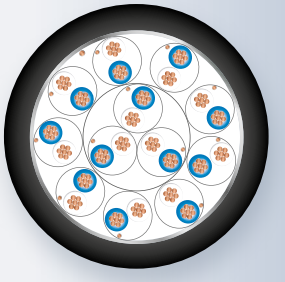
RT = Radial Thickness

Instrumentation Cable

IEC 60092-350, IEC 60092-376
90 °C / 250 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Multi-Pair, XLPE-Insulation, Individual & Collective Screen, LSZH-Sheath



M-2X(St)H PiMF

Application

For transmission of analogue and digital signals in offshore and shipboard applications, where people are potentially endangered in case of fire; allowed for use in zone 1 and zone 2 group II classified areas (IEC 60079-14); not allowed for direct connection to low impedance source, e.g. the public mains electricity. Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire, stranded, size: 0.5 mm², 0.75 mm²
Insulation	cross-linked polyethylene XLPE
Colour code	blue, white, continuously numbered on white cores (1, 2, 3 ..) for multipairs
Individual screen	plastic coated aluminium tape in contact with tinned copper drain wire
Wrapping	at least 1 layer of plastic tape
Collective screen	plastic coated aluminium tape in contact with tinned copper drain wire
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Cable marking	LEONI KERPEN SEALINE SIZE 250V IEC 60092-376 PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation

- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Temperature range	–40 °C up to +90 °C during operation
	–5 °C up to +50 °C during installation
Minimum bending radius	7.5 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section	0.5 mm²	0.75 mm²
Conductor resistance max.	36.7 Ω/km	25.0 Ω/km
Mutual capacitance max	150 nF/km	
Inductance max	1 mH/km	
L/R ratio max	25 µH/Ω	
Test voltage U_{rms} (core : core)	1500 V	
Test voltage U_{rms} (core : screen)	1500 V	
Operating voltage	250 V	

Abbreviations

M-	Marine Technologies - Instrumentation
2X	XLPE insulation
(St)	collective screen
H	LSZH outer sheath
PiMF	pair in metal foil

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

No. of elements	RT of insulation	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	black
0.5 mm²/7					
2	0.40	1.1	9.0	91	LKX 81610021
4	0.40	1.1	10.3	128	LKX 81610022
7	0.40	1.2	12.5	196	LKX 81610023
8	0.40	1.2	13.2	223	LKX 81610024
10	0.40	1.3	15.1	277	LKX 81610025
12	0.40	1.3	15.8	312	LKX 81610026
14	0.40	1.4	17.1	364	LKX 81610027
19	0.40	1.5	19.6	477	LKX 81610028
24	0.40	1.5	21.6	583	LKX 81610029
37	0.40	1.7	26.4	869	LKX 81610030
0.75 mm²/7					
2	0.50	1.1	10.4	115	LKX 81610031
4	0.50	1.2	12.3	174	LKX 81610032
7	0.50	1.3	14.8	282	LKX 81610033
8	0.50	1.3	15.7	304	LKX 81610034
10	0.50	1.4	18.0	380	LKX 81610035
12	0.50	1.4	18.9	428	LKX 81610036
14	0.50	1.5	20.4	499	LKX 81610037
19	0.50	1.6	23.4	653	LKX 81610038
24	0.50	1.7	26.0	820	LKX 81610039

RT = Radial Thickness

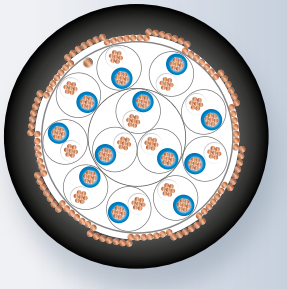
Instrumentation Cable

IEC 60092-350, IEC 60092-376
90 °C / 250 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Single & Multi-Pair, XLPE-Insulation, Collective Screen, LSZH-Sheath

M-2XCH



Application

For transmission of analogue and digital signals in offshore and shipboard applications, where people are potentially endangered in case of fire; allowed for use in zone 1 and zone 2 group II classified areas (IEC 60079-14); not allowed for direct connection to low impedance source, e.g. the public mains electricity. Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire, stranded, size: 0.5 mm², 0.75 mm², 1.5 mm²
Insulation	cross-linked polyethylene XLPE
Colour code	blue, white, continuously numbered on white core (1, 2, 3..) for multi-element, two pairs are designed as quad and are marked clockwise (bl1, bl2, ws1, ws2)
Wrapping	at least 1 layer of plastic tape
Collective screen	copper wire braid according to IEC 60092-350, optical coverage min. 84%
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Cable marking	LEONI KERPEN SEALINE SIZE 250V IEC 60092-376 PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Temperature range	–40 °C up to +90 °C during operation –5 °C up to +50 °C during installation
Minimum bending radius	7.5 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section	0.5 mm²	0.75 mm²	1.5 mm²
Conductor resistance max.	36.7 Ω/km	25.0 Ω/km	12.3 Ω/km
Mutual capacitance max.	150 nF/km		
Inductance max.	1 mH/km		
L/R ratio max.	25 µH/Ω		40 µH/Ω
Test voltage U_{rms} (core : core)	1500 V		
Test voltage U_{rms} (core : screen)	1500 V		
Operating voltage	250 V		

Abbreviations

M-	Marine Technologies - Instrumentation
2X	XLPE insulation
C	collective screen
H	LSZH outer sheath

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

No. of elements	RT of insulation	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	black
0.5 mm²/7					
1	0.40	1.0	6.3	59	LKX 80820001
2	0.40	1.0	7.0	76	LKX 80820011
4	0.40	1.1	10.1	133	LKX 80820012
7	0.40	1.2	12.2	207	LKX 80820013
8	0.40	1.2	12.9	226	LKX 80820014
10	0.40	1.3	14.6	277	LKX 80820015
12	0.40	1.3	15.2	309	LKX 80820016
14	0.40	1.3	16.1	344	LKX 80820017
19	0.40	1.4	18.4	441	LKX 80820018
24	0.40	1.5	20.3	534	LKX 80820019
37	0.40	1.7	25.1	841	LKX 80820020
0.75 mm²/7					
1	0.50	1.0	7.1	73	LKX 80820021
2	0.50	1.0	8.0	97	LKX 80820022
4	0.50	1.2	11.1	180	LKX 80820023
7	0.50	1.3	14.4	288	LKX 80820024
8	0.50	1.3	15.3	312	LKX 80820025
10	0.50	1.4	17.4	383	LKX 80820026
12	0.50	1.4	18.1	428	LKX 80820027
14	0.50	1.5	19.5	493	LKX 80820028
19	0.50	1.6	22.6	684	LKX 80820029
24	0.50	1.7	25.1	836	LKX 80820030
1.5 mm²/7					
2	0.60	1.1	9.8	152	LKX 80820032
4	0.60	1.3	15.1	308	LKX 80820033
7	0.60	1.4	18.1	459	LKX 80820034
8	0.60	1.5	19.5	523	LKX 80820035
10	0.60	1.6	22.6	693	LKX 80820036
12	0.60	1.6	23.5	781	LKX 80820037
14	0.60	1.7	25.3	901	LKX 80820038
19	0.60	1.8	28.8	1155	LKX 80820039

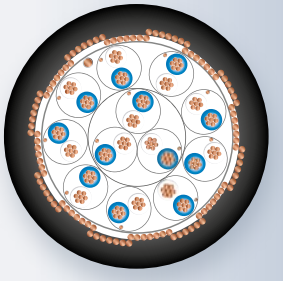
RT = Radial Thickness

Instrumentation Cable

IEC 60092-350, IEC 60092-376
90 °C / 250 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Multi-Pair, XLPE-Insulation, Individual & Collective Screen, LSZH-Sheath



M-2XCH PiMF

Application

For transmission of analogue and digital signals in offshore and shipboard applications, where people are potentially endangered in case of fire; allowed for use in zone 1 and zone 2 group II classified areas (IEC 60079-14); not allowed for direct connection to low impedance source, e.g. the public mains electricity. Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire, stranded, size: 0.5 mm², 0.75 mm², 1.5 mm²
Insulation	cross-linked polyethylene XLPE
Colour code	blue, white, continuously numbered on white cores (1-1, 2-2, 3-3..) for multipairs
Individual screen	plastic coated aluminium tape in contact with tinned copper drain wire
Wrapping	at least 1 layer of plastic tape
Collective screen	copper wire braid according to IEC 60092-350, optical coverage min. 84%
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Cable marking	LEONI KERPEN SEALINE SIZE 250V IEC 60092-376 PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Temperature range	–40 °C up to +90 °C during operation –5 °C up to +50 °C during installation
Minimum bending radius	7.5 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section	0.5 mm²	0.75 mm²	1.5 mm²
Conductor resistance max.	36.7 Ω/km	25.0 Ω/km	12.3 Ω/km
Mutual capacitance max.	150 nF/km		
Inductance max.	1 mH/km		
L/R ratio max.	25 µH/Ω		40 µH/Ω
Test voltage U_{rms} (core : core)	1500 V		
Test voltage U_{rms} (core : screen)	1500 V		
Operating voltage	250 V		

Abbreviations

M-	Marine Technologies - Instrumentation
2X	XLPE insulation
C	collective screen
H	LSZH outer sheath
PiMF	pair in metal foil

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

No. of elements	RT of insulation	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	black
0.5 mm²/7					
2	0.40	1.1	9.6	119	LKX 80820040
4	0.40	1.1	10.9	161	LKX 80820041
7	0.40	1.2	13.3	255	LKX 80820042
8	0.40	1.3	14.2	289	LKX 80820043
10	0.40	1.3	15.9	345	LKX 80820044
12	0.40	1.4	16.8	391	LKX 80820045
14	0.40	1.4	17.9	441	LKX 80820046
19	0.40	1.5	20.4	566	LKX 80820047
24	0.40	1.6	23.0	749	LKX 80820048
37	0.40	1.8	27.8	1072	LKX 80820049
0.75 mm²/7					
2	0.50	1.2	11.2	157	LKX 80820050
4	0.50	1.2	13.0	234	LKX 80820051
7	0.50	1.3	15.6	344	LKX 80820052
8	0.50	1.4	16.7	394	LKX 80820053
10	0.50	1.4	18.8	464	LKX 80820054
12	0.50	1.5	19.9	541	LKX 80820055
14	0.50	1.5	21.6	666	LKX 80820056
19	0.50	1.7	24.8	860	LKX 80820057
24	0.50	1.8	27.4	1054	LKX 80820058
1.5 mm²/7					
2	0.60	1.3	14.0	250	LKX 80820059
4	0.60	1.3	16.1	359	LKX 80820060
7	0.60	1.5	18.8	555	LKX 80820061
8	0.60	1.5	20.8	621	LKX 80820062
10	0.60	1.6	24.1	818	LKX 80820063
12	0.60	1.7	25.4	943	LKX 80820064
14	0.60	1.7	27.0	1069	LKX 80820065
19	0.60	1.9	31.1	1392	LKX 80820066

