

Marine Cables

General Catalogue



Marine Cables

Special cables for civil and defence ship applications
General catalogue

Linking the Future

As the worldwide leader in the cable industry, Prysmian Group believes in the effective, efficient and sustainable supply of energy and information as a primary driver in the development of communities.

With this in mind, we provide major global organisations in many industries with best-in-class cable solutions, based on state-of-the-art technology. Through two renowned commercial brands - Prysmian and Draka - based in almost 50 countries, we're constantly close to our customers, enabling them to further develop the world's energy and telecoms infrastructures, and achieve sustainable, profitable growth.

In our energy business, we design, produce, distribute and install cables and systems for the transmission and distribution of power at low, medium, high and extra-high voltage.

In telecoms, the Group is a leading manufacturer of all types of copper and fibre cables, systems and accessories - covering voice, video and data transmission.

Drawing on over 130 years' experience and continuously investing in R&D, we apply excellence, understanding and integrity to everything we do, meeting and exceeding the precise needs of our customers across all continents, at the same time shaping the evolution of our industry.





What links global expertise to the wheels of industry?

High-performing cable solutions to keep the wheels of industry turning

On every continent, in applications that range from commercial vessels to passenger ships and mega-yachts, workboats, tugs, icebreakers, specialized vessels (e.g. pipelaying ships) and military vessels, Prysmian's specialist cable solutions sit at the heart of significant international projects; supporting the work of major customers, with high-performing, durable and safe technology.

As the world leader in cabling, we draw on global expertise and local presence to work in close proximity with our customers, delivering products and service platforms built on easy contact, bespoke solutions and effective supply chain, meeting their specialised requirements, to help them drive the wheels of industry and achieve sustainable growth and profitability.



Marine cables

Application

The shipbuilding industry is becoming more and more demanding in several class of performance (e.g. eco-friendliness, reduced fuel consumption) and related regulations (e.g. Safe Return to Port) as well as a harder and harder competitive arena in terms of both cost and lead time reduction.

With the goal of maximizing passengers' comfort, operational efficiency, safety and speed, the shipyard industry is looking for new solutions in terms of both product and system development.

Demanding safety standards, enhanced supply chain performances, increased data, power and optical transmission find the best response in Prysmian's product range.

In terms of Fire Resistance performance, our technological solutions are milestone for industry advancement. SIENOPYR-FR is Prysmians innovative interpretation of electrical components and cable requirements, which enable shipbuilders to comply with the regulatory demands.

Combining every feature and requirement to exceed the most stringent fire resistance standards (including mechanical shock and water extensive contact), SIENOPYR-FR ultra fire resistance and ultra-high performance guarantee operation in case of fire, helping to support shipyards in complying with SOLAS' Safe Return to Port regulations, and ensuring the highest levels of safety on all vessels.



Benefits

> Wide Range

Prysmian's product lines incorporate a wide range of marine cables covering all possible uses on board a vessel, including all families of power cables from 1 kV to 20 kV, telecom cables with various braiding and shielding alternatives as well as special bus and fibre optic cables. In addition, Prysmian can also provide coaxial, radiating antenna and data cables. Thanks to the variety of cable sizes all customer needs can be met.

> Wide Range

Space is a scarce commodity on a ship, and weight is a major concern for shipbuilders and owners. Prysmian cables are designed with small diameters and light constructions, to provide overall benefits to the ship weight and operation. In order to save more space and weight, smaller cable trays can be used, too.

> Easy and quick to install

On board ship there is very little room, and the installations of cables can be a time consuming operation and can require hard work. Prysmian has developed cables that are flexible, easy to bend, easy to peel and easy to pull, in order to optimize the installation process even in the most narrow spaces.

> Close to Customers

Our marine cables concept consist also in being close and accessible to customers, thanks to a wide sales network covering more than 50 countries. By contacting the closest Prysmian affiliate, you will be addressed to a dedicated supply chain in order to receive the best possible assistance according to your needs.

Marine cables

Our factories and products are certified by



Application Groups



Halogen
free



Low
smoke



Safety
cables



flame
retardant

MEDIUM VOLTAGE MARINE CABLES

MMGCEGCH
MMGCEGCHX
MMGCGCH
MMGCGCHX

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MOTOR SUPPLY MARINE CABLES

MMGCEGCH FC
MMGCEGCHX FC
M2XCH FC 0,6/1 kV

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LOW VOLTAGE MARINE CABLES

M2XCH 1,8/3 kV
(L)M2XCH 0,6/1 kV
M2XCH 0,6/1 kV
(L)M2XH 0,6/1 kV
M2XH 0,6/1 kV
MGCHX 0,6/1 kV
MHXCH FE 120 0,6/1 kV
MHXH FE 120 0,6/1 kV

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COMMUNICATION MARINE CABLES

FM2XCH 250 V
FMGCHX 250 V
FMHXCH FE 120 250 V

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MARINE CABLES FOR DATA TRANSMISSION

MI-VHH 2G62,5/125 Fibre Optic
M-02Y(ST)CHX Profibus

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MULTIMEDIA CABLES

UCMULTIMEDIA 1500 SS22
UC900 SS23 Cat.7
UC900 SS27 Cat.7
UC300 HS24 Cat.5e
ICS IE ToughCat 7
ICS IE ToughCat 7S
ICS IE ToughCat 5e
UC^{FIBRE} I DI LSHF-FR ES9 2-24 fibres
RG213 FRNC
RG214 FRNC
RG223 FRNC

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MARINE CABLES (DEFENCE)

MGSGO VG95218-60
LMGSGO VG95218-61
FMGSGO VG95218-62
FMSGGO VG95218-63

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OTHER DEFENCE CABLES

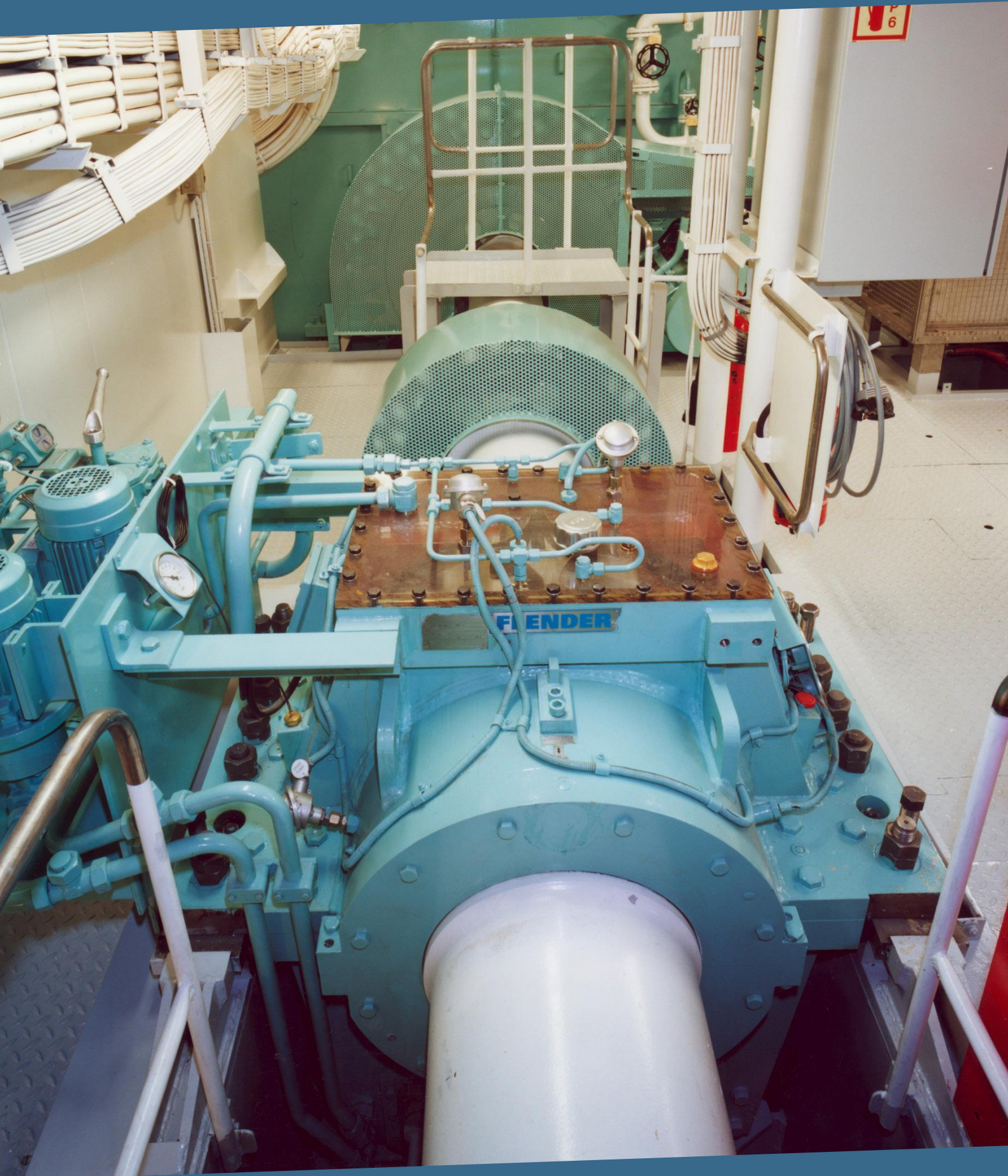
GI-LTG 450/750V VG 95218 T010A
H07RN-F VG95218-13 450/750V
NSSHOEU 0,6/1 kV VG 95218 T013C
S05ZZH2-F 300/500V VG 95218 T1008

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Marine cables



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Marine cables

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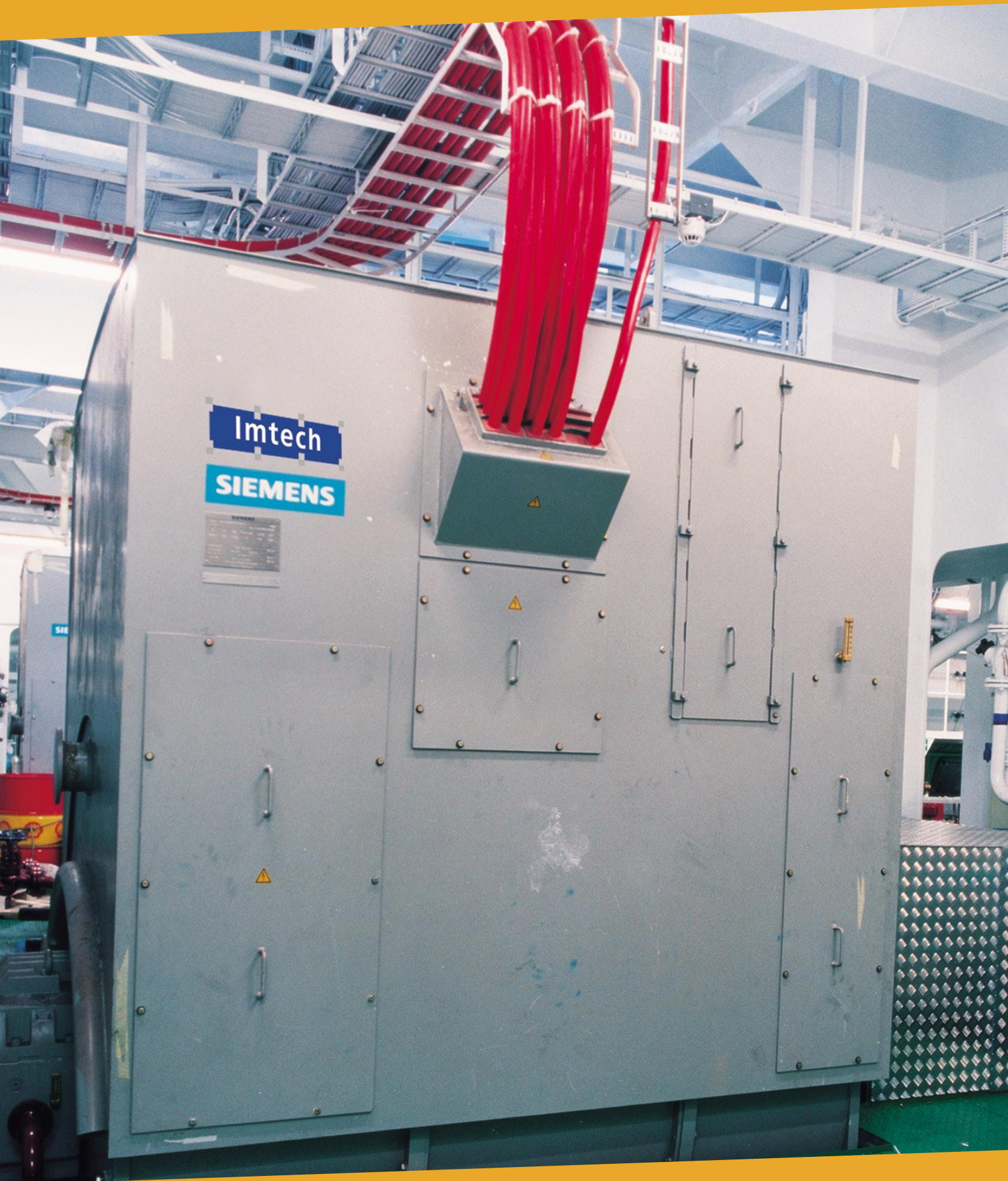
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Marine cables



MEDIUM VOLTAGE MARINE CABLES

Designation	Standard	Dimension	Fire performance	Cores	Insulation	Outer sheath
MMGCEGCH	acc. to IEC 60092-354		Flame retardant	3	EPR	SHF1
MMGCEGCHX	acc. to IEC 60092-354		Flame retardant	3	EPR	SHF2
MMGCGCH	acc. to IEC 60092-354		Flame retardant	1	EPR	SHF1
MMGCGCHX	acc. to IEC 60092-354		Flame retardant	1	EPR	SHF2

SIENOPYR FR MMGCEGCH

Medium voltage cables for ships and offshore units



Application

For fixed installation on ships and offshore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	MMGCEGCH
Standard	IEC 60092-354

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 or class 5
Insulation	Ethylen-propylene rubber (EPR) acc. to IEC 60092-360
Electrical field control	Inner and outer layer of semiconductive rubber compound
Colour code	Numerical 1-2-3 imprint on the black outer semi-conductive layer
Individual screen	Copper wires wrapped in a traverse spiral and/or copper tapes. The nominal cross-section of the screening is the sum of all individual core screens.
Inner covering	Polyolefine compound, black
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360

Electrical parameters

Rated voltage	6/10 kV
Max. permissible operating voltage AC	12 kV
AC test voltage	21 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-3-22
Flame propagation	according to IEC 60332-1-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	12 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Nom. operating capacitance $\mu\text{F}/\text{km}$	Inductance nom. mH/km	Current carrying capacity (1) A
MMGCEGCH 3 cores								
3 x 25 /16		5BG3 917	45	540	3390	0.28	0.3	89
3 x 35 /16		5BG3 915	48	576	3850	0.3	0.29	110
3 x 50 /16		5BG3 916	50	600	4360	0.33	0.28	137
3 x 70 /16	20001764	5BG3 900	54.5	654	5400	0.38	0.26	169
3 x 95 /16	20001765	5BG3 901	58.5	702	6600	0.42	0.25	205
3 x 120 /16	20026068	5BG3 902	62	744	7600	0.46	0.25	237
3 x 150 /25		5BG3 903	67	804	8700	0.5	0.24	272
MMGCEGCH 3 cores class 5								
3 x 25F /16		5BG3 937	46.5	558	3460	0.28	0.3	85
3 x 35F /16		5BG3 935	50	600	3930	0.3	0.29	105
3 x 50F /16		5BG3 936	52	624	4450	0.33	0.28	130
3 x 70F /16		5BG3 920	56.5	678	5510	0.38	0.26	161
3 x 95F /16		5BG3 921	61.5	738	6730	0.42	0.25	195
3 x 120F /16		5BG3 922	64	768	7750	0.46	0.25	225
3 x 150F /25		5BG3 923	69	828	8870	0.5	0.24	258

F = flexible conductor, stranded copper, class 5 acc. to IEC 60228

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship 's vibrations

SIENOPYR FR MMGCEGCHX

Medium voltage motor supply cables for ships and offshore units



Application

For fixed installation on ships and offshore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	MMGCEGCHX
Standard	IEC 60092-354

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 or class 5
Insulation	Ethylen-propylene rubber (EPR) acc. to IEC 60092-360
Electrical field control	Inner and outer layer of semiconductive rubber compound
Colour code	numerical 1-2-3 imprint on the black outer semi-conductive layer
Individual screen	Copper wires wrapped in a traverse spiral and/or copper tapes. The nominal cross-section of the screening is the sum of all individual core screens.
Inner covering	Polyolefine compound, black
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-2, according to IEC 60092-360

Electrical parameters

Rated voltage	6/10 kV
Max. permissible operating voltage AC	12 kV
AC test voltage	21 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	12 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Nom. operating capacitance $\mu\text{F}/\text{km}$	Inductance nom. mH/km	Current carrying capacity (1) A
MMGCGCHX 3 cores								
3 x 25 /16		5BG3 717	45	540	3390	0.28	0.3	89
3 x 35 /16		5BG3 715	48	576	3850	0.3	0.29	110
3 x 50 /16		5BG3 716	50	600	4360	0.33	0.28	137
3 x 70 /16		5BG3 700	54.5	654	5400	0.38	0.26	169
3 x 95 /16		5BG3 701	58.5	702	6600	0.42	0.25	205
3 x 120 /16		5BG3 702	62	744	7600	0.46	0.25	237
3 x 150 /25		5BG3 703	67	804	8700	0.5	0.24	272
MMGCEGCHX 3 cores class 5								
3 x 25F /16		5BG3 737	46.5	558	3460	0.28	0.3	85
3 x 35F /16		5BG3 735	50	600	3930	0.3	0.29	105
3 x 50F /16		5BG3 736	52	624	4450	0.33	0.28	130
3 x 70F /16		5BG3 720	56.5	678	5510	0.38	0.26	161
3 x 95F /16	20143582	5BG3 721	61.5	738	6730	0.42	0.25	195
3 x 120F /16		5BG3 722	64	768	7750	0.46	0.25	225
3 x 150F /25		5BG3 723	69	828	8870	0.5	0.24	258

F = flexible conductor, stranded copper, class 5 acc. to IEC 60228

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

SIENOPYR FR MMGCGCH

Medium voltage cables for ships and offshore units



Application

For fixed installation on ships and offshore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	MMGCGCH
Standard	IEC 60092-354

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 or class 5
Insulation	Ethylen-propylene rubber (EPR) acc. to IEC 60092-360
Electrical field control	Inner and outer layer of semiconductive rubber compound
Individual screen	Copper wires wrapped in a traverse spiral and/or copper tapes. The nominal cross-section of the screening is the sum of all individual core screens.
Inner covering	Polyolefine compound, black
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360

Electrical parameters

Rated voltage	6/10 kV
Max. permissible operating voltage AC	12 kV
AC test voltage	21 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-3-22
Flame propagation	according to IEC 60332-1-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	12 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Nom. operating capacitance $\mu\text{F}/\text{km}$	Inductance nom. mH/km	Current carrying capacity (1) A
MMGCGCH 1 cores								
1 x 35 /16		5BG3 905	26	260	1180	0.3	0.29	157
1 x 50 /16	20121421	5BG3 906	27.5	275	1320	0.33	0.28	196
1 x 70 /16		5BG3 907	29.5	295	1580	0.38	0.26	242
1 x 95 /16		5BG3 908	30.5	305	1930	0.42	0.25	293
1 x 120 /16		5BG3 910	32	320	2230	0.46	0.25	339
1 x 150 /25		5BG3 911	34	340	2570	0.5	0.24	389
1 x 185 /25		5BG3 912	36	360	3020	0.55	0.23	444
1 x 240 /25	20001769	5BG3 913	39.5	395	3750	0.61	0.22	522
1 x 300 /25		5BG3 914	41	410	4370	0.67	0.22	601
MMGCGCH 1 core class 5						0	0	
1 x 35F /16		5BG3 925	26.5	265	1190	0.3	0.29	149
1 x 50F /16		5BG3 926	28	280	1330	0.33	0.28	186
1 x 120F /16		5BG3 930	34	340	2260	0.46	0.25	322
1 x 150F /25		5BG3 931	36	360	2600	0.5	0.24	370
1 x 185F /25		5BG3 932	37.5	375	3050	0.55	0.23	422
1 x 240F /25		5BG3 933	39.5	395	3790	0.61	0.22	496
1 x 300F /25		5BG3 934	41.5	415	4420	0.67	0.22	571

F = flexible conductor, stranded copper, class 5 acc. to IEC 60228

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

SIENOPYR FR MMGCGCHX

Medium voltage cables for ships and offshore units



Application

For fixed installation on ships and offshore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	MMGCGCHX
Standard	IEC 60092-354

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 or class 5
Insulation	Ethylen-propylene rubber (EPR) acc. to IEC 60092-360
Electrical field control	Inner and outer layer of semiconductive rubber compound
Individual screen	Copper wires wrapped in a traverse spiral and/or copper tapes. The nominal cross-section of the screening is the sum of all individual core screens.
Inner covering	Polyolefine compound, black
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-2, according to IEC 60092-360

Electrical parameters

Rated voltage	6/10 kV
Max. permissible operating voltage AC	12 kV
AC test voltage	21 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-3-22
Flame propagation	according to IEC 60332-1-2

Thermal parameters

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Min. bending radius	12 x D

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MMGCGCHX 1 core								
1 x 35 /16		5BG3 705	26	260	1180	0.3	0.29	157
1 x 50 /16		5BG3 706	27.5	275	1320	0.33	0.28	196
1 x 70 /16		5BG3 707	29.5	295	1580	0.38	0.26	242
1 x 95 /16		5BG3 708	30.5	305	1930	0.42	0.25	293
1 x 120 /16		5BG3 710	32	320	2230	0.46	0.25	339
1 x 150 /25		5BG3 711	34	340	2570	0.5	0.24	389
1 x 185 /25		5BG3 712	36	360	3020	0.55	0.23	444
1 x 240 /25		5BG3 713	39.5	395	3750	0.61	0.22	522
1 x 300 /25		5BG3 714	41	410	4370	0.67	0.22	601
MMGCGCHX 1 core class 5								
1 x 35F /16	20143583	5BG3 725	26.5	265	1190	0.3	0.29	149
1 x 50F /16		5BG3 726	28	280	1330	0.33	0.28	186
1 x 120F /16	20098502	5BG3 730	34	340	2260	0.46	0.25	322
1 x 150F /25		5BG3 731	36	360	2600	0.5	0.24	370
1 x 185F /25		5BG3 732	37.5	375	3050	0.55	0.23	422
1 x 240F /25		5BG3 733	39.5	395	3790	0.61	0.22	496
1 x 300F /25		5BG3 734	41.5	415	4420	0.67	0.22	571

F = flexible conductor, stranded copper, class 5 acc. to IEC 60228

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

Marine cables



MOTOR SUPPLY MARINE CABLES

Designation	Standard	Dimension	Fire performance	Cores	Insulation	Outer sheath
MMGCEGCH FC	acc. to IEC 60092-354		Flame retardant	3	EPR	SHF1
MMGCEGCHX FC	acc. to IEC 60092-354		Flame retardant	3	EPR	SHF2
M2XCH FC	acc. to IEC 60092-353		Flame retardant	3	XLPE	SHF1

SIENOPYR FR MMGCEGCH FC

Medium voltage motor supply cables for ships and offshore units



Application

The three-core SIENOPYR-FR medium-voltage motor supply cables MMGCEGCH FC have been specially designed for pulse-type static inverter-fed-three-phase AC drives.

For fixed installation on ships and off-shore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	MMGCEGCH FC
Standard	IEC 60092-354

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 or class 5
Insulation	Ethylen-propylene rubber (EPR) acc. to IEC 60092-360
Electrical field control	Inner and outer layer of semiconductive rubber compound
Core identification	Numerical 1-2-3 imprint on the black outer semi-conductive layer
Individual screen	Copper wires wrapped in a traverse spiral and/or copper tapes. The nominal cross-section of the screening is the sum of all individual core screens.
Inner covering	Polyolefine compound, black
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360

Electrical parameters

Rated voltage	Three-phase AC operation at 50Hz: - U ₀ /U: 6/10 kV - U _{max} : 12 kV FC-operation: - U ₀ /U: 3,6/6 kV - U _{max} : 7,2 kV FC-operation (for a link voltage of max. 6.8 kV) incl. harmonics: - U: 4,16 kV (fundamental) - Ũ: max 15 kV
AC test voltage	21 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	12 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Nom. operating capacitance $\mu\text{F}/\text{km}$	Inductance nom. mH/km	Current carrying capacity (1) A
MMGCEGCH FC 3 cores								
3 x 35 /16		5BG3 951	48	576	3850	0.29	0.3	110
3 x 50 /16		5BG3 952	50	600	4360	0.32	0.28	137
3 x 70 /16		5BG3 953	54.5	654	5400	0.37	0.27	169
3 x 95 /16		5BG3 950	58.5	702	6600	0.41	0.26	205
3 x 120 /16	20001770	5BG3 954	62	744	7600	0.45	0.25	237
3 x 150 /25		5BG3 955	67	804	8700	0.48	0.24	272
MMGCEGCH FC 3 cores class 5								
3 x 35F /16		5BG3 966	50	600	3930	0.3	0.3	105
3 x 50F /16		5BG3 961	52	624	4450	0.33	0.28	130
3 x 70F /16		5BG3 962	56.5	678	5510	0.38	0.27	161
3 x 95F /16	20007754	5BG3 963	61.5	738	6730	0.42	0.26	195
3 x 120F /16		5BG3 964	64	768	7750	0.46	0.25	225
3 x 150F /25		5BG3 965	69	828	8870	0.5	0.24	258

F = flexible conductor, stranded copper, class 5 acc. to IEC 60228

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

SIENOPYR FR MMGCEGCHX FC

Medium voltage motor supply cables for ships and offshore units



Application

The three-core SIENOPYR-FR medium-voltage motor supply cables MMGCEGCHX FC have been specially designed for pulse-type static inverter-fed- three-phase AC drives.