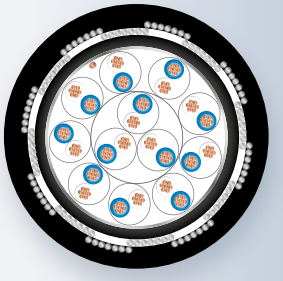
RT = Radial Thickness

Instrumentation Cable

Zero Halogen, Flame Retardant, Sunlight Resistant

IEC 60092-350, IEC 60092-376
90 °C / 250 V

Single & Multi-Pair, XLPE-Insulation, Collective Screen,Armour, LSZH-Sheath



M-2X(St)HQH

Application

For transmission of analogue and digital signals in offshore and shipboard applications, where people are potentially endangered in case of fire; allowed for use in zone 1 and zone 2 group II classified areas (IEC 60079-14); not allowed for direct connection to low impedance source, e.g. the public mains electricity. Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire, stranded, size: 0.75 mm², 1 mm²
Insulation	cross-linked polyethylene XLPE
Colour code	blue, white, continuously numbered on white core (1, 2, 3..) for multi-element, two pairs are designed as quad and are marked clockwise (bl1, bl2, ws1, ws2)
Wrapping	at least 1 layer of plastic tape
Collective screen	plastic coated aluminium tape in contact with tinned copper drain wire
Inner sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Armour	galvanised steel wire braid, opt. coverage 82 % (min.)
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Cable marking	LEONI KERPEN SEALINE SIZE 250V IEC 60092-376 PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Temperature range	–40 °C up to +90 °C during operation –5 °C up to +50 °C during installation
Minimum bending radius	7.5 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section		0.75 mm²	1.0 mm²
Conductor resistance max.		25.0 Ω/km	12.3 Ω/km
Insulation resistance		5000 MΩ x km	
Mutual capacitance max.	150 nF/km		
Inductance max.	1 mH/km		
L/R ratio max.	25 µH/Ω		40 µH/Ω
Capacitance unbalance max.	500 pF/500 m		
Test voltage U_{rms} (core : core)	2000 V		
Test voltage U_{rms} (core : screen)	2000 V		
Operating voltage	250 V		

Abbreviations

M-	Marine Technologies - Instrumentation
2X	XLPE insulation
(St)	collective screen
H	LSZH inner sheath
Q	steel wire braid
H	LSZH outer sheath

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

No. of elements	RT of insulation	RT of inner sheath	Dia. over inner sheath	Dia. of armour wire	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	mm	mm	mm	kg/km	black
0.75 mm²/7								
1	0.50	1.0	6.5	0.3	1.1	9.6	135	LKX 81630000
2	0.50	1.0	7.4	0.2	1.1	10.5	165	LKX 81630001
4	0.50	1.0	11.0	0.3	1.3	14.9	297	LKX 81630002
7	0.50	1.0	13.0	0.3	1.4	17.1	405	LKX 81630003
8	0.50	1.0	13.9	0.3	1.4	18.0	440	LKX 81630004
12	0.50	1.0	16.5	0.3	1.5	20.8	578	LKX 81630006
14	0.50	1.0	17.7	0.3	1.6	22.2	654	LKX 81630007
19	0.50	1.0	20.2	0.3	1.7	24.9	808	LKX 81630008
24	0.50	1.0	22.5	0.3	1.8	27.5	959	LKX 81630009
1 mm²/7								
1	0.50	1.0	5.9	0.2	1.1	9.2	148	LKX 81630010
2	0.50	1.0	6.8	0.2	1.1	10.9	184	LKX 81630011
4	0.50	1.0	11.7	0.3	1.3	15.6	342	LKX 81630012
7	0.50	1.0	14.0	0.3	1.4	18.1	467	LKX 81630013
8	0.50	1.0	14.9	0.3	1.4	19.0	505	LKX 81630014
10	0.50	1.0	17.0	0.3	1.5	21.3	606	LKX 81630015
12	0.50	1.0	17.8	0.3	1.6	22.3	681	LKX 81630016
14	0.50	1.0	19.0	0.3	1.6	23.5	758	LKX 81630017
19	0.50	1.0	21.8	0.3	1.7	26.5	942	LKX 81630018
24	0.50	1.0	24.2	0.3	1.8	29.1	1139	LKX 81630019

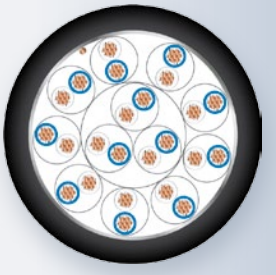
RT = Radial Thickness

Instrumentation Cable

IEC 60092-350, IEC 60092-376
90 °C / 500 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Single & Multi-Pair, XLPE-Insulation, Collective Screen, LSZH-Sheath



M-2XCH CI

Application

For transmission of analogue and digital signals in offshore and shipboard applications, where people are potentially endangered in case of fire and where, for a defined period of time, the continuity of control is of vital necessity; allowed for use in zone 1 and zone 2 group II classified areas (IEC 60079-14); not allowed for direct connection to low impedance source, e.g. the public mains electricity.

Recommended for indoor and outdoor installation, on racks, trays, in conduits, in dry and wet locations; not for direct burial.

Recommended for use as fire protection measure for people and important material assets.

Construction

Conductor	plain annealed copper wire, stranded, size: 0.75 mm²
Insulation	cross-linked polyethylene XLPE over the MICA-tape wrapped conductor
Colour code	blue, white, continuously numbered on white core (1, 2, 3..) for multi-element, two pairs are designed as quad and are marked clockwise (bl1, bl2, ws1, ws2)
Wrapping	at least 1 layer of plastic tape
Collective screen	copper wire braid according to IEC 60092-350, optical coverage min. 84 %
Outer sheath	low smoke, zero halogen, flame retardant compound LSZH (SHF 1), black
Cable marking	LEONI KERPEN SEALINE SIZE CI 250V IEC 60092-376 PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagetion

- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Circuit integrity	IEC 60331-21
Smoke density	IEC 61034-2 (L.T. > 60 %)
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Amount of halogen acid gas	IEC 60754-1 (0%)
Degree of acidity of gases	IEC 60754-2 (pH ≥ 4.3, C ≤ 10µS/mm)
Oil resistance	ICEA S-73-532*
Temperature range	–40 °C up to +90 °C during operation –20 °C up to +50 °C during installation
Minimum bending radius	7.5 x cable diameter

Electrical Properties at 20 °C

Conductor cross-section	0.75 mm²
Conductor resistance max.	25.0 Ω/km
Insulation resistance	5000 MΩ x km
Mutual capacitance max.	150 nF/km
Inductance max.	1 mH/km
Capacitance unbalance max.	500 pF/500 m
L/R ratio max.	25 µH/Ω
Test voltage U_{rms} (core : core)	1500 V
Test voltage U_{rms} (core : screen)	1500 V
Operating voltage	500 V

Abbreviations

M-	Marine Technologies - Instrumentation
2X	XLPE insulation
C	collective screen
H	LSZH outer sheath
CI	circuit integrity

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical Data

No. of elements	Dia. of core	RT of outer sheath	Outer dia.	Weight	Part No.
	approx.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	black
0.75 mm²/7					
2	2.6	1.1	8.8	98	LKX 81620000
4	2.6	1.2	13.4	178	LKX 81620001
7	2.6	1.3	16.2	273	LKX 81620002
8	2.6	1.4	17.5	313	LKX 81620003
10	2.6	1.5	20.0	387	LKX 81620004
12	2.6	1.5	20.9	441	LKX 81620005
14	2.6	1.6	22.6	512	LKX 81620006
19	2.6	1.7	25.9	671	LKX 81620007
24	2.6	1.8	28.8	830	LKX 81620008

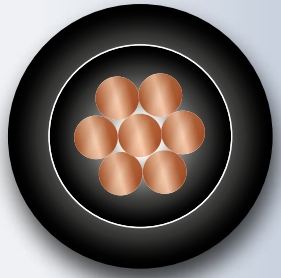
RT = Radial Thickness

Power & Control Cable

IEC 60092-353
90 °C / 600/1000 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Single-Core, XLPE-Insulation, LSZH-Sheath



M-2XH

Application

For electricity supply and control in offshore and shipboard applications, where people are potentially endangered in case of fire; suitable for use in zone 1 and zone 2 group II classified areas (IEC 60079-14).
Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire, circular stranded (RM), according to IEC 60228
Insulation	cross-linked polyethylene XLPE
Colour code	black * (other colours on request)
Laying up	cores twisted in layers (if necessary with filling element(s))
Wrapping	at least 1 layer of plastic tape
Outer sheath	low smoke zero halogen flame retardant compound LSZH, black
Cable marking	LEONI KERPEN ELECTRIC CABLE SIZE 0.6/1 kV SEALINE IEC 60092-353 YEAR PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Flammability temperature (FT)	ISO 4589-3 ann. A (min. +250 ° C)
Amount of halogen acid gas	IEC 60754-1
Degree of acidity of gases	IEC 60754-2
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	
during operation	–30 °C up to +90 °C
during installation	–5 °C up to +50 °C
(under short circuit)	max. +250 °C
Minimum bending radius	7.5 x cable diameter

Electrical Properties at 20 °C

Conductor resistance	according to IEC 60228
Test voltage U_{rms} (core : core)	3500 V
Test voltage U_{rms} (core : armour)	3500 V
Nominal Voltage U_o / U	600/1000 V
Highest system voltage U_m max.	1200 V (for three phase systems)

Abbreviations

M-	Marine Technologies - Power & Control
2X	XLPE insulation
H	LSZH outer sheath

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

Size	RT of insulation	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	black
6 mm²					
1 x 6 RM	0.70	1.0	6.5	90	LKX 23610000
10 mm²					
1 x 10 RM	0.70	1.0	7.4	139	LKX 23610001
16 mm²					
1 x 16 RM	0.73	1.0	8.6	199	LKX 23610002
25 mm²					
1 x 25 RM	0.90	1.0	10.2	297	LKX 23610003
35 mm²					
1 x 35 RM	0.90	1.1	11.3	395	LKX 23610004
50 mm²					
1 x 50 RM	1.00	1.2	12.8	529	LKX 23610005
70 mm²					
1 x 70 RM	1.10	1.3	15.0	732	LKX 23610006

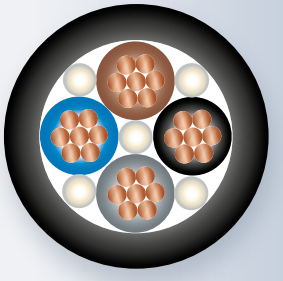
RT = Radial Thickness

Power & Control Cable

IEC 60092-353
90 °C / 600/1000 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Multi-Core, XLPE-Insulation, LSZH-Sheath



M-2XH

Application

For electricity supply and control in offshore and shipboard applications, where people are potentially endangered in case of fire; suitable for use in zone 1 and zone 2 group II classified areas (IEC 60079-14).

Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire , according to IEC 60228 ≤ 35 mm²: circular stranded (RM), > 35 mm²: sector-shaped stranded (SM)
Insulation	cross-linked polyethylene XLPE
Colour code	Two-core: blue / brown Three-core: brown / black / grey Four-core: blue / brown / black / grey * (other colours on request)
Wrapping	at least 1 layer of plastic tape
Outer sheath	low smoke zero halogen flame retardant compound LSZH, black
Cable marking	LEONI KERPEN ELECTRIC CABLE SIZE 0.6/1 kV SEALINE IEC 60092-353 YEAR PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Flammability temperature (FT)	ISO 4589-3 ann. A (min. +250 ° C)
Amount of halogen acid gas	IEC 60754-1
Degree of acidity of gases	IEC 60754-2
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	
during operation	–30 °C up to +90 °C
during installation	–5 °C up to +50 °C
(under short circuit)	max. +250 °C
Minimum bending radius	7.5 x cable diameter

Electrical Properties at 20 °C

Conductor resistance	according to IEC 60228
Test voltage U_{rms} (core : core)	3500 V
Test voltage U_{rms} (core : armour)	3500 V
Nominal Voltage U_o / U	600/1000 V
Highest system voltage U_m max.	1200 V (for three phase systems)

Abbreviations

M-	Marine Technologies - Power & Control
2X	XLPE insulation
H	LSZH outer sheath

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

Size	RT of insulation	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	black
1.5 mm²					
2 x 1.5 RM	0.70	1.1	8.8	116	LKX 23610007
4 x 1.5 RM	0.70	1.1	10.0	157	LKX 23610021
2.5 mm²					
2 x 2.5 RM	0.70	1.1	9.6	148	LKX 23610008
3 x 2.5 RM	0.70	1.1	10.2	174	LKX 23610014
4 x 2.5 RM	0.70	1.1	11.1	208	LKX 23610022
6 mm²					
2 x 6 RM	0.70	1.2	12.0	260	LKX 23610009
3 x 6 RM	0.70	1.2	12.7	315	LKX 23610015
4 x 6 RM	0.70	1.2	13.9	387	LKX 23610023
10 mm²					
2 x 10 RM	0.70	1.2	13.8	385	LKX 23610010
3 x 10 RM	0.70	1.3	14.9	489	LKX 23610016
4 x 10 RM	0.70	1.3	16.3	608	LKX 23610024
16 mm²					
2 x 16 RM	0.70	1.3	16.3	556	LKX 23610011
4 x 16 RM	0.70	1.4	19.1	884	LKX 23610025
25 mm²					
2 x 25 RM	0.90	1.4	19.4	818	LKX 23610012
3 x 25 RM	0.90	1.5	20.9	1051	LKX 23610017
4 x 25 RM	0.90	1.5	22.9	1309	LKX 23610026
35 mm²					
2 x 35 RM	0.90	1.5	21.8	1081	LKX 23610013
50 mm²					
3 x 50 SM	1.00	1.7	24.8	1715	LKX 23610018
4 x 50 SM	1.00	1.8	28.6	2247	LKX 23610027
70 mm²					
3 x 70 SM	1.10	1.8	28.4	2336	LKX 23610019
4 x 70 SM	1.10	2.0	32.5	3069	LKX 23610028
95 mm²					
4 x 95 SM	1.10	2.1	35.7	4160	LKX 23610029
120 mm²					
3 x 120 SM	1.20	2.1	34.5	3876	LKX 23610020

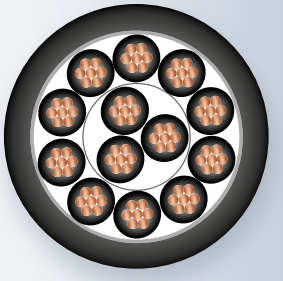
RT = Radial Thickness

Power & Control Cable

IEC 60092-353
90 °C / 600/1000 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Multi-Core, XLPE-Insulation, LSZH-Sheath



M-2XH

Application

For electricity supply and control in offshore and shipboard applications, where people are potentially endangered in case of fire; suitable for use in zone 1 and zone 2 group II classified areas (IEC 60079-14).

Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire, circular stranded (RM), according to IEC 60228
Insulation	cross-linked polyethylene XLPE
Colour code	black, continuously numbered * (other colours on request)
Laying up	cores twisted in layers (if necessary with filling element(s))
Wrapping	at least 1 layer of plastic tape
Outer sheath	low smoke zero halogen flame retardant compound LSZH, black
Cable marking	LLEONI KERPEN ELECTRIC CABLE SIZE 0.6/1 kV SEALINE IEC 60092-353 YEAR PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Flammability temperature (FT)	ISO 4589-3 ann. A (min. +250 ° C)
Amount of halogen acid gas	IEC 60754-1
Degree of acidity of gases	IEC 60754-2
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	
during operation	–30 °C up to +90 °C
during installation	–5 °C up to +50 °C
(under short circuit)	max. +250 °C
Minimum bending radius	7.5 x cable diameter

Electrical Properties at 20 °C

Conductor resistance	according to IEC 60228
Test voltage U_{rms} (core : core)	3500 V
Test voltage U_{rms} (core : armour)	3500 V
Nominal Voltage U_o / U	600/1000 V
Highest system voltage U_m max.	1200 V (for three phase systems)

Abbreviations

M-	Marine Technologies - Power & Control
2X	XLPE insulation
H	LSZH outer sheath

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

Size	RT of insulation	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	
1.5 mm²					
7 x 1.5 RM	0.70	1.2	11.5	198	LKX 23610030
10 x 1.5 RM	0.70	1.3	14.7	282	LKX 23610031
16 x 1.5 RM	0.70	1.4	17.0	423	LKX 23610032
24 x 1.5 RM	0.70	1.5	21.1	617	LKX 23610033
37 x 1.5 RM	0.70	1.6	24.3	902	LKX 23610034
2.5 mm²					
7 x 2.5 RM	0.70	1.2	12.7	272	LKX 23610035
10 x 2.5 RM	0.70	1.3	16.3	394	LKX 23610036
16 x 2.5 RM	0.70	1.4	18.9	589	LKX 23610037
24 x 2.5 RM	0.70	1.6	23.9	899	LKX 23610038
37 x 2.5 RM	0.70	1.7	27.5	1291	LKX 23610039

RT = Radial Thickness

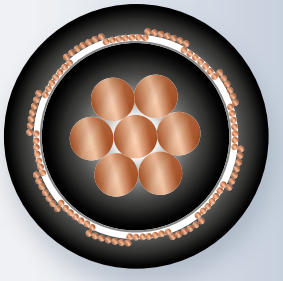
Power & Control Cable

IEC 60092-353
90 °C / 600/1000 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Single-Core, XLPE-Insulation, Armour, LSZH-Sheath

M-2X(C)H



Application

For electricity supply and control in offshore and shipboard applications, where people are potentially endangered in case of fire; suitable for use in zone 1 and zone 2 group II classified areas (IEC 60079-14).
Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire, circular stranded (RM), according to IEC 60228
Insulation	cross-linked polyethylene XLPE
Colour code	black * (other colours on request)
Armour	copper wire braid according to IEC 60092-350, optical coverage min. 82%
Outer sheath	low smoke zero halogen flame retardant compound LSZH, black
Cable marking	LEONI KERPEN ELECTRIC CABLE SIZE 0.6/1 kV SEALINE IEC 60092-353 YEAR PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Flammability temperature (FT)	ISO 4589-3 ann. A (min. +250 ° C)
Amount of halogen acid gas	IEC 60754-1
Degree of acidity of gases	IEC 60754-2
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	
(during operation)	–30 °C up to +90 °C
(during installation)	–5 °C up to +50 °C
(under short circuit)	max. +250 °C
Minimum bending radius	8 x cable diameter

Electrical Properties at 20 °C

Conductor resistance	according to IEC 60228
Test voltage U_{rms} (core : core)	3500 V
Test voltage U_{rms} (core : armour)	3500 V
Nominal Voltage U_o / U	600/1000 V
Highest system voltage U_m max.	1200 V (for three phase systems)

Abbreviations

M-	Marine Technologies - Power & Control
2X	XLPE insulation
(C)	copper wire braid
H	LSZH outer sheath

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

Size	RT of insulation	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	black
6 mm²					
1 x 6 RM	0.70	1.0	6.4	120	LKX 23620000
10 mm²					
1 x 10 RM	0.70	1.1	8.5	177	LKX 23620001
25 mm²					
1 x 25 RM	0.90	1.2	11.3	351	LKX 23620002

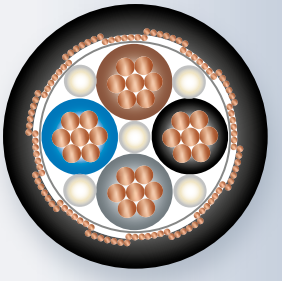
RT = Radial Thickness

Power & Control Cable

IEC 60092-353
90 °C / 600/1000 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Multi-Core, XLPE-Insulation, Armour, LSZH-Sheath



M-2X(C)H

Application

For electricity supply and control in offshore and shipboard applications, where people are potentially endangered in case of fire; suitable for use in zone 1 and zone 2 group II classified areas (IEC 60079-14).
Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire, sector shaped, according to IEC 60228
Insulation	cross-linked polyethylene XLPE
Colour code	Two-core: blue / brown Three-core: brown / black / grey Four-core: blue / brown / black / grey * (other colours on request)
Laying up	cores twisted in layers (if necessary with filling element(s))
Wrapping	at least 1 layer of plastic tape
Armour	copper wire braid according to IEC 60092-350, optical coverage min. 82%
Outer sheath	low smoke zero halogen flame retardant compound LSZH, black
Cable marking	LEONI KERPEN ELECTRIC CABLE SIZE 0.6/1 kV SEALINE IEC 60092-353 YEAR PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Flammability temperature (FT)	ISO 4589-3 ann. A (min. +250 ° C)
Amount of halogen acid gas	IEC 60754-1
Degree of acidity of gases	IEC 60754-2
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	
during operation	–30 °C up to +90 °C
during installation	–5 °C up to +50 °C
(under short circuit)	max. +250 °C
Minimum bending radius	8 x cable diameter