For fixed installation on ships and off-shore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	MMGCEGCHX FC
Standard	IEC 60092-354

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 or class 5
Insulation	Ethylen-propylene rubber (EPR) acc. to IEC 60092-360
Electrical field control	Inner and outer layer of semiconductive rubber compound
Core identification	Numerical 1-2-3 imprint on the black outer semi-conductive layer
Individual screen	Copper wires wrapped in a traverse spiral and/or copper tapes. The nominal cross-section of the screening is the sum of all individual core screens.
Inner covering	Polyolefine compound, black
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-2, according to IEC 60092-360 flame retardant - low smoke - halogen free

Electrical parameters

Rated voltage	Three-phase AC operation at 50Hz: - U ₀ /U: 6/10 kV - U _{max} : 12 kV FC-operation: - U ₀ /U: 3,6/6 kV - U _{max} : 7,2 kV FC-operation (for a link voltage of max. 6.8 kV) incl. harmonics: - U: 4,16 kV (fundamental) - $\dot{U}$: max 15 kV
AC test voltage	21 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-3-22
Flame propagation	according to IEC 60332-1-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	12 x D

Number of cores x cross section	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Nom. operating capacitance $\mu\text{F}/\text{km}$	Inductance nom. mH/km	Current carrying capacity (1) A
MMGCEGCHX FC 3 cores							
3 x 35 /16	5BG3 755	48	576	3850	0.29	0.3	110
3 x 50 /16	5BG3 756	50	600	4360	0.32	0.28	137
3 x 70 /16	5BG3 750	54.5	654	5400	0.37	0.27	169
3 x 95 /16	5BG3 751	58.5	702	6600	0.41	0.26	205
3 x 120 /16	5BG3 752	62	744	7600	0.45	0.25	237
3 x 150 /25	5BG3 753	67	804	8700	0.48	0.24	272
MMGCEGCHX FC 3 cores class 5							
3 x 35F /16	5BG3 745	50	600	3930	0.3	0.3	105
3 x 50F /16	5BG3 746	52	624	4450	0.33	0.28	130
3 x 70F /16	5BG3 740	56.5	678	5510	0.38	0.27	161
3 x 95F /16	5BG3 741	61.5	738	6730	0.42	0.26	195
3 x 120F /16	5BG3 742	64	768	7750	0.46	0.25	225
3 x 150F /25	5BG3 743	69	828	8870	0.5	0.24	258

F = flexible conductor, stranded copper, class 5 acc. to IEC 60228

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

SIENOPYR FR M2XCH FC 0,6/1 kV

Motor supply cables for ships and offshore units



Application

Our three-core halogen-free SIENOPYR-FR motor supply cables M2XCH FC was specially developed for pulse converter-fed three-phase drives. The insulating material and cable construction is selected for minimum capacitive leakage currents. For fixed installation on ships and offshore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	M2XCH-FC
Standard	IEC 60092-353

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 or class 5
Insulation	Cross-linked-polyethylene (XLPE) acc. to IEC 60092-360
Core identification	3-cores: brown, black, grey
Inner covering	Halogen free, flame retardant compound
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	1.2 kV
Max. permissible operating voltage DC	1.8 kV
AC test voltage	5 kV
Peak voltage	2400 V
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
M2XCH 3 cores							
3 x 70	20001917	5BG6 900	37.5	225	3340	10500	169
3 x 95	20001918	5BG6 901	41	246	4100	14250	205
3 x 120	20001919	5BG6 902	44.5	267	5050	18000	237
3 x 70F		5BG6 910	37.5	225	3200	10500	161
3 x 95F	20001921	5BG6 911	41	246	4000	14250	195
3 x 120F		5BG6 912	46.5	279	5050	18000	225

F = flexible conductor, stranded copper, class 5 acc. to IEC 60228

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

Marine cables



LOW VOLTAGE MARINE CABLES

Designation	Standard	Dimension	Fire performance	Cores	Insulation	Outer sheath
M2XCH 1,8/3 kV	acc. to IEC 60092-353	Standard	Flame retardant		XLPE	SHF1
(L)M2XCH 0,6/1 kV	acc. to IEC 60092-353	Optimized	Flame retardant		XLPE	SHF1
M2XCH 0,6/1 kV	acc. to IEC 60092-353	Standard	Flame retardant		XLPE	SHF1
(L)M2XH 0,6/1 kV	acc. to IEC 60092-353	Optimized	Flame retardant		XLPE	SHF1
M2XH 0,6/1 kV	acc. to IEC 60092-353	Standard	Flame retardant		XLPE	SHF1
MGCHX 0,6/1 kV	acc. to IEC 60092-353	Standard	Flame retardant		HEPR	SHF2
MHXCH FE120 0,6/1 kV	acc. to IEC 60092-353	Standard	Flame retardant and fire resistant		S95	SHF1
MHXH FE120 0,6/1 kV	acc. to IEC 60092-353	Standard	Flame retardant and fire resistant		S95	SHF1

SIENOPYR FR M2XCH 1,8/3 kV

Power cables for ships and offshore units with screen



Application

For fixed installation on ships and offshore units in all locations and on open decks. Special measures, e.g. screening are necessary for installation of unarmoured cables in radio stations or above the upper metallic deck. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	M2XCH
Standard	IEC 60092-353

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 or class 5
Insulation	Cross-linked-polyethylene (XLPE) acc. to IEC 60092-360
Core identification	1-core: brown 3-core: brown, black, grey
Inner covering	Halogen free, flame retardant compound
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360

Electrical parameters

Rated voltage	1.8/3 kV
Max. permissible operating voltage AC	2.1/3.6 kV
Max. permissible operating voltage DC	2.7/5.4 kV
AC test voltage	6,5 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-3-22
Flame propagation	according to IEC 60332-1-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
M2XCH 1 core							
1 x 95		5BG4512	21.5	129	1160	4750	293
1 x 120	20001771	5BG4513	22.5	135	1430	6000	339
1 x 150		5BG4514	24.5	147	1690	7500	389
1 x 185F	20170491	5BG4515	28	160	2060	9250	422
1 x 240F	20001772	5BG4516	30.5	183	2630	12000	496
1 x 300F	20157620	5BG4517	34	204	3150	15000	571
M2XCH 3 cores							
3 x 70		5BG4541	41	246	3360	10500	169
3 x 95	20001773	5BG4542	45	270	4480	14250	205
3 x 120		5BG4543	48	288	5250	18000	237

F = flexible conductor, stranded copper, class 5 acc. to IEC 60228

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

SIENOPYR FR (L)M2XCH 0,6/1 kV

Light power cables for ships and offshore units with screen



Application

For fixed installation on ships and offshore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	(L)M2XCH
Standard	IEC 60092-353

Design features

Conductor	Copper, stranded acc. to IEC 60228 class 2 (class 5 on request)
Insulation	Cross-linked-polyethylene (XLPE) acc. to IEC 60092-360
Core identification	Core identification according to IEC 60092-353 (L)M2XCH: 1-core: brown; 2 core: blue, brown 3-core: brown, black, grey 4-core: blue, brown, black, grey 5 and multicore: white with black numbers (L)M2XCH-J: 1-core: gn-ye 3-core: gn-ye, blue, brown 4-core: gn-ye, brown, black, grey 5 and multicore: white with black numbers, one core gn-ye
Core arrangement	Lapped tape over single or laid-up cores
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	1.2 kV
Max. permissible operating voltage DC	1.8 kV
AC test voltage	3.5 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
(L)M2XCH 1 core								
1 x 4			5BG6 503	7.5	45	105	200	51
1 x 6			5BG6 504	8	48	130	300	52
1 x 10		20014547	5BG6 505	9.2	55	175	500	72
1 x 16		20001850	5BG6 506	10	60	233	800	96
1 x 25		20001851	5BG6 507	12.1	73	341	1250	127
1 x 35		20001852	5BG6 508	13.8	83	443	1750	157
1 x 50		20001853	5BG6 510	15.5	93	623	2500	196
1 x 70		20001854	5BG6 511	17.8	107	840	3500	242
1 x 95		20001855	5BG6 512	19.7	118	1100	4750	293
1 x 120		20001856	5BG6 513	21	126	1350	6000	339
1 x 150			5BG6 514	23.5	141	1800	7500	389
1 x 185			5BG6 515	26	156	2040	9250	444
1 x 240			5BG6 516	29	174	2630	12000	422
1 x 300			5BG6 517	33.5	201	3300	15000	601
(L)M2XCH 2 cores					0			
2 x 1.5		20001809	5BG6 112	9.7	58	117	150	20
2 x 2.5		20001810	5BG6 113	10.5	63	145	250	26
2 x 4		20001811	5BG6 114	12.1	73	192	400	34
2 x 6		20001812	5BG6 115	13.1	79	241	600	44
2 x 10		20014546	5BG6 116	15.5	93	376	1000	61
2 x 16		20001813	5BG6 117	17.8	107	530	1600	82
2 x 25		20100156	5BG6 118	21.5	129	770	2500	108
(L)M2XCH 3 cores					0			
3 x 1.5		20001814	5BG6 122	10.1	61	140	225	16
3 x 2.5		20001815	5BG6 123	11.5	69	183	375	21
3 x 4		20001816	5BG6 124	12.7	76	241	600	28
3 x 6		20001817	5BG6 125	13.9	83	310	900	36
3 x 10		20001818	5BG6 126	16.6	100	487	1500	50
3 x 16		20001819	5BG6 127	18.9	113	700	2400	67
3 x 25		20001820	5BG6 128	22.5	135	1020	3750	89
3 x 35SM		20001874	5BG6 650	22.8	137	1290	5250	110
3 x 50SM		20001875	5BG6 651	25.3	152	1690	7500	137
3 x 70SM			5BG6 652	30.1	181	2330	10500	169
3 x 95SM		20001876	5BG6 653	33.4	200	3110	14250	205
3 x 120SM			5BG6 654	37.3	224	3900	18000	237
(L)M2XCH-J 3 cores with gn/ye					0			
3 x 1.5	-J	20001821	5BG6 132	10.1	61	140	225	16
3 x 2.5	-J	20001822	5BG6 133	11.5	69	183	375	21
3 x 4	-J	20001823	5BG6 134	12.7	76	241	600	28
3 x 6	-J		5BG6 135	13.9	83	310	900	36
3 x 10	-J		5BG6 136	16.6	100	487	1500	50
3 x 16	-J		5BG6 137	18.9	113	700	2400	67
3 x 25	-J		5BG6 138	22.5	135	1020	3750	89
(L)M2XCH 4 cores					0			
4 x 1.5		20001824	5BG6 142	11.2	67	168	300	16
4 x 2.5		20001825	5BG6 143	12.4	74	222	500	21

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
4 x 4		20001826	5BG6 144	13.7	82	299	800	28
4 x 6		20001827	5BG6 145	15.6	94	428	1200	36
4 x 10		20001828	5BG6 146	18.1	109	630	2000	50
4 x 16		20001829	5BG6 147	20.7	124	890	3200	67
4 x 25		20001830	5BG6 148	25	150	1330	5000	89
(L)M2XCH-J 4 cores with gn/ye					0			
4 x 1.5	-J	20001831	5BG6 162	11.2	67	168	300	16
4 x 2.5	-J	20001832	5BG6 153	12.4	74	222	500	21
4 x 4	-J	20001833	5BG6 154	13.7	82	299	800	28
4 x 6	-J	20001834	5BG6 155	15.6	94	428	1200	36
4 x 10	-J	20159281	5BG6 156	18.1	109	630	2000	50
4 x 16	-J	20001835	5BG6 157	20.7	124	890	3200	67
4 x 25	-J	20001836	5BG6 158	25	150	1330	5000	89
(L)M2XCH 5 and multicore					0			
5 x 1.5		20001837	5BG6 162	12.2	73	205	375	14
5 x 2.5		20001838	5BG6 167	13.4	80	267	625	18
7 x 1.5		20001841	5BG6 172	13.1	79	245	525	10
7 x 2.5		20001842	5BG6 173	15	90	370	875	14
10 x 1.5		20001868	5BG6 591	16.9	101	375	750	9
12 x 1.5		20001869	5BG6 592	17.6	106	426	900	9
14 x 1.5		20001870	5BG6 593	18.4	110	471	1050	8
16 x 1.5		20001871	5BG6 594	19.3	116	530	1200	8
19 x 1.5		20001872	5BG6 595	20.3	122	600	1425	7
24 x 1.5		20001873	5BG6 596	23.4	140	750	1800	7
(L)M2XCH-J 5 and multicore with gn/ye					0			
5 x 1.5	-J	20001839	5BG6 166	12.2	73	205	375	14
5 x 2.5	-J	20001840	5BG6 167	13.4	80	267	625	18
7 x 1.5	-J	20001843	5BG6 176	13.1	79	245	525	10

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

(L)M2XCH = armoured, without green-yellow core, (L)M2XCH-J = armoured, with green-yellow core

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

SIENOPYR FR M2XCH 0,6/1 kV

Power cables for ships and offshore units with screen



Application

For fixed installation on ships and offshore units in all locations and on open decks. Special measures, e.g. screening are necessary for installation of unarmoured cables in radio stations or above the upper metallic deck. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	M2XCH
Standard	IEC 60092-353

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 or class 5
Insulation	Cross-linked-polyethylene (XLPE) acc. to IEC 60092-360
Core identification	3-core: brown, black, grey 4-core: blue, brown, black, grey
Inner covering	Halogen free, flame retardant compound
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	1.2 kV
Max. permissible operating voltage DC	1.8 kV
AC test voltage	3.5 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-3-22
Flame propagation	according to IEC 60332-1-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
M2XCH 3 cores							
3 x 35	20001858	5BG6 538	28	168	1700	5250	110
3 x 50	20001859	5BG6 540	32	192	2250	7500	137
3 x 70	20001860	5BG6 541	37.5	225	3100	10500	169
3 x 95	20001861	5BG6 542	41	246	4000	14250	205
3 x 120	20001862	5BG6 543	44.5	267	4990	18000	237
3 x 70F		5BG6 321	37.5	225	3100	10500	161
3 x 95F		5BG6 324	41	246	3970	14250	195
3 x 120F		5BG6 315	46.5	279	4990	18000	225
M2XCH 4 cores							
4 x 35	20001864	5BG6 558	30	180	2080	7000	110
4 x 50	20001865	5BG6 560	34	204	2750	10000	137
4 x 70	20001866	5BG6 561	41	246	3750	14000	169
4 x 95	20001867	5BG6 562	44.5	267	5070	19000	205
4 x 120	20161738	5BG6 563	47.5	285	6090	24000	237
4 x 70F		5BG6 303	42	252	3930	14000	161
4 x 95F		5BG6 304	45.5	273	5150	19000	195
4 x 120F		5BG6 305	48.5	291	6150	24000	225

F = flexible conductor, stranded copper, class 5 acc. to IEC 60228

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

SIENOPYR FR (L)M2XH 0,6/1 kV

Light power cables for ships and offshore units without screen



Application

For fixed installation on ships and offshore units in all locations and on open decks. Special measures, e.g. screening are necessary for installation of unarmoured cables in radio stations or above the upper metallic deck. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	(L)M2XH
Standard	IEC 60092-353

Design features

Conductor	Copper, stranded acc. to IEC 60228 class 2 (class 5 on request)
Insulation	Cross-linked-polyethylene (XLPE) acc. to IEC 60092-360
Core identification	Core identification according to IEC 60092-353 (L)M2XH: 1-core: brown; 2 core: blue, brown 3-core: brown, black, grey 4-core: blue, brown, black, grey 5 and multicore: white with black numbers (L)M2XH-J: 1-core: gn-ye 3-core: gn-ye, blue, brown 4-core: gn-ye, brown, black, grey 5 and multicore: white with black numbers, one core gn-ye
Core arrangement	Lapped tape over single or laid-up cores
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	1.2 kV
Max. permissible operating voltage DC	1.8 kV
AC test voltage	3.5 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	4 x D for all cables with D < 25mm (except cables with sector shaped conductors SM) 6 x D for all other cables

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
(L)M2XH 1 core								
1 x 4			5BG6 703	6.5	26	70	200	51
1 x 6			5BG6 704	7	28	95	300	52
1 x 10			5BG6 705	8	32	140	500	72
1 x 16			5BG6 706	9.2	37	195	800	96
1 x 25		20001879	5BG6 707	11.1	45	288	1250	127
1 x 35		20038697	5BG6 708	12.5	50	400	1750	157
1 x 50			5BG6 710	13.9	56	520	2500	196
1 x 70			5BG6 711	16.3	66	730	3500	242
1 x 95			5BG6 712	17.6	71	1002	4750	293
1 x 120			5BG6 713	19.6	79	1290	6000	339
1 x 150			5BG6 714	22	88	1550	7500	389
1 x 185			5BG6 715	26	104	1900	9250	444
1 x 240			5BG6 716	28.5	114	2350	12000	422
1 x 300			5BG6 717	33.5	134	2930	15000	601
(L)M2XH 2 cores								
2 x 1.5		20001775	5BG6 012	8.8	36	82	150	20
2 x 2.5		20001776	5BG6 013	9.6	39	107	250	26
2 x 4		20001777	5BG6 014	11	44	146	400	34
2 x 6			5BG6 015	12.2	49	197	600	44
2 x 10		20001779	5BG6 016	14	56	289	1000	61
2 x 16			5BG6 017	16	64	430	1600	82
(L)M2XH 3 cores								
3 x 1.5		20001780	5BG6 022	9.2	37	96	225	16
3 x 2.5		20001781	5BG6 023	10.1	41	130	375	21
3 x 4		20001782	5BG6 024	11.8	48	186	600	28
3 x 6		20001783	5BG6 025	13	52	249	900	36
3 x 10		20001784	5BG6 026	15.1	61	381	1500	50
3 x 16		20001785	5BG6 027	17.4	70	560	2400	67
3 x 25		20001786	5BG6 028	21.5	86	880	3750	89
3 x 35SM		20001903	5BG6 850	20.8	125	1150	5250	110
3 x 50SM		20001904	5BG6 851	23.6	142	1530	7500	137
3 x 70SM		20001905	5BG6 852	27.7	167	2150	10500	169
3 x 95SM		20001906	5BG6 853	31.1	187	2910	14250	205
3 x 120SM		20001907	5BG6 854	33.8	203	3620	18000	237
(L)M2XH-J 3cores with gn/ye								
3 x 1.5	-J	20001787	5BG6 032	9.2	37	96	225	16
3 x 2.5	-J	20001788	5BG6 033	10.1	41	130	375	21
3 x 4	-J	20001789	5BG6 034	11.8	48	186	600	28
3 x 6	-J		5BG6 035	13	52	249	900	36
3 x 10	-J		5BG6 036	15.1	61	381	1500	50
3 x 16	-J		5BG6 037	17.4	70	560	2400	67
3 x 25	-J		5BG6 038	21.5	86	880	3750	89
(L)M2XH 4 cores								
4 x 1.5		20001790	5BG6 042	10	40	120	300	16
4 x 2.5		20001791	5BG6 043	11.3	46	163	500	21
4 x 4		20001792	5BG6 044	12.8	52	238	800	28

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
4 x 6		20001793	5BG6 045	14.1	57	321	1200	36
4 x 10		20001794	5BG6 046	16.6	67	495	2000	50
4 x 16		20001795	5BG6 047	19.2	77	750	3200	67
4 x 25		20001796	5BG6 048	23.7	95	1140	5000	89
(L)M2XH 4-J cores with gn/ye								
4 x 1.5	-J	20001797	5BG6 052	10	40	120	300	16
4 x 2.5	-J	20001798	5BG6 053	11.3	46	163	500	21
4 x 4	-J	20001799	5BG6 054	12.8	52	238	800	28
4 x 6	-J	20001800	5BG6 055	14.1	57	321	1200	36
4 x 10	-J	20001801	5BG6 056	16.6	67	495	2000	50
4 x 16	-J	20001802	5BG6 057	19.2	77	750	3200	67
4 x 25	-J	20001803	5BG6 058	23.7	95	1140	5000	89
(L)M2XH 5 and multicores								
5 x 1.5		20001804	5BG6 062	11.1	45	148	375	14
5 x 2.5		20001805	5BG6 063	12.5	50	209	625	18
7 x 1.5		20001807	5BG6 072	12.2	49	186	525	10
10 x 1.5		20001896	5BG6 791	15.5	62	268	750	9
12 x 1.5		20001897	5BG6 792	16.2	65	310	900	9
14 x 1.5		20001898	5BG6 793	17	68	353	1050	8
16 x 1.5		20001899	5BG6 794	18	72	420	1200	8
19 x 1.5		20001900	5BG6 795	18.9	76	465	1425	7
24 x 1.5		20001901	5BG6 796	22	88	590	1800	7
(L)M2XH-J 5 and multicores with gn/ye								
5 x 1.5	-J	20001806	5BG6 066	11.1	45	148	375	14
5 x 2.5	-J	20149541	5BG6 067	12.5	50	209	625	18
7 x 1.5	-J	20001808	5BG6 076	12.2	49	186	525	10

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

(L)M2XH = without green-yellow core, (L)M2XH-J = with green-yellow core

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SIENOPYR FR M2XH 0,6/1 kV

Power cables for ships and offshore units without screen



Application

For fixed installation on ships and offshore units in all locations and on open decks. Special measures, e.g. screening are necessary for installation of unarmoured cables in radio stations or above the upper metallic deck. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	M2XH
Standard	IEC 60092-353

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 or class 5
Insulation	Cross-linked-polyethylene (XLPE) acc. to IEC 60092-360
Core identification	3-core: brown, black, grey 4-core: blue, brown, black, grey
Inner covering	Halogen free, flame retardant compound
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	1.2 kV
Max. permissible operating voltage DC	1.8 kV
AC test voltage	3.5 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
M2XH 3 core							
3 x 35	20001886	5BG6 738	27	162	1550	5250	110
3 x 50	20001887	5BG6 740	30.5	183	2060	7500	137
3 x 70	20001888	5BG6 741	35.2	212	2800	10500	169
3 x 95	20001889	5BG6 742	39.3	236	3740	14250	205
3 x 120	20001890	5BG6 743	41.7	251	4560	18000	237
3 x 70F		5BG6 351	36	216	2800	10500	161
3 x 95F		5BG6 354	40	240	3800	14250	195
3 x 120F		5BG6 345	43	258	4600	18000	225
M2XH 4 core				0			
4 x 35	20001892	5BG6 758	28.5	171	1860	7000	110
4 x 50	20001893	5BG6 760	32.5	195	2460	10000	137
4 x 70	20001894	5BG6 761	38	228	3460	14000	169
4 x 95	20001895	5BG6 762	43.5	261	4690	19000	205
4 x 70F		5BG6 333	40	240	3500	14000	161
4 x 95F		5BG6 334	44.5	267	4700	19000	195

F = flexible conductor, stranded copper, class 5 acc. to IEC 60228

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

SIENOPYR FR MGCHX 0,6/1 kV

Power cables for ships and offshore units -50°C



Application

For fixed installation on ships and offshore units in all locations and on open decks. Special measures, e.g. screening are necessary for installation of unarmoured cables in radio stations or above the upper metallic deck. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	MGCHX
Standard	IEC 60092-353

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 (class 5 on request)
Insulation	Thermoset compound type HEPR acc. to IEC 60092-360
Core identification	MGCHX: 3-core: brown, black, grey 4-core: blue, brown, black, grey 5 and multicore: white with black numbers MGCHX-J: 3-core: gn-ye, blue, brown 4-core: gn-ye, brown, black, grey 5 and multicore: white with black numbers, one core gn-ye
Inner covering	Halogen free, flame retardant compound
Screen	Plain copper wire braid
Outer sheath	Thermoset compound, type SHF-2, according to IEC 60092-360

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	1.2 kV
Max. permissible operating voltage DC	1.8 kV
AC test voltage	3.5 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-50 °C
Laying temperature min.	-20 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
MGCHX 3 cores								
3 x 1.5		20024101	5BG2 531	12.5	75	220	225	16
3 x 2.5		20001753	5BG2 532	13.5	81	270	375	21
3 x 4			5BG2 533	14.5	87	340	600	28
3 x 6			5BG2 534	16.5	99	470	900	36
3 x 10		20001754	5BG2 535	19	114	650	1500	50
3 x 16		20016748	5BG2 536	21	126	900	2400	67
3 x 25		20016749	5BG2 537	25	150	1320	3750	89
3 x 35		20016750	5BG2 538	28	168	1730	5250	110
3 x 50		20016751	5BG2 540	31.5	189	2240	7500	137
3 x 70			5BG2 541	37.5	225	3120	10500	169
3 x 95		20001755	5BG2 542	41.5	249	4150	14250	205
MGCHX-J 3 cores with gn/ye								
3 x 1.5	-J	20001758	5BG2 601	12.5	75	220	225	16
3 x 2.5	-J	20001759	5BG2 602	13.5	81	270	375	21
3 x 4	-J		5BG2 603	14.5	87	340	600	28
3 x 6	-J		5BG2 604	16.5	99	470	900	36
3 x 10	-J		5BG2 605	19	114	650	1500	50
3 x 16	-J		5BG2 606	21	126	900	2400	67
3 x 25	-J		5BG2 607	25	150	1320	3750	89
MGCHX 4 cores								
4 x 1.5			5BG2 551	13.5	81	250	300	16
4 x 2.5			5BG2 552	14	84	310	500	21
4 x 4			5BG2 553	16	96	450	800	28
4 x 6			5BG2 554	18	108	560	1200	36
4 x 10			5BG2 555	20	120	800	2000	50
4 x 16			5BG2 556	23	138	1100	3200	67
4 x 25			5BG2 557	27.5	165	1640	5000	89
MGCHX-J 4 cores with gn/ye								
4 x 1.5	-J	20001760	5BG2 611	13.5	81	250	300	16
4 x 2.5	-J	20026144	5BG2 612	14	84	310	500	21
4 x 4	-J		5BG2 613	16	96	450	800	28
4 x 6	-J	20001761	5BG2 614	18	108	560	1200	36
4 x 10	-J		5BG2 615	20	120	800	2000	50
4 x 16	-J	20001762	5BG2 616	23	138	1100	3200	67
4 x 25	-J	20001763	5BG2 617	27.5	165	1640	5000	89
MGCHX 5 and multicores								
5 x 1.5			5BG2 571	14	84	290	375	14
5 x 2.5			5BG2 572	16	96	440	625	18
7 x 1.5		20001752	5BG2 172	15.4	92.4	380	525	10
12 x 1.5		20001756	5BG2 592	19	114	560	900	9
16 x 1.5		20001757	5BG2 594	21	126	690	1200	8
19 x 1.5		20024102	5BG2 595	22	132	770	1425	8
24 x 1.5			5BG2 596	24.5	147	950	1800	7
MGCHX-J 5 and multicores with gn/ye								

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
5 x 1.5	-J		5BG2 621	14	84	290	375	14
5 x 2.5	-J		5BG2 622	16	96	440	625	18
7 x 1.5	-J		5BG2 176	15.4	92.4	380	525	10

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -20 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

NOTES

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SIENOPYR FR MHXCH FE120 0,6/1 kV

Fire resistant power cables for ships and offshore units



Application

For fixed installation on ships and offshore units in all locations and on open decks. Special measures, e.g. screening are necessary for installation of unarmoured cables in radio stations or above the upper metallic deck. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	MHXCH
Standard	IEC 60092-353

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 (class 5 on request)
Insulation	Halogen free, ceramized special-elastomere insulation compound S95
Core identification	Core identification according to IEC 60092-353 MHXCH: 1-core: brown; 2 core: blue, brown 3-core: brown, black, grey 4-core: blue, brown, black, grey 5 and multicore: white with black numbers MHXCH-J: 1-core: gn-ye 3-core: gn-ye, blue, brown 4-core: gn-ye, brown, black, grey 5 and multicore: white with black numbers, one core gn-ye
Inner covering	Halogen free, flame retardant compound
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360, color orange