Electrical Properties at 20 °C

Conductor resistance	according to IEC 60228
Test voltage U_{rms} (core : core)	3500 V
Test voltage U_{rms} (core : armour)	3500 V
Nominal Voltage U_o / U	600/1000 V
Highest system voltage U_m max.	1200 V (for three phase systems)

Abbreviations

M-	Marine Technologies - Power & Control
2X	XLPE insulation
(C)	copper wire braid
H	LSZH outer sheath

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

Geometrical data

Size	RT of insulation	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	black
1.5 mm²					
2 x 1.5 RM	0.70	1.1	9.3	124	LKX 23620003
3 x 1.5 RM	0.70	1.1	9.8	144	LKX 23620011
2.5 mm²					
2 x 2.5 RM	0.70	1.1	10.1	149	LKX 23620004
3 x 2.5 RM	0.70	1.1	10.7	182	LKX 23620012
4 x 2.5 RM	0.70	1.2	11.7	239	LKX 23620021
4 mm²					
2 x 4 RM	0.70	1.2	11.5	206	LKX 23620005
3 x 4 RM	0.70	1.2	12.1	258	LKX 23620013
4 x 4 RM	0.70	1.2	13.1	321	LKX 23620022
6 mm²					
2 x 6 RM	0.70	1.2	12.5	251	LKX 23620007
3 x 6 RM	0.70	1.2	13.2	325	LKX 23620014
10 mm²					
2 x 10 RM	0.70	1.3	14.9	402	LKX 23620008
3 x 10 RM	0.70	1.3	15.8	526	LKX 23620015
4 x 10 RM	0.70	1.4	17.4	651	LKX 23620023
16 mm²					
2 x 16 RM	0.70	1.4	17.4	573	LKX 23620009
4 x 16 RM	0.70	1.5	20.3	925	LKX 23620024
25 mm²					
2 x 25 RM	0.90	1.5	20.5	801	LKX 23620010
3 x 25 RM	0.90	1.5	22.1	1064	LKX 23620016
50 mm²					
3 x 50 SM	1.00	1.8	25.8	1791	LKX 23620017
70 mm²					
3 x 70 SM	1.10	1.9	29.4	2414	LKX 23620018
95 mm²					
3 x 95 SM	1.10	2.0	32.1	3247	LKX 23620019
120 mm²					
3 x 120 SM	1.20	2.2	40.3	4162	LKX 23620020

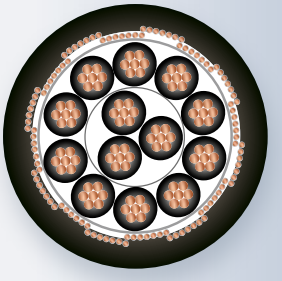
RT = Radial Thickness

Power & Control Cable

IEC 60092-353
90 °C / 600/1000 V

Zero Halogen, Flame Retardant, Sunlight Resistant

Multi-Core, XLPE-Insulation, Armour, LSZH-Sheath



M-2X(C)H

Application

For electricity supply and control in offshore and shipboard applications, where people are potentially endangered in case of fire; suitable for use in zone 1 and zone 2 group II classified areas (IEC 60079-14).

Recommended for indoor and outdoor installation on ships and platforms, on racks, trays, in conduits, in dry and wet locations.

Construction

Conductor	plain annealed copper wire, circular stranded (RM), according to IEC 60228
Insulation	cross-linked polyethylene XLPE
Colour code	black, continuously numbered * (other colours on request)
Laying up	cores twisted in layers (if necessary with filling element(s))
Wrapping	at least 1 layer of plastic tape
Armour	copper wire braid according to IEC 60092-350, optical coverage min. 82%
Outer sheath	low smoke zero halogen flame retardant compound LSZH, black
Cable marking	LEONI KERPEN ELECTRIC CABLE SIZE 0.6/1 kV SEALINE IEC 60092-353 YEAR PRODUCTION LOT CODE LENGTH MARKING

Technical data

Flame propagation	
- Test on single cable	IEC 60332-1-2
- Test on bunched cables	IEC 60332-3-22 (Cat. A)
Smoke density	IEC 61034-1 and 2
Limiting Oxygen Index (LOI)	ASTM D 2863 (min. 30 %)
Flammability temperature (FT)	ISO 4589-3 ann. A (min. +250 ° C)
Amount of halogen acid gas	IEC 60754-1
Degree of acidity of gases	IEC 60754-2
Oil resistance	ICEA S-73-532*
Sunlight resistance	UL 1581 section 1200
Temperature range	
during operation	–30 °C up to +90 °C
during installation	–5 °C up to +50 °C
(under short circuit)	max. +250 °C
Minimum bending radius	8 x cable diameter

Electrical Properties at 20 °C

Conductor resistance	according to IEC 60228
Test voltage U_{rms} (core : core)	3500 V
Test voltage U_{rms} (core : armour)	3500 V
Nominal Voltage U_o / U	600/1000 V
Highest system voltage U_m max.	1200 V (for three phase systems)

Abbreviations

M-	Marine Technologies - Power & Control
2X	XLPE insulation
(C)	copper wire braid
H	LSZH outer sheath

* Test temperature +60 °C; duration 4 h. Retention: min: 60 % of tensile strength/ min. 60 % of elongation.

IEC 60092-353

Geometrical data

Size	RT of insulation	RT of outer sheath	Outer dia.	Weight	Part No.
	nom.	nom.	approx.	approx.	Colour
	mm	mm	mm	kg/km	black
1.5 mm²					
5 x 1.5 RM	0.70	1.2	11.6	208	LKX 23620025
7 x 1.5 RM	0.70	1.2	12.5	257	LKX 23620026
10 x 1.5 RM	0.70	1.3	16.1	402	LKX 23620027
16 x 1.5 RM	0.70	1.4	18.4	547	LKX 23620028
24 x 1.5 RM	0.70	1.6	22.7	789	LKX 23620029
2.5 mm²					
5 x 2.5 RM	0.70	1.2	12.7	268	LKX 23620030
7 x 2.5 RM	0.70	1.3	14.3	365	LKX 23620031
10 x 2.5 RM	0.70	1.4	17.9	513	LKX 23620032
16 x 2.5 RM	0.70	1.5	20.5	740	LKX 23620033
24 x 2.5 RM	0.70	1.7	25.4	1069	LKX 23620034

RT = Radial Thickness

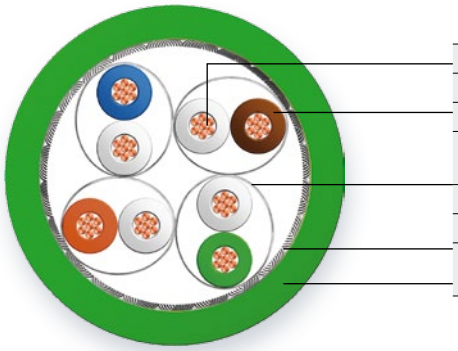
MegaLine® F6-70 S/F HV flex

KS-02YSCHV 4x2xAWG 24/7 PiMF Cat 7

Germanischer Lloyd · DNV · BUREAU VERITAS · ABS TYPE APPROVAL PROGRAM

$S_3 P_3 I_4 C_3 E_5$

4p construction



Conductor	bare copper wire, AWG 24/7
Insulation	cellular-PE, core dia.: nominal value 1.55 mm
Twisting element	pair
Individual screen	aluminium-bonded polyester tape
Twisting	4 pairs
Overall screen	tinned copper wire braid, braid coverage approx. 65 %
Strain relief element	Aramid/Dielectric: 0.55/1.45 mm
Outer sheath	zero halogen, flame retardant compound (SHF1 acc. to IEC 60092-359), thickness 0.9 mm

Fire behaviour

flame resistance	acc. to IEC 60332-3-22/EN 50266-2-2
Zero halogen	acc. to IEC 60754-1/2
Smoke resistance	acc. to IEC 61034-1/2
Fire load	0.80 MJ/m

Capability characteristics

better than Category 7 acc. to EN 50288 und IEC 61156
excellent NEXT
excellent screen properties (pair- and overall screen),
low Skew, bandwidth 700 MHz

Application

Connecting cable and patch cord for generic cabling systems acc. to ISO/IEC 11801 and EN 50173 (2nd edition and also acc. to ISO/IEC 24702 and EN 50173-3. Ideal for all applications of class D up to F multimedia (video, data, voice) > 10 GbE acc. to IEEE 802.3 an, cable sharing, VoIP, PoE. For application in rough envirenment because of extrem strong H-sheath.