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	1.2 kV
Max. permissible operating voltage DC	1.8 kV
AC test voltage	3.5 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Resistance to fire	according to IEC 60331-1 resp. IEC 60331-2 120min.
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
MHXCH FE120 1 core								
1 x 4			5BG7 503	8.2	50	120	200	51
1 x 6			5BG7 504	8.8	53	145	300	52
1 x 10		20001938	5BG7 505	9.6	58	195	500	72
1 x 16		20001939	5BG7 506	10.6	64	265	800	96
1 x 25		20001940	5BG7 507	12.2	74	390	1250	127
1 x 35		20001941	5BG7 508	13.5	81	485	1750	157
1 x 50		20001942	5BG7 510	15.3	92	660	2500	196
1 x 70			5BG7 511	17.5	105	880	3500	242
1 x 95		20001943	5BG7 512	19.3	116	1180	4750	293
1 x 120			5BG7 513	21.2	128	1420	6000	339
MHXCH FE120 2 cores								
2 x 1.5		20001944	5BG7 521	13.3	80	245	150	20
2 x 2.5		20001945	5BG7 522	14.1	85	290	250	26
2 x 4			5BG7 523	15.5	93	380	400	34
2 x 6			5BG7 524	17	102	465	600	44
2 x 10			5BG7 525	19	114	615	1000	61
2 x 16			5BG7 526	21	126	810	1600	82
MHXCH FE120 3 cores								
3 x 1.5		20001950	5BG7 531	13.8	83	270	225	16
3 x 2.5		20001951	5BG7 532	14.7	89	322	375	21
3 x 4		20001952	5BG7 533	16.7	101	445	600	28
3 x 6		20001953	5BG7 534	18	108	545	900	36
3 x 10		20001954	5BG7 535	20	120	730	1500	50
3 x 16		20001955	5BG7 536	22.3	134	980	2400	67
3 x 25		20001956	5BG7 537	25.7	155	1380	3750	89
3 x 35		20001957	5BG7 538	28.5	171	1770	5250	110
3 x 50		20001958	5BG7 540	32.1	193	2300	7500	137
3 x 70		20165126	5BG7 541	35.7	215	3110	10500	169
3 x 95		20115714	5BG7 542	41.5	249	4230	14250	205
3 x 120		20001959	5BG7 543	45.5	273	5150	18000	237
MHXCH-J FE120 3 cores with gn/ye								
3 x 1.5	-J	20001968	5BG7 601	13.8	83	270	225	16
3 x 2.5	-J	20001969	5BG7 602	14.7	89	322	375	21
3 x 4	-J		5BG7 603	16.7	101	445	600	28
3 x 6	-J		5BG7 604	18	108	545	900	36
3 x 10	-J		5BG7 605	20	120	730	1500	50
3 x 16	-J		5BG7 606	22.3	134	980	2400	67
MHXCH FE120 4 cores			5BG7 607	25.7	155	1380	3750	89
4 x 1.5		20008803	5BG7 551	15.3	92	345	300	16
4 x 2.5		20102350	5BG7 552	16.5	99	415	500	21
4 x 4		20001960	5BG7 553	17.5	105	525	800	28
4 x 6		20001961	5BG7 554	18.8	113	645	1200	36
4 x 10		20001962	5BG7 555	21.5	129	880	2000	50
4 x 16		20165127	5BG7 556	24	144	1200	3200	67

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
4 x 25		20037902	5BG7 557	28	168	1740	5000	89
4 x 35			5BG7 558	31	186	2190	7000	110
4 x 50		20165128	5BG7 560	35	210	2860	10000	137
4 x 70			5BG7 561	40	240	3940	14000	169
MHXCH-J FE120 4 cores with gn/ye		20165129	5BG7 562	46	276	5330	19000	205
4 x 1.5	-J	20001970	5BG7 611	15.3	92	345	300	16
4 x 2.5	-J	20001971	5BG7 612	16.5	99	415	500	21
4 x 4	-J		5BG7 613	17.5	105	525	800	28
4 x 6	-J		5BG7 614	18.8	113	645	1200	36
4 x 10	-J		5BG7 615	21.5	129	880	2000	50
4 x 16	-J		5BG7 616	24	144	1200	3200	67
MHXCH FE120 5 and multicores			5BG7 617	28	168	1740	5000	89
5 x 1.5		20001963	5BG7 571	16.5	99	400	375	14
5 x 2.5		20042607	5BG7 572	17.5	105	490	625	18
7 x 1.5		20001936	5BG7 172	16.1	97	360	525	10
12 x 1.5		20001964	5BG7 592	20.6	124	565	900	9
14 x 1.5		20040048	5BG7 593	21.5	129	630	1050	8
16 x 1.5			5BG7 594	22.6	136	700	1200	8
19 x 1.5		20001965	5BG7 595	23.8	143	790	1425	7
24 x 1.5		20001966	5BG7 596	26.3	158	970	1800	7
MHXCH-J FE120 5 and multicores with gn/ye								
5 x 1.5	-J		5BG7 621	16.5	99	400	375	14
5 x 2.5	-J		5BG7 622	17.5	105	490	625	18
7 x 1.5	-J		5BG7 176	16.5	99	360	525	10

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.
At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship 's vibrations

NOTES

[illegible]

SIENOPYR FR MHXH FE120 0,6/1 kV

Fire resistant power cables for ships and offshore units



Application

For fixed installation on ships and offshore units in all locations and on open decks. Special measures, e.g. screening are necessary for installation of unarmoured cables in radio stations or above the upper metallic deck. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	MHXH
Standard	IEC 60092-353

Design features

Conductor	Copper, round stranded acc. to IEC 60228 class 2 (class 5 on request)
Insulation	halogen free, ceramized special-elastomere insulation compound S95
Core identification	Core identification according to IEC 60092-353 MHXH: 1-core: brown; 2 core: blue, brown 3-core: brown, black, grey 4-core: blue, brown, black, grey 5 and multicore: white with black numbers MHXH-J: 1-core: gn-ye 3-core: gn-ye, blue, brown 4-core: gn-ye, brown, black, grey 5 and multicore: white with black numbers, one core gn-ye
Inner covering	Halogen free, flame retardant compound
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360, color orange

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	1.2 kV
Max. permissible operating voltage DC	1.8 kV
AC test voltage	3.5 kV
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Resistance to fire	according to IEC 60331-1 resp. IEC 60331-2 120min.
Flame propagation	according to IEC 60332-3-22
Flame propagation	according to IEC 60332-1-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
MHXX FE120 1 core								
1 x 4			5BG7 703	7	28	80	200	51
1 x 6			5BG7 704	7.5	30	100	300	52
1 x 10			5BG7 705	8.5	34	150	500	72
1 x 16			5BG7 706	9.5	38	210	800	96
1 x 25		20165130	5BG7 707	11.1	45	305	1250	127
1 x 35		20165131	5BG7 708	12.3	50	410	1750	157
1 x 50		20165132	5BG7 710	13.8	56	540	2500	196
1 x 70		20165133	5BG7 711	15.7	63	750	3500	242
1 x 95		20165134	5BG7 712	18	72	1020	4750	293
1 x 120			5BG7 713	19.8	80	1260	6000	339
MHXX FE120 2 cores								
2 x 1.5		20001925	5BG7 012	9.9	40	115	150	20
2 x 2.5		20165135	5BG7 013	10.8	44	145	250	26
2 x 4			5BG7 014	12	48	170	400	34
2 x 6			5BG7 015	13.5	54	215	600	44
2 x 10			5BG7 016	15.5	62	310	1000	61
2 x 16			5BG7 017	17.5	70	450	1600	82
MHXX FE120 3 cores								
3 x 1.5		20001926	5BG7 022	10.5	42	125	225	16
3 x 2.5		20001927	5BG7 023	11.9	48	165	375	21
3 x 4		20165136	5BG7 024	12.8	52	225	600	28
3 x 6		20001928	5BG7 025	14.2	57	290	900	36
3 x 10		20001929	5BG7 026	16.6	67	430	1500	50
3 x 16		20001930	5BG7 027	18.9	76	630	2400	67
3 x 25		20001972	5BG7 737	23.9	96	1210	3750	89
3 x 35		20001973	5BG7 738	27.2	164	1570	5250	110
3 x 50		20001974	5BG7 740	30.6	184	2060	7500	137
3 x 70		20001975	5BG7 741	34.7	209	2820	10500	169
3 x 95		20165137	5BG7 742	39.5	237	3830	14250	205
3 x 120		20001976	5BG7 743	43	258	4670	18000	237
MHXX-J FE120 3 cores with gn/ye								
3 x 1.5	-J	20001931	5BG7 032	10.5	42	125	225	16
3 x 2.5	-J	20001932	5BG7 033	11.9	48	165	375	21
3 x 4	-J		5BG7 034	12.8	52	225	600	28
3 x 6	-J		5BG7 035	14.2	57	290	900	36
3 x 10	-J		5BG7 036	16.6	67	430	1500	50
3 x 16	-J		5BG7 037	18.9	76	630	2400	67
MHXX FE120 4 cores								
4 x 1.5		20001933	5BG7 042	12	48	158	300	16
4 x 2.5		20165138	5BG7 043	13	52	207	500	21
4 x 4		20165139	5BG7 044	14	56	285	800	28
4 x 6		20165140	5BG7 045	15.5	62	380	1200	36
4 x 10		20165191	5BG7 046	18	72	565	2000	50
4 x 16		20165192	5BG7 047	21	84	830	3200	67
4 x 25		20026222	5BG7 757	26.7	161	1520	5000	89

Number of cores x cross section	Art. Des. O/J	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
4 x 35		20165193	5BG7 758	30	180	1980	7000	110
4 x 50		20165194	5BG7 760	33.5	201	2640	10000	137
4 x 70			5BG7 761	38	228	3560	14000	169
MHXXH-J FE120 4 cores with gn/ye								
4 x 1.5	-J		5BG7 052	12	48	158	300	16
4 x 2.5	-J		5BG7 053	13	52	207	500	21
4 x 4	-J		5BG7 054	14	56	285	800	28
4 x 6	-J	20008563	5BG7 055	15.5	62	380	1200	36
4 x 10	-J		5BG7 056	18	72	565	2000	50
4 x 16	-J		5BG7 057	21	84	830	3200	67
MHXXH FE120 5 and multicores								
5 x 1.5		20001934	5BG7 062	12.9	52	195	375	14
5 x 2.5		20165195	5BG7 063	14	56	255	625	18
7 x 1.5		20001935	5BG7 072	14.1	57	240	525	10
12 x 1.5		20001977	5BG7 792	18.8	76	405	900	9
14 x 1.5		20001978	5BG7 593	19.7	79	460	1050	8
16 x 1.5			5BG7 794	20.5	82	550	1200	8
19 x 1.5		20001979	5BG7 795	22	88	605	1425	7
24 x 1.5		20001980	5BG7 796	25.5	153	800	1800	7
MHXXH-J FE120 5 and multicores with gn/ye								
5 x 1.5	-J		5BG7 066	12.9	52	195	375	14
5 x 2.5	-J		5BG7 067	14	56	255	625	18
7 x 1.5	-J		5BG7 076	14.1	57	240	525	10

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 6 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

Marine cables



COMMUNICATION MARINE CABLES

Designation	Standard	Dimension	Fire performance	Cores	Insulation	Outer sheath
FM2XCH 250V	acc. to IEC 60092-376	Optimized	Flame retardant		XLPE	SHF1
FMGCHX 250V	acc. to IEC 60092-376	Optimized	Flame retardant		HEPR	SHF2
FMHXCH FE120 250V	acc. to IEC 60092-376	Optimized	Flame retardant and fire resistant		S95	SHF1

SIENOPYR FR FM2XCH 250 V

Instrumentation cables for ships and offshore units



Application

For fixed installation on ships and offshore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	FM2XCH
Standard	IEC 60092-376

Design features

Conductor	7 bare copper wires acc. to IEC 60228 class 2 cross section: 0,75mm ² / AWG 20 = 0,518mm ² / AWG 18 = 0,821mm ²
Insulation	Cross linked polyethylene (XLPE) acc. to IEC 60092-360
Core identification	Each pair white and blue with black numbers
Core assembly	Pairs in layers
Core arrangement	Lapped tape over laid-up pairs
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360

Electrical parameters

Max. permissible operating voltage AC	0,250 kV
Max. permissible operating voltage DC	0,250 kV
AC test voltage	1.5 kV
Mutual capacitance	max. 120 nF/km (at 800 Hz)
Coupling	max. 1000 pF over 500 m
Near-end crosstalk attenuation (NEXT)	Over 100 m: at 800Hz: -77 dB (standard value) at 10 kHz: -75 dB (standard value) at 100 kHz: -68 dB (standard value)
Wave attenuation	at 800 Hz: 0,75 dB/km (standard value) at 10 kHz: 1,70 dB/km (standard value) at 100 kHz: 3,20 dB/km (standard value)
Characteristic impedance	100 kHz to 2 MHz: 130 Ohm (standard value) >2 MHz: 110 Ohm (standard value)
Transfer impedance	10 mOhm/m (standard value) at 10 MHz
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Conductor resistance at 20°C max. Ω/km	Current carrying capacity (1) A
1 x 2 x 0.75	20001908	5BG6 890	7.7	46.2	75	75	52	10
2 x 2 x 0.75	20001909	5BG6 891	8.7	52.2	103	150	52	7
4 x 2 x 0.75	20001910	5BG6 892	11.2	67.2	170	300	52	6
7 x 2 x 0.75	20001911	5BG6 893	13.7	82.2	255	525	52	4
10 x 2 x 0.75	20001912	5BG6 894	16.6	99.6	355	750	52	4
14 x 2 x 0.75	20001913	5BG6 895	18.9	113.4	460	1050	52	3
19 x 2 x 0.75	20001914	5BG6 896	21	126	590	1425	52	3
24 x 2 x 0.75	20001915	5BG6 897	23.7	142.2	720	1800	52	3

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 4 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -20 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

SIENOPYR FR FMGCHX 250V

Instrumentation cables for ships and offshore units -50°C



Application

For fixed installation on ships and offshore units in all locations and on open decks. Special measures, e.g. screening are necessary for installation of unarmoured cables in radio stations or above the upper metallic deck. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	FMGCHX
Standard	IEC 60092-376

Design features

Conductor	7 bare copper wires acc. to IEC 60228 classe 2 cross section: 0,75mm ² / AWG 20 = 0,518mm ² / AWG 18 = 0,821mm ²
Insulation	Thermoset compound type HEPR acc. to IEC 60092-360
Core identification	White with black numbers
Core assembly	Pairs in layers
Inner covering	Halogen free, flame retardant compound
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-2, according to IEC 60092-360

Electrical parameters

Max. permissible operating voltage AC	0,250 kV
Max. permissible operating voltage DC	0,250 kV
AC test voltage	1.5 kV
Mutual capacitance	max. 120 nF/km (at 800 Hz)
Coupling	max. 1000 pF over 500 m
Near-end crosstalk attenuation (NEXT)	Over 100 m: at 800Hz: -77 dB (standard value) at 10 kHz: -75 dB (standard value) at 100 kHz: -68 dB (standard value)
Wave attenuation	at 800 Hz: 0,75 dB/km (standard value) at 10 kHz: 1,70 dB/km (standard value) at 100 kHz: 3,20 dB/km (standard value)
Characteristic impedance	100 kHz to 2 MHz: 130 Ohm (standard value) >2 MHz: 110 Ohm (standard value)
Transfer impedance	10 mOhm/m (standard value) at 10 MHz
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034-2
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-50 °C
Laying temperature min.	-20 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Conductor resistance at 20°C max. Ω/km	Current carrying capacity (1) A
1 x 2 x 0.75		5BG2 890	8.9	53.4	100	75	52	10
2 x 2 x 0.75	20016552	5BG2 891	9.8	58.8	145	150	52	7
4 x 2 x 0.75		5BG2 892	14.5	87	250	300	52	6
7 x 2 x 0.75	20016603	5BG2 893	17.2	103.2	380	525	52	4
10 x 2 x 0.75		5BG2 894	20	120	510	750	52	4
14 x 2 x 0.75		5BG2 895	23	138	680	1050	52	3
19 x 2 x 0.75		5BG2 896	26	156	790	1425	52	3
24 x 2 x 0.75		5BG2 897	29	174	1000	1800	52	3

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 4 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -20 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

SIENOPYR FR FMHXCH FE120 250 V

Fire resistant instrumentation cables for ships and offshore units



Application

For fixed installation on ships and offshore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR
Type designation	FMHXCH
Standard	IEC 60092-376

Design features

Conductor	7 bare copper wires acc. to IEC 60228 class 2 cross section: 0,75mm ² / AWG 20 = 0,518mm ² / AWG 18 = 0,821mm ²
Insulation	Halogen free, ceramized special-elastomere insulation compound S95
Core identification	White with black numbers
Core assembly	Pairs in layers
Core arrangement	Lapped polyester foil and textile tape over laid-up cores
Screen	Plain copper wire braid
Outer sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360. Colour: orange

Electrical parameters

Max. permissible operating voltage AC	0,250 kV
Max. permissible operating voltage DC	0,250 kV
AC test voltage	1.5 kV
Mutual capacitance	max. 120 nF/km (at 800 Hz)
Coupling	max. 1000 pF over 500 m
Near-end crosstalk attenuation (NEXT)	Over 100 m: at 800Hz: -77 dB (standard value) at 10 kHz: -75 dB (standard value) at 100 kHz: -68 dB (standard value)
Wave attenuation	at 800 Hz: 0,75 dB/km (standard value) at 10 kHz: 1,70 dB/km (standard value) at 100 kHz: 3,20 dB/km (standard value)
Characteristic impedance	100 kHz to 2 MHz: 130 Ohm (standard value) >2 MHz: 110 Ohm (standard value)
Transfer impedance	10 mOhm/m (standard value) at 10 MHz
Current Carrying Capacity description	The definitions in IEC 60092-201 apply.

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according IEC 60754-2
Resistance to fire	according IEC 60331-1 resp. IEC 60331-2 for 120 min
Flame propagation	according to IEC 60332-3-22
Flame propagation	according to IEC 60332-1-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	6 x D

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Conductor resistance at 20°C max. Ω/km	Current carrying capacity (1) A
1 x 2 x 0.75	20001981	5BG7 890	8.4	50.4	92	75	52	10
2 x 2 x 0.75	20001982	5BG7 891	9.6	57.6	127	150	52	7
4 x 2 x 0.75	20001983	5BG7 892	12.5	75	200	300	52	6
7 x 2 x 0.75	20001984	5BG7 893	14.9	89.4	305	525	52	4
10 x 2 x 0.75	20001985	5BG7 894	18.1	108.6	430	750	52	4
14 x 2 x 0.75	20001986	5BG7 895	20.6	123.6	560	1050	52	3
19 x 2 x 0.75	20001987	5BG7 896	22.8	136.8	700	1425	52	3
24 x 2 x 0.75	20001988	5BG7 897	25.8	154.8	870	1800	52	3

(1) The values are for continuous load at 45 °C ambient temperature and laying of max. 4 cables in horizontal arrangement, tightly packed, free air circulation around the cable bundle.

At ambient temperatures below -15 °C the cables should be subjected to no further mechanical movement than normal ship's vibrations

Marine cables



MARINE CABLES FOR DATA TRANSMISSION

Designation	Standard	Dimension	Fire performance	Cores	Insulation	Outer sheath
MI-VHH 2G62,5/125 Fiber Optic			Flame retardant			
M-02Y(ST)CHX Profibus			Flame retardant			

SIENOPYR FR MI-VHH 2G62,5

Fiber optic cables for ships and offshore units



Application

As a bus cable for fixed installation on ships and offshore units in all locations and on open decks. The cables are not suitable for continuous use in water. We recommend BFOC connectors (compatible with FST connectors). In order to improve the resistance to vibrations, the fiber optic buffers should be connected with adhesive to the connector housing.

Global data

Brand	SIENOPYR FR
Type designation	MI-VHH

Design features

Conductor	Copper round, stranded
Insulation	Ethylene propylene rubber (EPR) according to IEC 60092-360. Diameter: 2.9 mm
Core identification	Fiber optic: - a buffer: orange - b buffer: blue Copper core: - a core: neutral colour - b core: black
Optical Fiber	Multimode graded index mineral glass optical fiber with aramid fibers for strain and a protective jacket of halogen-free polyolefine Core diameter: 62.5 µm, Cladding diameter: 125 µm, Diameter over the jacket: 2.9 mm. - attenuation constant at 850 nm: max. 3.1 dB/km - bandwidth-length product at 850 nm: min. 200 MHz km - attenuation constant at 1300 nm: max. 0.8 dB/km - bandwidth-length product at 1300 nm: min. 600 MHz km
Core arrangement	Nonwoven plastic textile band
Screen	Plain copper wire braid
Inner sheath	Extruded filling compound. Diameter: 10.6 mm
Outer sheath	Halogen free compound (SHF1) according IEC 60092-360. Colour: black

Electrical parameters

Rated voltage	300/300V
Insulation resistance at 20°C	1200 MΩxkm
Surface resistance of the outer sheath at 20°C	10 ⁹ Ω
Max. conductor loop resistance at 20°C	36.2 Ω/km
Current Carrying Capacity description	The definitions in DIN VDE 0891 apply. Max. permissible current carrying capacity of the copper conductor at an ambient temperature: 45°C 10 A 60°C 8 A 70°C 6 A

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-1-2
Flame propagation	according to IEC 60332-3-22
Ozone resistance	according to EN 50396 clause 8.1.3

Thermal parameters

Max. permissible temperature at conductor	80 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load	Temporary: max. 500 N Continuous: max. 250 N
Min. bending radius	10 x D (single bending), 20 x D (several times bending)

Number of cores x cross section	Part number	MLFB Number	Outer diameter min. mm	Outer diameter max. mm	Weight (ca.) kg/km
2G62.5/125 3.1/ B200 + 0.8F600 + 2.1CU	20001923	5BG6 960	12.8	13.8	210

SIENOPYR FR PROFIBUS M-02Y(ST)CHX

Bus cables for ships and offshore units



Application

As a bus cable for fixed installation on ships and off-shore units in all locations and on open decks. The cables are not suitable for continuous use in water.

Global data

Brand	SIENOPYR FR PROFIBUS
Type designation	M-02Y(ST)CHX
Standard	IEC 61784
Standard	IEC 61158

Design features

Conductor	7 bare copper wires E-Cu58 F21 to DIN 40500 part 4 Cross section: 0.35 mm ² (AWG 22 = 0.325 mm ²)
Insulation	Polyethylene foam (cellular HDPE)
Core identification	a core: red b core: green
Core arrangement	Laying of the both copper cores with two blind cores. Nonwoven plastic textile band around the laid-up cores
Screen	1. layer: laminated aluminium foil 2. layer: tinned copper wire braid
Inner sheath	Polyolefine compound, type SHF-1, according to IEC 60092-360. Diameter: 8 mm
Outer sheath	Halogen free, cross-linked polymer based on VG 95218 Colour: black

Electrical parameters

Rated voltage	100/100V
Insulation resistance at 20°C	16000 MΩxkm
Surface resistance of the outer sheath at 20°C	10 ⁹ Ω
Mutual capacitance	max. 30 nF/km (at 800 Hz)
Wave attenuation	at 16 MHz: max. 45 dB/km at 4 MHz: max. 22 dB/km at 38.4 kHz: max. 5 dB/km at 9.6 kHz: max. 3 dB/km
Characteristic impedance	3 MHz to 20 MHz: 150 +/- 15 Ω at 38.4 kHz 185 +/- 18.5 Ω at 9.6 kHz 250 +/- 25 Ω
Max. conductor loop resistance at 20°C	110 Ω/km

Chemical parameters

Smoke emission	according to IEC 61034
Acidity of fire gases	according to IEC 60754-2
Flame propagation	according to IEC 60332-3-24
Ozone resistance	according to EN 50396 clause 8.1.3
Resistance to chemicals	Diesel fuel, Oils, Hydraulic fluids, Solvent cleansing agents, De-ionized water and De-ionized water with 3,5% NaCl (tests based on VG 95218 part 2)

Thermal parameters

Max. permissible temperature at conductor	80 °C
Ambient temperature for fix installation min.	-35 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load	100 N
Min. bending radius	10 x D (single bending), 20 x D (several times bending)

Number of cores x cross section	Part number	MLFB Number	Outer diameter max. mm	Bending radii min. mm	Weight (ca.) kg/km
1x2x0.35	20001922	5BG6 951	10.8	108	110

Marine cables



MULTIMEDIA CABLES

UCMULTIMEDIA 1500 SS23

6FOILS S/FTP AWG23/1



Application

Primary (Campus), Secondary (Riser), Tertiary (Horizontal)
IEEE 802.5; IEEE 802.3: 10Base-T; 100Base-T; 1000Base-T; 10GBase-T
ISDN; TPDDI; ATM, CATV, Broadband Video, SOHO-Cabling
Power over Ethernet (PoE) / PoE+

Standards

EN 50173-1; EN 50288-9-1
ISO/IEC 11801; IEEE 802.3at
IEC 61156-5; IEC61156-7

Certificates



Flame resistance

LSHF-FR(LSFROH): IEC 60754-2; IEC 61034 IEC 60332-1; IEC 60332-3-24

Construction

Conductor	bare copper wire Ø 0.57 mm (AWG 23/1)
Insulation	Foamskin PE, Ø 1.4 mm
Twisting	2 cores to the pair
Pair screen	Al-laminated plastic foil, patented wrapping of two pairs each
Cable lay up	2 x 2 pairs to the core
Screen	copper braid, tinned
Sheath	Halogen free compound (SHF1) according IEC 60092-360 melon yellow RAL 1028

Mechanical properties

Bending radius	without load	4 x D
	with load	8 x D
Temperature range	during operation	-20°C to + 60°C
	during installation	0°C to + 50°C

Electrical properties

at 20°C ± 5°C

Loop resistance		≤ 135 Ω/km	
Resistance unbalance		≤ 2%	
Insulation resistance	(500 V)	≥ 2000 MΩ*km	
Mutual capacitance	at 800 Hz	Nom. 43 nF/km	
Capacitance unbalance	(pair/ground)	≤ 1500 pF/km	
Mean characteristic impedance	at 100 MHz	100 ± 5 Ω	
Nominal velocity of propagation		ca. 80 %	
Propagation delay		≤ 427 ns/100m	
Delay skew		≤ 12 ns/100m	
Test voltage	(DC, 1 min) core/core and core/screen	1000 V	
Transfer impedance	bei 1 MHz	≤ 5 mΩ /m	Grade 1
	bei 10 MHz	≤ 2 mΩ /m	
	bei 30 MHz	≤ 2 mΩ /m	
Coupling attenuation		≥ 85 dB	Type 1
Segregation classification acc. EN 50174-2			„d“

Electrical data (nominal)

acc. to Cat.7A (at 20°C)

F (MHz)	Attenuation (dB/100m)	NEXT (dB)	PS-NEXT (dB)	ACR (dB/100m)	PS-ACR (dB/100m)	ACRF (dB/100m)	PS-ACRF (dB/100m)	Return loss (dB)
1.0	1.8	115	112	113	110	105	102	-
4.0	3.4	115	112	112	109	105	102	27
10.0	5.4	115	112	110	107	97	94	30
16.0	6.8	115	112	108	105	93	90	30
20.0	7.7	115	112	107	104	91	88	30
31.2	9.6	115	112	105	102	87	84	30
62.5	13.7	114	111	100	97	81	78	30
100.0	17.4	111	108	94	91	77	74	30
155.5	19.5	109	106	89	86	75	72	26
200.0	25.0	107	104	82	79	71	68	25
250.0	28.1	105	102	77	74	69	66	24
300.0	30.9	104	101	73	70	67	64	24
600.0	44.8	100	97	55	52	61	58	22
1000.0	58.4	96	93	37	34	57	54	19
1200.0	65.2	95	92	30	27	45	42	
1500.0	73.5	94	91	21	18	43	40	

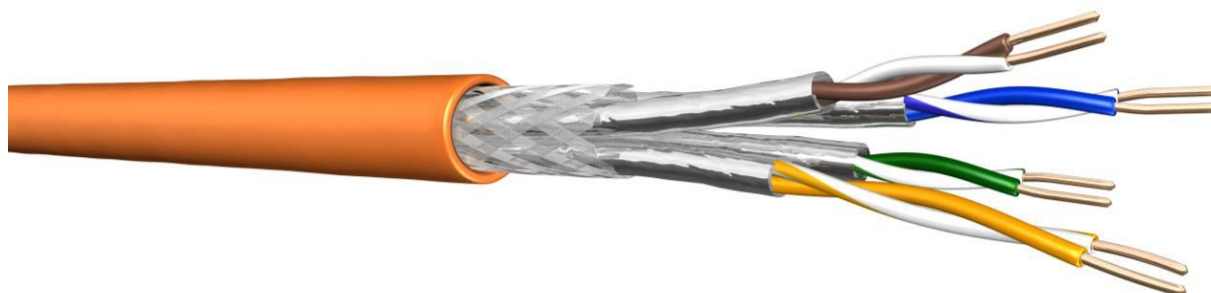
Product order data

Product code	Cable type	Brand name	Outer diameter	Fire load		Weight	Copper content	Tensile force
			Mm	MJ/km	kWh/m			N
1001088	J-02YSCH 4x2x0.57 PiMF	UC MULTIMEDIA 1500 SS23 6F S/FTP 4P LSHF-FR	7.9	642	0.178	81	39	340