Mechanical characteristics

bending radius:	in operation	5 x outer diameter (min.)
tensile loading (max.)		400 N
crush resistance		1000 N/100 mm
impact strength (quantit)		10

Electromagnetic behaviour

transfer impedance at 10 MHz (nom.)	5 mΩ/m
screen attenuation up to 1000 MHz (nom.)	60 dB
coupling attenuation up to 1000 MHz (nom.)	90 dB

Security (fire behaviour)

S	**1** IEC 60332-2-2	**2** IEC-60332-1-2	**3** IEC-60332-3-24	**4** EFP Grade 1	**5** EFP Grade 2

Performance (class, bandwidth)

P	**1** > Klasse E > 250 MHz	**2** > Klasse E_A > 500 MHz	**3** > Klasse F > 600 MHz	**4** > Klasse F_A > 1000 MHz	**5** > Klasse „G" > 1200 MHz

Application (Ethernet, TV)

I	**1** > 100 MbE	**2** > 1 GbE	**3** bis 10 GbE	**4** > 10 GbE	**5** > 10 GbE TV

Construction (conductor size, tensile strength)

C	**1** AWG 27	**2** AWG 26/25	**3** AWG 24	**4** AWG 23	**5** AWG 22

EMC (coupling attenuation)

E	**1** > 40 dB	**2** > 50 dB	**3** > 60 dB	**4** > 70 dB	**5** > 80 dB

Electrical characteristics (HF) at 20 °C

Frequency MHz	Attenuation dB/100m		NEXT dB		PS-NEXT dB		ACR dB at 10m		PS-ACR dB at 10m		EL-FEXT dB at 10m		PS-ELFEXT dB at 10m		RL dB	
	LEONI nom.	Cat. 7. max.*	LEONI nom.	Cat. 7 min.*	LEONI nom.	Cat. 7 min.*	LEONI nom.	Cat. 7 min.*	LEONI nom.	Cat. 7 min.*	LEONI nom.	Cat. 7 min.*	LEONI nom.	Cat. 7 min.*	LEONI nom.	Cat. 7 min.*
1	0.23	0.29	90	80.0	87	77	90	80	87	77	90	80	87	77	23.3	-
4	0.4	0.55	90	80.0	87	77	90	79	87	77	90	80	87	77	25	23
10	0.63	0.85	90	80.0	87	77	89	79	86	77	90	74	87	71	30	25
16	0.79	1.08	90	80.0	87	77	89	79	86	77	90	70	87	67	30	25
20	0.91	1.21	90	80.0	87	77	89	79	86	77	85	68	82	65	30	25
100	2.07	2.78	81	72.4	78	69	79	70	76	69	64	54	61	51	24	20.1
200	3.07	4.01	76	67.9	73	65	73	64	70	65	57	48	54	45	24	18
250	3.43	4.53	74	66.5	71	63	71	62	68	63	53	46	50	43	24	17.3
500	4.77	6.62	70	61.9	67	59	65	55	62	59	45	40	42	37	21	17.3
600	5.23	7.33	68	60.8	65	58	63	53	60	58	42	38	39	35	21	17.3
700	5.65	–	65	–	62	–	59	–	56	–	39	–	36	–	19	–

* EN 50288-4-1(2004)/IEC 61156-5(2002)

Electrical characteristics (NF) at 20 °C

DC resistance	max.	84 Ω/km
insulation resistance	min.	5 GΩ x km
mutual capacitance	approx.	42.5 pF/m
signal tempo (c)	approx.	0.78
signal transit time	approx.	430 ns/100 m
Skew at 100 MHz	approx.	4 ns/100 m
Charact. impedance	at 100 MHz	100 ± 5 Ω
text voltage U_{eff}		1000 V
operating voltage	max.	125 V

Thermal characteristics

Temperature range	
for fixed installation	–25 °C up to +70 °C
for mobile operation	0 °C up to +50 °C

Chemical characteristics

free of harzadous substances acc. to RoHS 2002/95/EG

Oil resistance IRM 902 acc. to IEC 60811-2-, ICEA S-73-532 (4h, 60 °C)

Printing outer sheath

LEONI MegaLine Sea 724 flex 4P AWG 24&7 Heavz Dutz }H} 125 V IEC 60332/3/22 $Year$ $Procuction Lot Code$ $Meter marking$

Colour code

wh/bl, wh/or, wh/gn, wh/br

Certificates and approbation

Quality seal with production control:

GL (Germanischer Lloyd), DNV (Det Norske Veritas), ABS (American Bureau of Shipping), B (Bureau Veritas)

Link performance:

LEONI MegaLine® systems and further commercial plug-inn connector acc. to DIN 55350-18-4.2.1 resp. EN 10204

Conform to LVD (2006/95/EC): $CE Logo$

Geometrical data

Designation	Core Dia [mm]	Cable dia. [mm]	Weight [kg/km]	Colour code	Part. No.	outer sheath colour
	nom.	nom.	nom.			
KS-02YSCH 4 x 2 x AWG 24/7 PiMF	2.55	1.4	9.0	■/■/■/■	LKD 7KS01699	grey
KS-02YSCH 4 x 2 x AWG 24/7 PiMF	2.55	1.4	9.0	■/■/■/■	LKD 7KS01710	green

General units

Length			
1 mil	=	0.0254	mm
1 inch (in“)	=	25.4	mm
1 foot (ft.‘)	=	0.305	m
1 yard (yd)	=	0.914	m
1 mile (mi.)	=	1.61	km
1 statute mile (mi.)	=	1.61	km
1 intern. naut. mile (sm)	=	1.852	km

Area			
1 circ. mil (CM)	=	0.0005067	mm^2
1 MCM	=	0.5067	mm^2
1 square inch (in^2)	=	645.16	mm^2
1 square foot (ft^2)	=	0.0929	m^2
1 square yard (yd^2)	=	0.836	m^2
1 square mile (sq.mi.)	=	2.59	km^2

Volume			
1 cubic inch (m^3)	=	16.39	cm^3
1 cubic foot (ft^3)	=	0.0283	m^3
1 cubic yard (yd^3)	=	0.765	m^3
1 barrel	=	159	l
1 US gallon (US gal)	=	3.79	l
1 UK gallon (UK gal)	=	4.55	l

Electrical Unit per Length			
1 µ f per mile	=	0.62	µ F/km
1 MΩ per mile	=	1.61	MΩ x km
1 decibel per mile	=	0.62	dB/km
1 pf per foot	=	3.28	pF/m
1 decibel per 1000 ft.	=	3.28	dB/km
1 Ω per 1000 ft.	=	3.28	Ω/km

Force			
1 poundal (pdl)	=	0.1 38	N
1 pound-force (lbf)	=	4.448	N
1 Brit. ton-force	=	9964	N

Mass			
1 ounce (oz)	=	0.0284	kg
1 pound (lb)	=	0.454	kg
1 Brit. ton (long ton)	=	1016	kg
1 US ton (short ton)	=	907	kg

Power			
1 horsepower (H.P.)	=	0.746	kW

Energy			
1 Brit. therm. unit (B U)	=	1055	J
1 Brit. therm. unit	=	0.000293	kWh

Pressure						
1 bf/in^2 (psi)	=	0.06895	bar	=	6.895	N/m^2
1 lbf/ft^2	=	0.000479	bar	=	47.9	N/m^2
1 lbf/yd^2	=	0.0000532	bar	=	5.32	N/m^2
1 lbf/in^2 (psi)	=	0.703	kp/cm^2	=	0.0703	at

Abbreviations for multiples and submultiples

prefix	abridged mark	multiple power	multiple name	prefix	abridged mark	sub multiple power	sub multiple name
Tera	T	10^{12}	billion *	Piko	p	10^{12}	billionth *
Giga	G	10^9	milliard *	Nano	n	10^9	milliardth *
Mega	M	10^6	million	Mikro	µ	10^6	millionth
Kilo	k	10^3	thousand	Milli	m	10^3	thousanth
Hekto	h	10^2	hundred	Zenti	c	10^2	hundredth
Deka	da	10^1	ten	Dezi	d	10^1	tenth

**In USA 10^9 indicates a billion and 10^{12} indicates a trillion*

Conductors

AWG and metric values by comparison

The dimensions and cross-sections of conductors used in information and data cables are frequently quoted in AWG (American Wire Gauge).

The following standards are of particular importance:

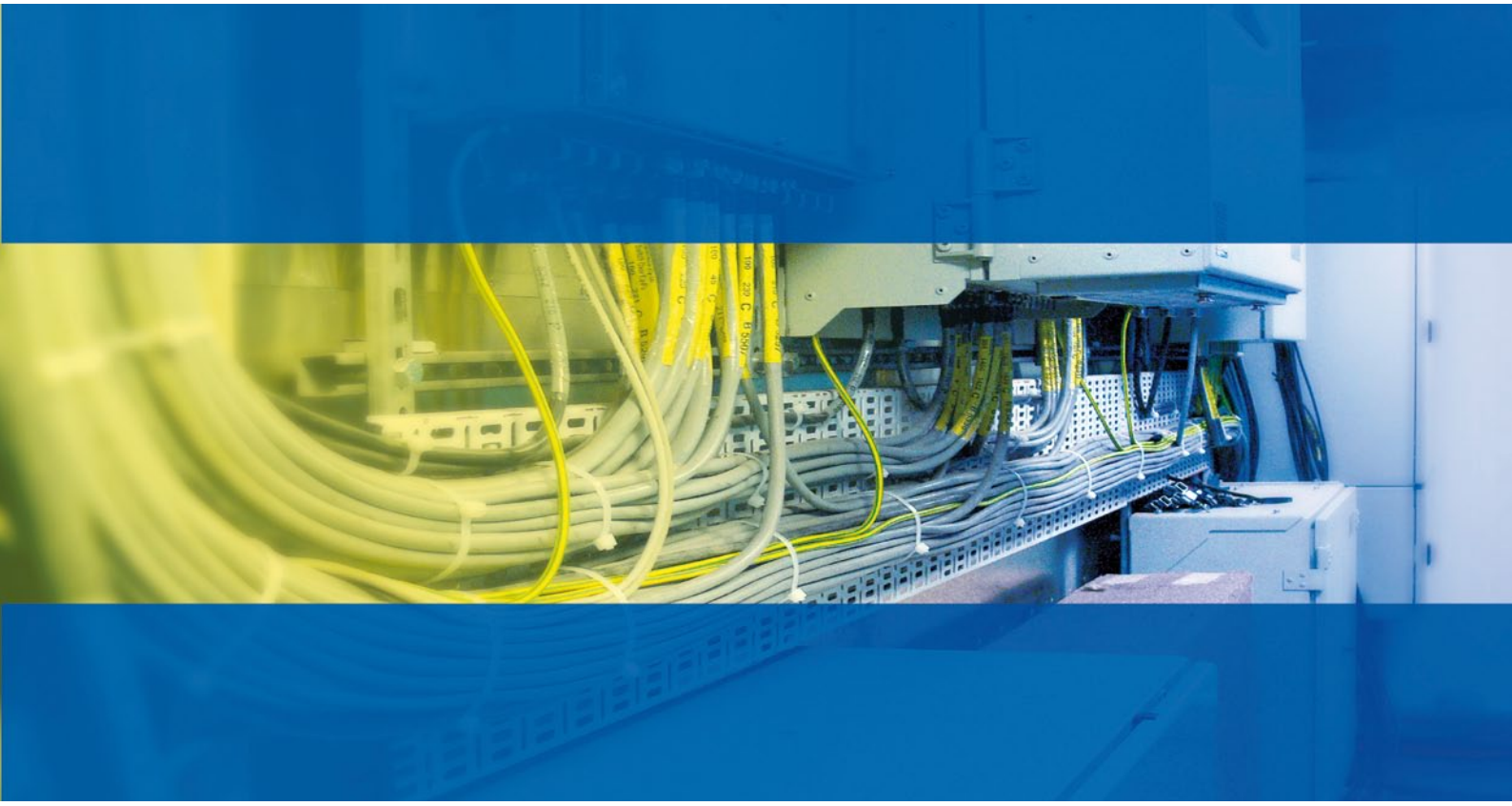
- ASTM B258 Standard Nominal Diameters and Cross-Sectional Areas of AWG Sizes of Solid Round Wires as Electrical Conductors
- ASTM B8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- ASTM B174 Bunch-Stranded Copper Conductors for Electrical Conductors

These regulations show the key specifications for the design of most of the copper conductors for data cables included in this catalogue.