Product Code Table

Product Description	Product Code	PG Reference Code	PG Part Number
UC MM 1500 SS23 6F S/FTP LSHFFR 500DW	1001088-00500DW	60011602	60011601
UC MM 1500 SS23 6F S/FTP LSHFFR	1001088	60011602	60011602
UC MM 1500 SS23 6F S/FTP LSHFFR 100RW	1001088-00100RW	60011602	60015304
UC MM 1500 SS23 6F S/FTP LSHFFR 1000DW	1001088-01000DW	60011602	60015307

UC900 SS23 Cat.7 S/FTP AWG23/1



Application

Primary (Campus), Secondary (Riser), Tertiary (Horizontal)
IEEE 802.3: 10Base-T; 100Base-T; 1000Base-T; 10GBase-T
IEEE 802.5 16 MB; ISDN; TPDDI; ATM
Power over Ethernet (PoE) / PoE+

Standards

EN 50173-1; EN 50288-4-1
ISO/IEC 11801; IEC 61156-5
IEEE 802.3af

Flame resistance

LSHF (LSOH): IEC 60332-1; IEC 60754-2; IEC 61034
LSHF-FR (LSOH-FR): IEC 60332-1; IEC 60332-3-24; IEC 60754-2; IEC 61034

Construction

Conductor	bare copper wire, Ø 0.56 mm (AWG 23/1)
Insulation	Foamskin PE, Ø 1.38 mm
Twisting	2 cores to the pair
Pair screen	Al-laminated plastic foil
Cable lay up	4 pairs (PiMF) to the core
Screen	copper braid, tinned
Sheath	LSHF, orange or LSHF-FR, orange, halogen free compound (SHF1) according IEC 60092-360

Mechanical properties

Bending radius	without load	4 x D
	with load	8 x D
Temperature range	during operation	-20°C to + 60°C
	during installation	0°C to + 50°C

Electrical properties

at 20°C ± 5°C

Loop resistance		154 Ω/km	
Resistance unbalance		≤ 2%	
Insulation resistance	(500 V)	≥ 2000 MΩ*km	
Mutual capacitance	at 800 Hz	Nom. 43 nF/km	
Capacitance unbalance	(pair/ground)	≤ 1500 pF/km	
Mean characteristic impedance	100 MHz	100 ± 5 Ω	
Nominal velocity of propagation		ca. 79 %	
Propagation delay		≤ 427 ns/100m	
Delay skew		≤ 12 ns/100m	
Test voltage	(DC, 1 min) core/core and core/screen	1000 V	
Transfer impedance	bei 1 MHz	≤ 5 mΩ /m	Grade 1
	bei 10 MHz	≤ 5 mΩ /m	
	bei 30 MHz	≤ 10 mΩ /m	
Coupling attenuation		≥ 85 dB	Type 1
Segregation classification acc. EN 50174-2			„D“

Electrical data (nominal)

acc. to Cat.7 (at 20°C)

F (MHZ)	Attenuation (dB/100m)	NEXT (dB)	PS-NEXT (dB)	ACR (dB/100m)	PS-ACR (dB/100m)	ACRF (dB/100m)	PS-ACRF (dB/100m)	Return loss (dB)
1,0	1,8	100	97	98	95	105	105	-
4,0	3,4	100	97	97	94	105	102	27
10,0	5,4	100	97	95	92	97	94	30
16,0	6,8	100	97	93	90	93	90	30
20,0	7,7	100	97	92	89	91	88	30
31,2	9,6	100	97	90	87	87	84	30
62,5	13,7	100	97	86	83	81	78	30
100,0	17,4	100	97	83	80	77	74	30
125,0	19,5	95	92	75	72	75	72	26
155,5	21,9	94	91	72	69	73	70	26
175,0	23,3	93	90	70	67	72	69	25
200,0	25,0	92	89	67	64	71	68	25
250,0	28,1	90	87	62	59	69	66	24
300,0	30,9	89	86	58	55	67	64	24
450,0	38,3	87	84	48	45	64	61	23
600,0	44,8	85	82	40	37	61	58	22
750,0	52,0	83	80	31	28	59	56	21
900,0	59,4	82	79	23	20	58	55	20
1000,0	63,1	80	77	17	14	57	54	20

Product order data

Product code	Cable type	Brand name	Outer diameter	Fire load		Weight	Copper content	Tensile force
			mm	MJ/km	kWh/m	kg/km		N
1001032	J-02YSCH 4x2x0,56 PiMF	UC900 SS23 Cat.7 S/FTP 4P LSHF	7,5	585	0,163	75	38	340
1001033		UC900 SS23 Cat.7 S/FTP 4P LSHF-FR						
1001034	J-02YSCH 2x(4x2x0,56) PiMF	UC900 SS23 Cat.7 S/FTP 2x4P LSHF	7,5/15,0	1170	0,326	150	76	680
1001035		UC900 SS23 Cat.7 S/FTP 2x4P LSHF-FR						

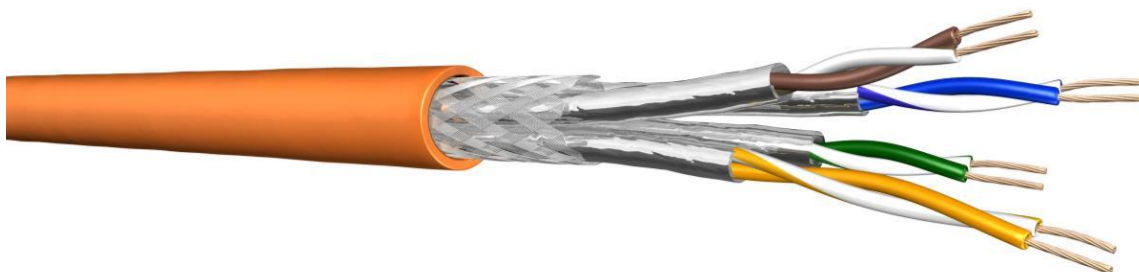
Product Code Table

Product Description	Product Code	PG Reference Code	PG Part Number
UC900 SS23 C7 S/FTP 4P LSHF	1001032	60011543	60011543
UC900 SS23 C7 S/FTP 4P LSHF 100RW	1001032-00100RW	60011543	60013258
UC900 SS23 C7 S/FTP 4P LSHF 250BR	1001032-00250BR	60011543	60013259
UC900 SS23 C7 S/FTP 4P LSHF 250DW	1001032-00250DW	60011543	60015261
UC900 SS23 C7 S/FTP 4P LSHF 500DW	1001032-00500DW	60011543	60011541
UC900 SS23 C7 S/FTP 4P LSHF 1000DW	1001032-01000DW	60011543	60011542
UC900 SS23 C7 S/FTP 2x4P LSHF	1001034	60016082	60016082
UC900 SS23 C7 S/FTP 2x4P LSHF 1000DW	1001034-01000DW	60016082	60016086
UC900 SS23 C7 S/FTP 2x4P LSHF 250DW	1001034-00250DW	60016082	60016091
UC900 SS23 C7 S/FTP 2x4P LSHF 500DW	1001034-00500DW	60016082	60013232
UC900 SS23 C7 S/FTP 2x4P LSHF 100DW	1001034-00100DW	60016082	60013233
UC900 SS23 C7 S/FTP 4P LSHF-FR	1001033	60015274	60015274
UC900 SS23 C7 S/FTP 4P LSHF-FR 200RW	1001033-00200RW	60015274	60015277
UC900 SS23 C7 S/FTP 4P LSHF-FR 1000DW	1001033-01000DW	60015274	60011123
UC900 SS23 C7 S/FTP 4P LSHF-FR 500DW	1001033-00500DW	60015274	60011126
UC900 SS23 C7 S/FTP 2x4P LSHF-FR	1001035	60016105	60016105
UC900 SS23 C7 S/FTP 2x4P LSHF-FR 1000DW	1001035-01000DW	60016105	60016108

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

UC900 SS27 Cat.7

S/FTP Patch cable AWG27/7



Application

Work area and patch cord cable
IEEE 802.3: 10Base-T; 100Base-T; 1000Base-T; 10GBase-T
IEEE 802.5 16 MB; ISDN; TPDDI; ATM

Standards

EN 50173-1; EN 50288-4-2
ISO/IEC 11801; IEC 61156-6

Flame resistance

PVC: IEC 60332-1
LSHF (FRNC): IEC 60332-1; IEC 60754-2; IEC 61034

Construction

Conductor	stranded bare copper wire Ø 0.42 mm (AWG 27/7)
Insulation	Foam Skin Polypropylen, Ø 0.98 mm
Twisting	2 cores to the pair
Pair screen	Al-laminated plastic foil
Cable lay up	4 pairs (PiMF) to the core
Screen	Copper braid, tinned
Sheath	LSHF, color see "Technical data" Halogen free compound (SHF1) according IEC 60092-360.

Mechanical properties

Bending radius	without load	≥ 25 mm
	with load	≥ 50 mm
Temperature range	during operation	-20°C to + 60°C
	during installation	0°C to + 50°C

Electrical properties

at 20°C ± 5°C

Loop resistance		≤ 340 Ω/km
Resistance unbalance		≤ 3%
Insulation resistance	(500 V)	≥ 2000 MΩ*km
Mutual capacitance	at 800 Hz	Nom. 43 nF/km
Capacitance unbalance	(pair/ground)	≤ 1500 pF/km
Mean characteristic impedance	100 MHz	100 ± 5 Ω
Nominal velocity of propagation		ca. 79 %
Propagation delay		≤ 427 ns/100m
Delay skew		≤ 12 ns/100m
Test voltage	(DC, 1 min) core/core and core/screen	1000 V
Transfer impedance	at 1 MHz	10 mΩ/m
	at 10 MHz	10 mΩ/m
	at 30 MHz	30 mΩ/m
Coupling attenuation		85 dB

Electrical data (nominal)

acc. to Cat.7 (at 20°C)

F (MHZ)	Attenuation (dB/10m)	NEXT (dB)	PS-NEXT (dB)	ACR (dB/100m)	ACRF (dB/100m)	PS- ACRF (dB/100m)	Return loss (dB)
1.0	0.3	90	87	90	80	77	23
4.0	0.6	90	87	89	80	77	24
10.0	1.0	90	87	89	80	77	25
16.0	1.3	90	87	89	76	73	25
20.0	1.4	90	87	89	74	71	25
31.2	1.8	90	87	88	70	67	25
62.5	2.6	90	87	87	64	61	23
100.0	3.2	87	84	84	60	57	21
125.0	3.6	85	82	81	58	55	20
155.5	4.0	84	81	80	56	53	19
175.0	4.3	83	80	79	55	52	19
200.0	4.6	82	79	77	54	51	18
250.0	5.1	81	78	76	52	49	18
300.0	5.6	80	77	74	50	47	17
450.0	6.9	77	74	70	47	44	17
600.0	7.9	75	72	67	44	41	17
750.0	8.7	73	70	64	42	39	
900.0	9.7	72	69	62	41	38	
1000,0	10,2	71	68	61	40	37	

Product order data

Product code	Cable type	Brand name	Colour	Outer diameter mm	Fire load		Weight kg/km	Copper content	Tensile force N
					MJ/km	kWh/m			
1001129 1001130 1001131 1001132 1001133 1001134 1001135	Li-02YSCH 4x2x0,42L PiMF LSHF	UC900 SS27 Cat.7 S/FTP 4PLSHF	orange black red green blue grey yellow	5,9	349	0,097	39	24	100