It should be noted that all AWG-compliant copper conductors are standardised in their geometric dimensions. The AWG standard does not cover either electrical conductance of the copper conductor used or any possible coating.

Solid plain annealed copper conductors

Conductor size[1]				Electrical resistance[2]			
AWG	Metric	No. of wires	Conductor-Ø	EN 50288-7[3]		UL 13[4]	
	mm²		mm	Ω/km	Ω/1000 ft.	Ω/km	Ω/1000 ft.
30	0.051	1	0.254	–	–	361	110
28	0.081	1	0.320	–	–	228	69.3
26	0.128	1	0.404	–	–	154	46.9
24	0.205	1	0.511	–	–	97.6	29.7
22	0.324	1	0.643	–	–	56.3	17.2
–	0.5 [1]	1	0.8	36.8	11.2	–	–
20	0.517	1	0.813	–	–	35.2	10.7
–	0.75 [1]	1	1.0	25.0	7.6	–	–
18	0.82	1	1.02	–	–	22.3	6.8
–	1.0 [1]	1	1.13	18.5	5.6	–	–
16	1.3	1	1.29	–	–	14.0	4.3
–	1.5 [1]	1	1.37	12.3	3.76	–	–
14	2.1	1	1.63	–	–	8.79	2.67
–	2.5	1	1.76	7.56	2.31	–	–
12	3.3	1	2.05	–	–	5.52	1.68
–	4.0 [1]	1	2.26	4.70	1.43	–	–



Stranded plain annealed copper conductors

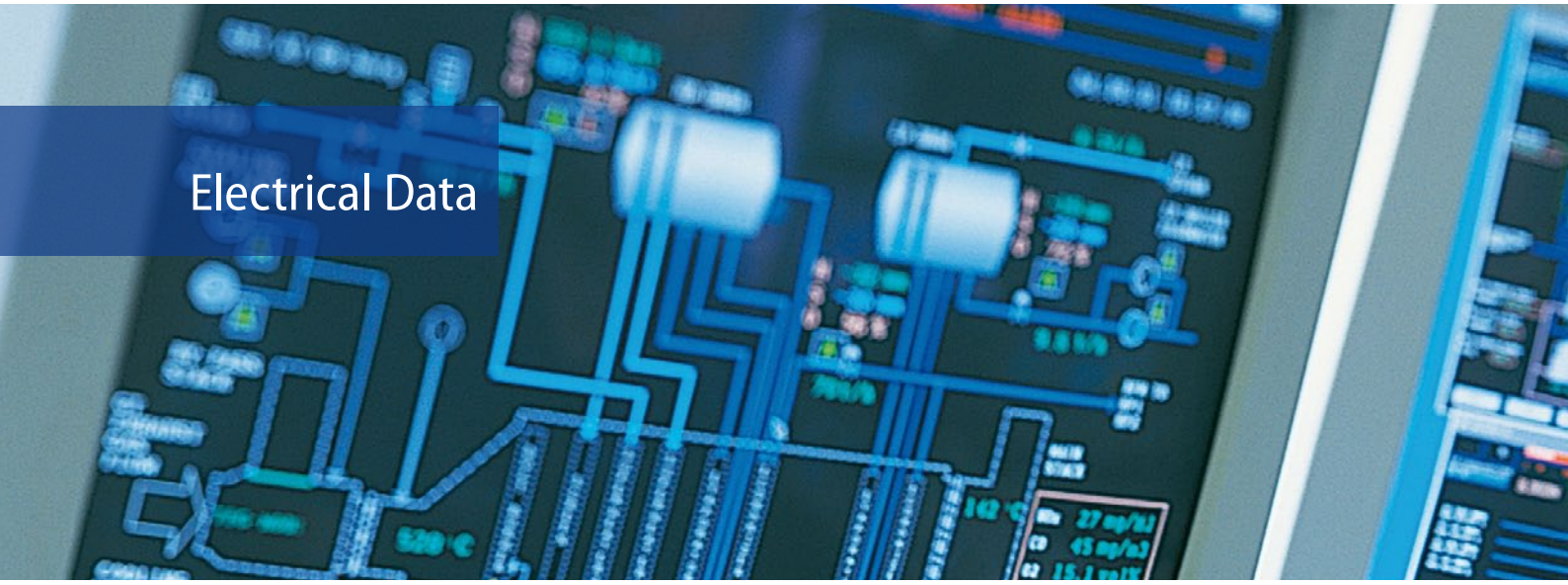
Conductor size[1]				Electrical resistance[2]			
AWG	Metric	No. of wires	Conductor-Ø	EN 50288-7[3]		UL 13[4]	
	mm²		mm	Ω/km	Ω/1000 ft.	Ω/km	Ω/1000 ft.
24	0.205	7	0.579	–	–	91.1	27.8
22	0.327	7	0.729	–	–	57.6	17.6
–	0.5	7	0.9	36.8	11.2	–	—
20	0.517	7	0.919	–	–	35.8	11.0
–	0.75 [1]	7	1.11	25.0	7.6	–	—
18	0.82	7	1.16	–	–	22.8	6.9
–	1.0 [1]	7	1.29	18.5	5.6	–	—
16	1.3	7	1.46	–	–	14.2	4.36
–	1.5 [1]	7	1.59	12.3	3.76	–	—
14	2.1	7	1.85	–	–	8.94	2.72
–	2.5 [1]	7	2.01	7.56	2.31	–	—
12	3.3	7	2.32	–	–	5.63	1.72
–	4.0 [1]	7	2.58	4.70	1.43	–	–

[1] *Sizes according to EN 50288-7.*

[2] *The value for the electrical resistance is given for 20 °C (68.0 °F).*

[3] *The value for the electrical resistance according to EN 50288-7 is for the finished cables with multi pairs/triples.*

[4] *The value for the electrical resistance according to UL 13 is calculated for "one pair/triple and an assembly of pairs/triples".*



Electrical Data

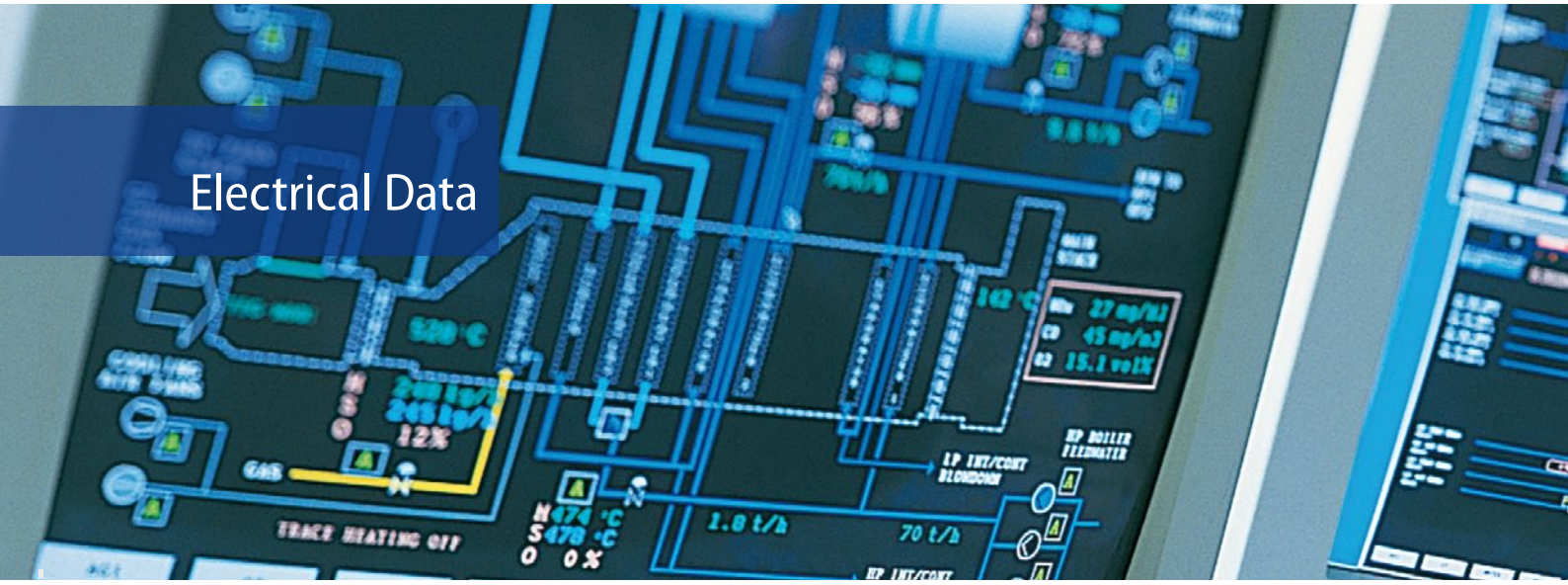
Table 1: Resistance

Nominal cross-sectional area	DC resistance at 20 °C (copper)	Max. active resistance (copper)	
nom (mm²)	max (Ω/km)	at 70 °C for PVC insulated (Ω/km)	at 90 °C for XLPE insulated (Ω/km)
1.5	12.1	14.5	15.4
2.5	7.41	8.87	9.45
4	4.61	5.52	5.88
6	3.08	3.69	3.93
10	1.83	2.19	2.33
16	1.15	1.38	1.47
25	0.727	0.872	0.927
35	0.524	0.628	0.669
50	0.387	0.464	0.494
70	0.268	0.322	0.342
95	0.193	0.233	0.247
120	0.153	0.186	0.196
150	0.124	0.152	0.160
185	0.0991	0.122	0.128
240	0.0754	0.0948	0.0988
300	0.0601	0.0774	0.0800
400	0.0470	0.0619	0.0641
500	0.0366	0.0495	0.0514
630	0.0283	0.0405	0.0421
800	0.0221	0.0332	0.0350
1000	0.0176	0.0273	0.0302

Table 2: Reactance

Nominal cross-sectional area	Reactance[1] (inductive) per conductor at 50 Hz for U_o/U 6/1 kV			
	PVC insulated		XLPE insulated	
nom. (mm^2)	single core[2] nom. (Ω/km)	multicore nom. (Ω/km	single core[2] nom. (Ω/km)	multicore nom. (Ω/km)
1.5	-----	0.119	-----	0.114
2.5	-----	0.114	-----	0.105
4	-----	0.110	-----	0.098
6	-----	0.103	-----	0.094
10	-----	0.097	-----	0.088
16	0.117	0.091	0.118	0.084
25	0.110	0.088	0.112	0.083
35	0.105	0.085	0.107	0.081
50	0.102	0.085	0.104	0.080
70	0.097	0.081	0.101	0.079
95	0.095	0.081	0.098	0.077
120	0.092	0.079	0.096	0.077
150	0.091	0.079	0.096	0.077
185	0.090	0.079	0.096	0.077
240	0.088	0.079	0.094	0.077
300	0.088	0.079	0.093	0.077
400	0.086	0.079	0.093	0.076
500	0.085	-----	0.093	-----
630	0.084	-----	0.090	-----
800	0.083	-----	0.092	-----

1) Values for steel wire armoured cables. For unarmoured cables the values can be reduced by approx. 10 %.
2) Cables with aluminium wire armouring and in touching trefoil arrangement.



Electrical Data

Table 3: Voltage drop

Nominal cross-sectional area (mm^2)	DC- System (mV/A/m)	Single-phase AC-System (mV/A/m)	Three-phase AC-System (mV/A/m)
1.5	24.2	27.9	24.1
2.5	14.3	17.1	14.8
4	9.0	10.7	9.3
6	6.0	7.2	6.2
10	3.6	4.3	3.7
16	2.3	2.8	2.4
25	1.5	1.8	1.5
35	1.1	1.3	1.1
50	0.8	0.96	0.85
70	0.6	0.70	0.60
95	0.4	0.55	0.45
120	0.3	0.45	0.35
150	0.25	0.35	0.31
185	0.20	0.30	0.26
240	0.15	0.25	0.22
300	0.12	0.22	0.19
400	0.10	0.19	0.17

The voltage drop in a circuit, of which the cable forms a part, should not exceed 3 - 5% of the nominal voltage; e.g. 20.0 volts (5%) for a three-phase 400 volts supply. The above mentioned voltage drop is tabulated for a current of 1 ampere for a 1 metre run. For any cable length, the values need to be multiplied by the length of the cable (in metres) and by the current (in amperes).

Select a cross-section, such that the voltage drop is equal to or less than 0.83 mV/A/m from table 3. It has to be ensured that the selected cross-section will carry the current (see pages 47 up to 49).

The corresponding cross-section will be 50 mm^2.

Example:

Formula for the calculated voltage drop in mV/A/m:

$$e_{cal} = \frac{\text{permissible voltage drop (e) x 1000}}{\text{current (I) x length (l)}}$$

Installation length (l):	300 m
Current (I) to carry:	80 A
Nominal voltage (U):	400 V (Three-phase AC)
Permissible voltage drop (e):	20.0 V (5% of 400 V)

$$e_{cal} = \frac{20.0\ V\ x\ 1000}{80\ A\ x\ 300\ m} = 0.83\ mV/A/m$$

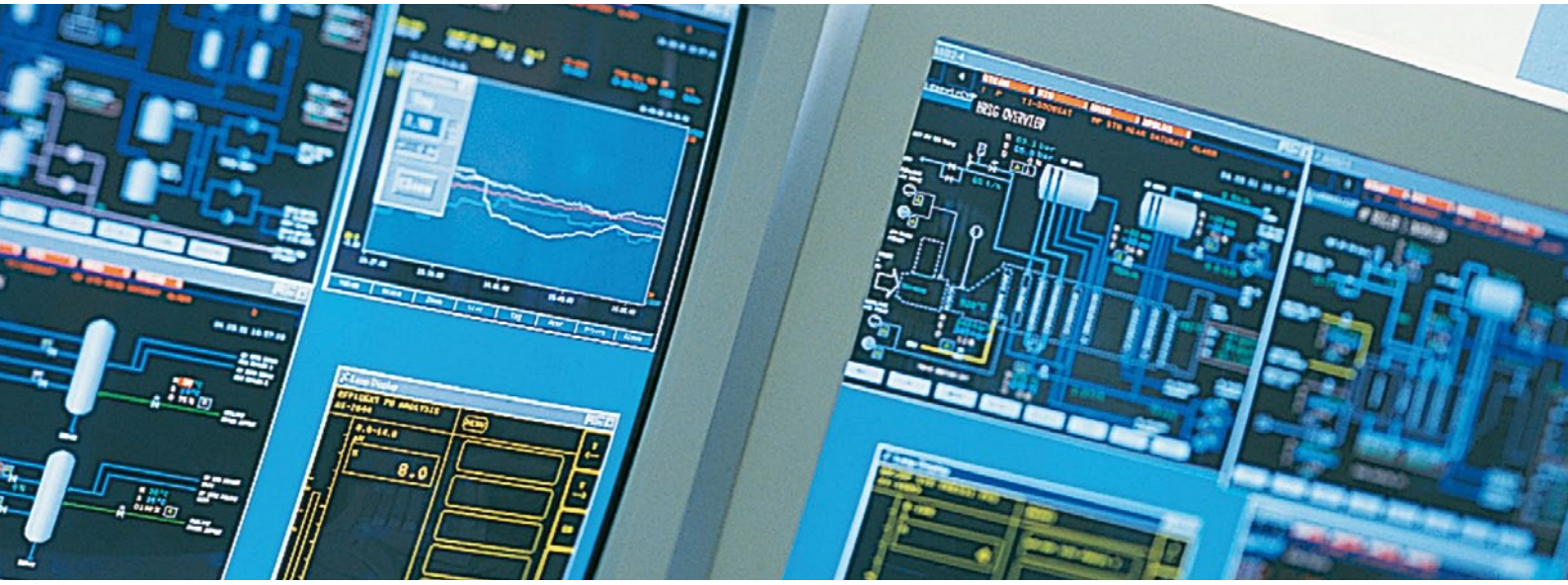
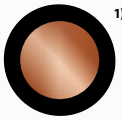
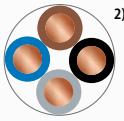


Table 4: Current Ratings: Copper conductors laid in air

Nominal cross-sectional area U_0 / U 0.6 / 1 kV	 1)		  2)			
nom. (mm²)	PVC **(A)**	XLPE **(A)**	PVC **(A)**	XLPE **(A)**	PVC **(A)**	XLPE **(A)**
1.5	27	33	20	24	21	27
2.5	35	43	26	32	28	36
4	47	57	34	42	37	47
6	59	72	43	53	47	59
10	81	99	59	73	64	81
16	107	131	78	97	84	109
25	144	177	105	132	114	146
35	176	217	129	162	139	179
50	214	265	157	197	169	218
70	270	336	199	250	213	275
95	334	415	246	308	264	336
120	389	485	285	359	307	388
150	446	557	326	412	352	438
185	516	647	374	475	406	501
240	618	775	445	564	483	580
300	711	894	510	649	552	649
400	843	1061	597	761	646	734
500	994	1254	663	860	747	827
630	1180	1486	-	-	858	934
800	1396	1751	-	-	971	-
1000	1620	2044	-	-	1078	-

[1] Current in DC circuits with return conductor far away.

[2] For auxiliary and multicore cables with 4-cores fully loaded.

Basic assumption and conditions of installation:

Ambient temperature: 30 °C

Distance between cables: 2 x overall diameter

Loading factor: 1.0

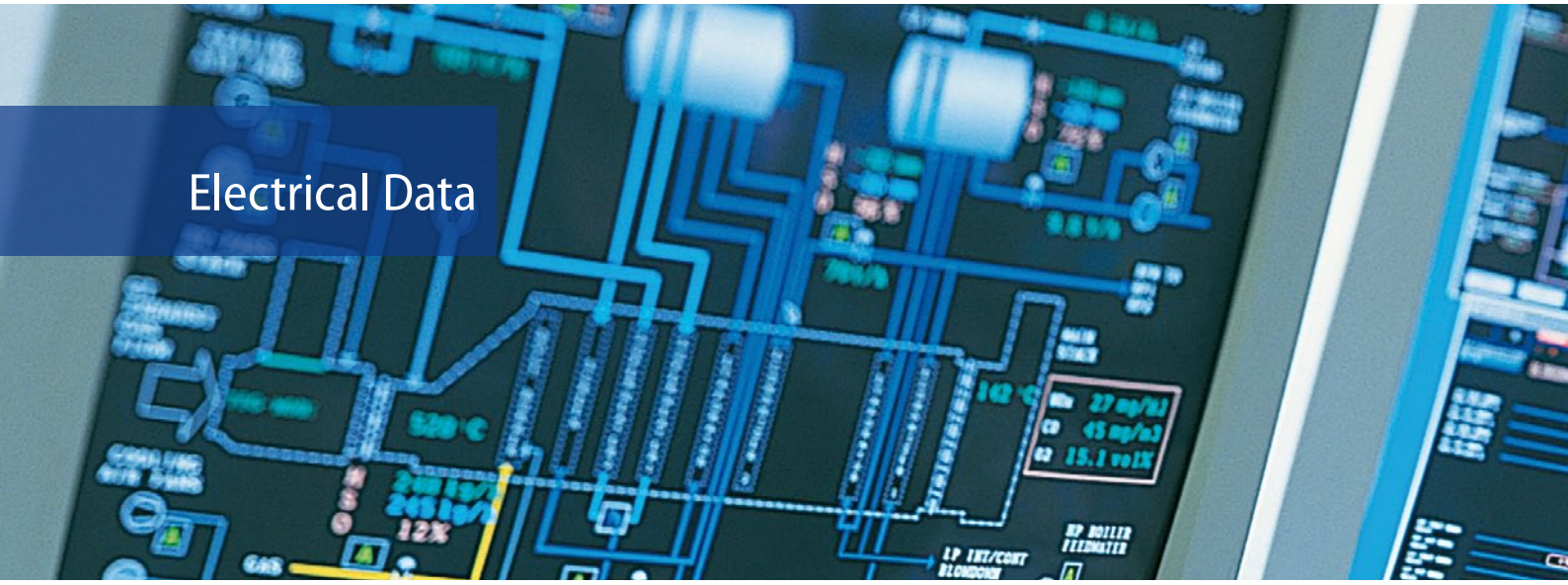
Distance (VDE 0298):

between cables and walls, ground or ceiling: 2 cm

between systems (one upon another) : 30 cm

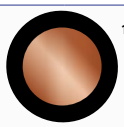
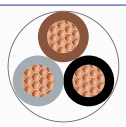
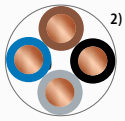
between cables(side by side): 2 x overall diameter

between cables(one upon another): 2 x overall diameter



Electrical Data

Table 5: Current Ratings: Copper conductors laid direct in ground

Nominal cross-sectional area U_0 / U 0.6 / 1 kV	 1)			 2)		
nom. (mm²)	PVC **(A)**	XLPE **(A)**	PVC **(A)**	XLPE **(A)**	PVC **(A)**	XLPE **(A)**
1.5	41	48	27	31	30	33
2.5	55	63	36	40	39	42
4	71	82	46	52	50	54
6	90	102	58	64	62	67
10	124	136	78	86	83	89
16	160	176	101	111	107	115
25	208	229	132	145	138	148
35	250	275	159	174	164	177
50	296	326	188	206	195	209
70	365	400	232	254	238	256
95	438	480	280	305	286	307
120	501	548	318	348	325	349
150	563	616	359	392	365	393
185	639	699	406	444	413	445
240	746	815	473	517	479	516
300	845	924	535	585	539	581
400	975	1065	613	671	614	662
500	1125	1228	684	756	693	749
630	1304	1421	-	-	777	843
800	1507	1638	-	-	859	935
1000	1715	1870	-	-	936	1022

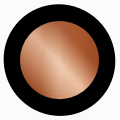
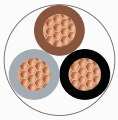
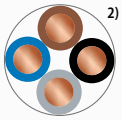
[1] Current in DC circuits with return conductor far away.

[2] For auxiliary and multicore cables with 4-cores fully loaded.

Basic assumption and conditions of installation (VDE 0298):

Thermal resistivity of soil:	1.0 K x m/W
Standard ground temperature:	20 °C
Loading factor:	0.7
Depth of burial:	0.7 – 1.2 m
No. of cable systems:	1

Table 6: Current Ratings: Copper conductors laid in single way ducts

Nominal cross-sectional area U_0 / U 0.6 / 1 kV	 1)			 2)		
nom. (mm²)	PVC **(A)**	XLPE **(A)**	PVC **(A)**	XLPE **(A)**	PVC **(A)**	XLPE **(A)**
1.5	35	41	23	26	26	28
2.5	47	54	31	34	33	36
4	60	70	39	44	43	46
6	77	87	49	54	53	57
10	105	116	66	73	71	76
16	136	150	86	94	91	98
25	177	195	112	123	117	126
35	213	234	135	148	139	150
50	252	277	160	175	166	178
70	310	340	197	216	202	218
95	372	408	238	259	243	261
120	426	466	270	296	276	297
150	479	524	305	333	310	334
185	543	594	345	377	351	378
240	634	693	402	439	407	439
300	718	785	455	497	485	494
400	829	905	521	570	522	563
500	956	1044	581	643	589	637
630	1108	1208	-	-	660	717
800	1281	1392	-	-	730	795
1000	1458	1590	-	-	796	869

[1] Current in DC circuits with return conductor far away.

[2] For auxiliary and multicore cables with 4-cores fully loaded.

Basic assumption and conditions of installation (VDE 0298):

Thermal resistivity of soil:	1.0 K x m/W
Standard ground temperature:	20 °C
Loading factor:	0.7
Depth of burial:	0.7 – 1.2 m
No. of cable systems:	1

The term "ducts" means fiber, ferrous or earthenware pipes. In case of single core cables for use in AC-systems, ferrous ducts should not be applied.

Cables under fire conditions (Common test methods)

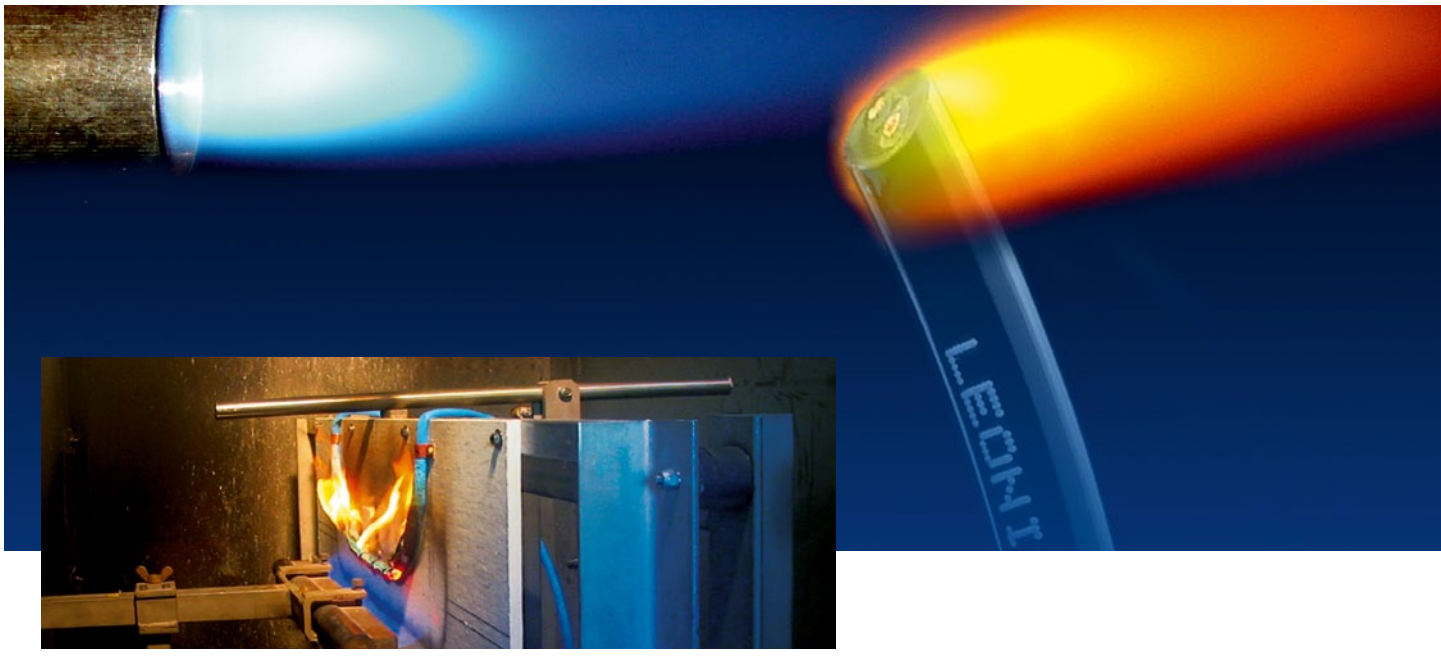
Reaction to Fire –

IEC and corresponding European Standards

IEC Standard		Cenelec Standard	
No.	Title	**No.**	**Title**
IEC 60332	Test on electric and optical cables under fire conditions	**EN 60332**	Test on electrical and optical cables under fire conditions. Test for vertical flame propagation for a single insulated wire or cable
IEC 60332-**1-1**	Test on a single vertical insulated wire or cable – Apparatus	EN 60332-**1-1**	- Apparatus
IEC 60332-**1-2**	– Procedure	EN 60332-**1-2**	- Procedure for 1 kV pre-mixed flame
IEC 60332-**1-3**	– Procedure for determination of flaming droplets / particles	EN 60332-**1-3**	- Procedure for determination of flaming droplets / particles
IEC 60332	Tests on electric cables under fire conditions	**EN 60332**	Test for vertical flame propagation for a single small insulated wire or cable
IEC 60332-**2-1**	Test on a single vertical insulated wire or cable – Apparatus	EN 60332-**2-1**	- Apparatus
IEC 60332-**2-2**	Test on a single vertical insulated wire or cable – Procedure	EN 60332-**2-2**	- Procedure for diffusion flame
IEC 60332	Tests on bunched wires or cables	**EN 50266**	Test for vertical flame spread of vertically mounted bunched wires o. cables
IEC 60332-**3-10**	Apparatus	EN 60332-**3-10**	Apparatus
IEC 60332-**3-21**	Procedures Category A F/R	EN 60332-**3-21**	Procedures – Category A F/R
IEC 60332-**3-22**	Procedures Category A	EN 60332-**3-22**	Procedures – Category A
IEC 60332-**3-23**	Procedures Category B	EN 60332-**3-23**	Procedures – Category B
IEC 60332-**3-24**	Procedures Category C	EN 60332-**3-24**	Procedures – Category C
IEC 60332-**3-25**	Procedures – small cables –	EN 60332-**3-25**	Procedures – small cables –
IEC 60754	Tests on gases evolved during combustion of materials from cables	**EN 50267**	Tests on gases evolved during combustion of materials from cables
IEC 60754-**1**	Determination of amount of halogen acid gas	EN 50267-**1**	Apparatus
IEC 60754-**2**	Determination of degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity	EN 50267-**2-1**	Procedures – Determination of the amount of halogen acid gas
		EN 50267-**2-2**	Procedures – Determination of degree of acidity of gases for materials by measuring pH and conductivity
		EN 50267-**2-3**	Procedures – Determination of degree of acidity of gases for cables by determination of the weighted average of pH and conductivity
IEC 61034	Measurement of smoke density of cables burning under defined conditions	**EN 61034**	Measurement of smoke density of cables burning under defined conditions
IEC 61034-**1**	Test apparatus	EN 61034-**1**	Apparatus
IEC 61034-**2**	Test procedure and requirements	EN 61034-**2**	Test procedure and requirements

Circuit integrity (CI) Fire resistance

IEC Standard		Cenelec Standard	
No.	**Title**	**No.**	**Title**
IEC 60331	Tests for electric cables under fire conditions – Circuit Integrity	**EN 50200**	Method of test for resistance to fire of unprotected small cables for use in emergency circuits
IEC 60331-**1**	fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0.6/1 kV and with an overall diameter exceeding 20 mm		
IEC 60331-**2**	fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0.6/1 kV and with an overall diameter not exceeding 20 mm		
IEC 60331-**3**	fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0.6/1 kV tested in a metall enclosure		
IEC 60331-**11**	Apparatus Fire alone at temperature of at least 750 °C		
IEC 60331-**21**	Procedures and requirements – Cables of rated voltage up to and including 0.6/1 kV		
IEC 60331-**22**	Procedures and requirements – Cables of rated voltage greater than 1 kV (under consideration)		
IEC 60331-**23**	Proc. and requirements – Electric data cables		
IEC 60331-**25**	Proc. and requirements – Optical fiber cables		



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