Product Code Table

Product Description	Product Code	PG Reference Code	PG Part Number
UC900 SS27 C7 S/FTPp 4P LSHF GY no pr.		60015521	60015521
UC900 SS27 C7 S/FTPp 4P LSHF GYnp 1000DW	1000387-01000DW	60015521	60015525
UC900 SS27 C7 S/FTPp 4P LSHF GYnp 1000DP	1000387-01000DP	60015521	60015527
UC900 SS27 C7 S/FTPp 4P LSHF OG np		60015510	60015510
UC900 SS27 C7 S/FTPp 4P LSHF OG	1001129	60016131	60016131
UC900 SS27 C7 S/FTPp 4P LSHF OG 100RW	1001129-00100RW	60016131	60016134
UC900 SS27 C7 S/FTPp 4P LSHF OG 500DW	1001129-00500DW	60016131	60016136
UC900 SS27 C7 S/FTPp 4P LSHF OG 1000DW	1001129-01000DW	60016131	60016141
UC900 SS27 C7 S/FTPp 4P LSHF BK no pr.		60015511	60015511
UC900 SS27 C7 S/FTPp 4P LSHF BK	1001130	60011273	60011273
UC900 SS27 C7 S/FTPp 4P LSHF BK 100RW	1001130-00100RW	60011273	60016148
UC900 SS27 C7 S/FTPp 4P LSHF BK 500DW	1001130-00500DW	60011273	60016151
UC900 SS27 C7 S/FTPp 4P LSHF BK 1000DW	1001130-01000DW	60011273	60016153
UC900 SS27 C7 S/FTPp 4P LSHF RD np		60015513	60015513
UC900 SS27 C7 S/FTPp 4P LSHF RD	1001131	60016156	60016156
UC900 SS27 C7 S/FTPp 4P LSHF RD 100RW	1001131-00100RW	60016156	60016159
UC900 SS27 C7 S/FTPp 4P LSHF RD 500DW	1001131-00500DW	60016156	60016161
UC900 SS27 C7 S/FTPp 4P LSHF RD 1000DW	1001131-01000DW	60016156	60016163
UC900 SS27 C7 S/FTPp 4P LSHF GN no pr.		60015515	60015515
UC900 SS27 C7 S/FTPp 4P LSHF GN		60016166	60016166
UC900 SS27 C7 S/FTPp 4P LSHF GN 100RW	1001132-00100RW	60016166	60016169
UC900 SS27 C7 S/FTPp 4P LSHF GN 500DW	1001132-00500DW	60016166	60016172
UC900 SS27 C7 S/FTPp 4P LSHF GN 1000DW	1001132-01000DW	60016166	60016175
UC900 SS27 C7 S/FTPp 4P LSHF BU no pr.		60015517	60015517
UC900 SS27 C7 S/FTPp 4P LSHF BU	1001133	60016178	60016178
UC900 SS27 C7 S/FTPp 4P LSHF BU 100RW	1001133-00100RW	60016178	60016180
UC900 SS27 C7 S/FTPp 4P LSHF BU 500DW	1001133-00500DW	60016178	60016182
UC900 SS27 C7 S/FTPp 4P LSHF BU 1000DW	1001133-01000DW	60016178	60016185
UC900 SS27 C7 S/FTPp 4P LSHF GY	1001134	60011272	60011272
UC900 SS27 C7 S/FTPp 4P LSHF GY 100RW	1001134-00100RW	60011272	60016191
UC900 SS27 C7 S/FTPp 4P LSHF GY 500DW	1001134-00500DW	60011272	60016195
UC900 SS27 C7 S/FTPp 4P LSHF GY 1000DP	1001134-01000DP	60011272	60016200
UC900 SS27 C7 S/FTPp 4P LSHF GY 1000DW	1001134-01000DW	60011272	60011271
UC900 SS27 C7 S/FTPp 4P LSHF GY 50RW	1001134-00050RW	60011272	60016203
UC900 SS27 C7 S/FTPp 4P LSHF GY 25RW	1001134-00025RW	60011272	60016206
UC900 SS27 C7 S/FTPp 4P LSHF YE	1001135	60011274	60011274
UC900 SS27 C7 S/FTPp 4P LSHF YE 100RW	1001135-00100RW	60011274	60016212
UC900 SS27 C7 S/FTPp 4P LSHF YE 500DW	1001135-00500DW	60011274	60016215
UC900 SS27 C7 S/FTPp 4P LSHF YE 1000DW	1001135-01000DW	60011274	60016218
UC900 SS27 C7 S/FTPp 4P LSHF VT		60016221	60016221
UC900 SS27 C7 S/FTPp 4P LSHF VT 1000DW	1001159-01000DW	60016221	60016224
UC900 SS27 C7 S/FTPp 4P LSHF WH		60016226	60016226
UC900 SS27 C7 S/FTPp 4P LSHF WH 1000DW	1016570-01000DW	60016226	60016230
UC900 SS27 C7 S/FTPp 4P LSHF BK 5000DW	1001130-05000DW	60011273	60025669

NOTES

[illegible]

UC300 HS24 Cat.5e

SF/UTP Installation Cable



Application

Primary (Campus), Secondary (Riser), Tertiary (Horizontal)
IEEE 802.3: 10Base-T; 100Base-T; 1000Base-T;
IEEE 802.5 16 MB; ISDN; TPDDI; ATM
Power over Ethernet (PoE) / PoE+

Standards

EN 50173-1; EN 50288-2-1
ISO/IEC 11801; IEC 61156-5
TIA/EIA-568-B.2
IEEE 802.3at

Flame resistance

LSHF(LSOH): IEC 60332-1; IEC 60754-2; IEC 61034
LSHF-FR(LSFROH): IEC 60332-1; IEC 60754-2; IEC 61034; IEC 60332-3-24

Construction

Conductor	bare copper wire, Ø 0.51 mm (AWG24)
Insulation	PE, Ø 1.1 mm
Twisting	2 cores to the pair
Cable lay up	4 pairs to the core
Screen	Al-laminated plastic foil and Copper braid, tinned
Sheath	LSHF, grey RAL 7035; duplex sheath: two cables parallel, separable LSHF-FR, grey RAL 7035; halogen free compound (SHF1) according IEC 60092-360.

Mechanical properties

Bending radius	without load	≥ 25 mm
	with load	≥ 50 mm
Temperature range	during operation	-20°C to + 60°C
	during installation	0°C to + 50°C

Electrical properties

at 20°C ± 5°C

Loop resistance		≤ 190 Ω/km
Resistance unbalance		≤ 2%
Insulation resistance	(500 V)	≥ 2000 MΩxkm
Mutual capacitance	at 800 Hz	Nom. 48 nF/km
Capacitance unbalance	(pair/ground)	≤ 1500 pF/km
Mean characteristic impedance	100 MHz	100 ± 5 Ω
Nominal velocity of propagation		ca. 67%
Propagation delay		≤ 535 ns/100 m
Delay skew		≤ 20 ns/100 m
Test voltage	(DC, 1 min) core/core and core/screen	1000 V
Transfer impedance	at 1 MHz	≤ 20 mΩ /m
	at 10 MHz	≤ 20 mΩ /m
	at 30 MHz	≤ 30 mΩ /m
	at 100MHz	≤ 60 mΩ /m
Coupling attenuation		≥ 75 dB
Segregation class		"c"

Electrical data (nominal)

acc. to Cat.5e (at 20°C)

F (MHZ)	Attenuation (dB/100m)	NEXT (dB)	PS-NEXT (dB)	ACR (dB/100m)	PS-ACR (dB/100m)	ELFEXT (dB/100m)	PS-ELFEXT (dB/100m)	Return loss (dB)
1.0	1.9	71	68	69.1	66.1	68	65	20
4.0	3.7	62	59	58.3	55.3	56	53	23
10.0	6.0	56	53	50.0	47.0	48	45	25
16.0	7.6	53	50	45.4	42.4	44	41	25
20.0	8.5	51	48	42.5	39.5	42	39	25
31.2	10.7	49	46	38.3	35.3	38	35	24
62.5	15.7	44	41	28.3	25.3	32	29	22
100.0	19.8	41	38	21.2	18.2	28	25	20
125.0	22.3	40	37	17.7	14.7	26	23	19
155.5	24.2	38	35	13.8	10.8	24	21	
175.0	25.7	37	34	11.3	8.3	23	20	
200.0	27.5	36	33	8.5	5.5	22	19	
250.0	29.2	35	32	5.8	2.8	20	17	
300.0	32.0	34	31	2.0	-1.0	16	13	

Product order data

Product code	Cable type	Brand name	Outer diameter	Fire load		Weight	Copper content	Tensile force
			mm	MJ/km	kWh/m	kg/km		N
1000536	J-2Y(St)CH 4x2x0.51	UC300 HS24 Cat.5e SF/UTP 4P LSHF	6.4	433	0.120	47	27	120
1000546	J-2Y(St)CH 4x2x0.51	UC300 HS24 Cat.5e SF/UTP 4P LSHF-FR						
1000493	J-2Y(St)CH 2x(4x2x0.51)	UC300 HS24 Cat.5e SF/UTP 2x4P LSHF	6.5/13.0	866	0.240	94	54	240

Produkt Code Table

Product name	Produkt Code	PG Referenz Code	PG Artikel Nummer
UC300 HS24 C5e SF/UTP 4P LSHF	1000536	60009618	60009618
UC300 HS24 C5e SF/UTP 4P LSHF 50RW	1000536-00050RW	60009618	60024745
UC300 HS24 C5e SF/UTP 4P LSHF 100RW	1000536-00100RW	60009618	60013237
UC300 HS24 C5e SF/UTP 4P LSHF 250RW	1000536-00250RW	60009618	60024746
UC300 HS24 C5e SF/UTP 4P LSHF 500DW	1000536-00500DW	60009618	60011496
UC300 HS24 C5e SF/UTP 4P LSHF 1000DW	1000536-01000DW	60009618	60009201
UC300 HS24 C5e SF/UTP 4P LSHF 6000DW	1000536-06000DW	60009618	60017493
UC300 HS24 C5e SF/UTP 4P LSHF-FR 500DP	1000546-00500DP	60024665	60024665
UC300 HS24 C5e SF/UTP 2x4P LSHF 100DW	1000493-00100DW	60017490	60017490
UC300 HS24 C5e SF/UTP 2x4P LSHF 500DW	1000493-00500DW	60017490	60017491
UC300 HS24 C5e SF/UTP 2x4P LSHF 1000DW	1000493-01000DW	60017490	60017492

[illegible]

ICS IE ToughCat 7

S/FTP Installation Cable for tougher environments



Application

Generic Data transmission. This cable is a **Cat7 S/FTP** cable meant for use as installation/horizontal cable in tougher electrical and mechanical environment, including ships and offshore units.

Standards

EN 50173-1; EN 50288-4-1
ISO/IEC 11801; IEC 61156-5
Power over Ethernet(PoE/PoE+)
Det Norske Veritas (DNV) specification No. 6-827.50-2

Fire rating

LSHF-FR(SHF1) : IEC 60754-2; IEC 61034, IEC 60332-3-24

Chemical resistance

Mineral oils IRM 902 (IEC60811-2-1) : 7 days/23°C, 4 hours/70°C
Diesel - IRM 903 (IEC60811-2-1) : 7 days/23°C, 4 hours/70°C

Certification

This cable is certified by: Det Norske Veritas (DNV) and American Bureau of Shipping (ABS)

Construction

Conductor	Stranded copper wire Ø 0.27 mm ² , AWG23
Insulation	PE, Ø 1.6 mm
Twisting	2 cores to the pair
Cable lay up	4 pairs
Pair screen	Al-laminated plastic foil around each pair
Overall screen	Copper braid, tinned Ø 6,6 mm
Sheath	Oil resistant, Fire retardant and halogen free LSHF-FR (SHF1).

Mechanical Properties

Bending radius	Installation	8 x D
	Installed	4 x D
Temperature range	During operation	-40°C to + 85°C
	During installation	-15°C to + 50°C
Fire load	4 pair	670 MJ/km
Maximum tensile load	During operation	No load
	During installation	100 N

Electrical Properties

at 20°C

DC loop resistance		≤ 138 Ω/km
Resistance unbalance		≤ 2%
Insulation resistance	(500 V)	≥ 5000 MΩxkm
Capacitance	at 800 Hz	Nom. 43 nF/km
Capacitance unbalance	(pair to ground)	≤ 1500 pF/km
Mean Characteristic impedance	@ 100 MHz)	100 ± 5 Ω
Nominal velocity of propagation		0,76c
Propagation delay		≤ 450 ns/100 m
Delay skew		≤ 15 ns/100 m
Transfer impedance	at 1 MHz	≤ 10 mΩ /m
	at 10 MHz	≤ 8 mΩ /m
	at 30 MHz	≤ 10 mΩ /m
Coupling attenuation		≥ 85 dB
Segregation classification	Acc. to EN 50174-2	"D"

Nominal Transmission characteristics

at 20°C

F (MHz)	Attenuation (dB/100m)	NEXT (dB)	ACR (dB/100m)	Return loss (dB)	PS-NEXT (dB)	PS-ACR (dB/100m)	ELFEXT (dB/100m)	PS-ELFEXT (dB/100m)
1	2,0	90	88		87	85	85	82
4	3,6	90	86	27	87	83	85	82
10	5,5	90	84	30	87	81	79	76
16	7,5	90	82	30	87	79	75	72
20	7,7	90	82	30	87	79	73	70
31.25	9,8	90	80	30	87	77	69	66
62.50	14,0	86	72	30	83	69	63	60
100	17,9	83	65	30	80	62	59	56
155.00	22,4	81	59	26	78	55	57	54
200.00	25,6	78	52	25	75	49	53	50
250.00	28,8	77	48	25	74	45	51	48
300.00	31,6	73	41	23	70	38	47	44
600.00	45,7	71	25	20	68	22	44	41

Technical data

Part no.	Description	Colour	Outer diameter mm	Fire load		Weight kg/km
				MJ/km	kWh/m	
1016274	ToughCat C7 LSHF-FR 4x2/0.27mm2	Grey RAL7035	8,1	670	0,186	75

Product Code Table

Product Description	Product Code	PG Reference Code	PG Part Number
ToughCat C7 LSHF-FR 4x2/0.27mm2	1016274	60011617	60011617
ToughCat C7 LSHF-FR 4x2/0.27mm2 500DP	1016274-00500DP	60011617	60015820
ToughCat C7 LSHF-FR 4x2/0.27mm2 1000DP		60011617	60030363

ICS IE ToughCat 7S*

S/FTP Installation Cable for tougher environments



* Version with Solid conductors

Application

Generic Data transmission. This cable is a **Cat7 S/FTP** cable meant for use as installation/horizontal cable in tougher electrical and mechanical environment, including ships and offshore units.

Standards

EN 50173-1; EN 50288-4-1
ISO/IEC 11801; IEC 61156-5
Power over Ethernet(PoE/PoE+)
Det Norske Veritas (DNV) specification No. 6-827.50-2

Fire rating

LSHF-FR(SHF1) : IEC 60754-2; IEC 61034, IEC 60332-3-24

Chemical resistance

Mineral oils IRM 902 (IEC60811-2-1) : 7 days/23°C, 4 hours/70°C
Diesel - IRM 903 (IEC60811-2-1) : 7 days/23°C, 4 hours/70°C

Certification

This cable is certified by: Det Norske Veritas (DNV)

Construction

Conductor	Solid copper wire, Ø 0.56 mm (AWG 23)
Insulation	foamskin PE, Ø 1.4 mm
Twisting	2 cores to the pair
Pair screen	Al-laminated plastic foil
Cable lay up	4 pairs (PiMF) to the core
Screen	copper braid, tinned
Sheath	Oil resistant, Fire retardant and halogen free LSHF-FR (SHF1).

Mechanical properties

Bending radius	Installation	8 x D
	Installed	4 x D
Temperature range	During operation	-40°C to + 85°C
	During installation	-15°C to + 50°C
Fire load	4 pair	670 MJ/km
Maximum tensile load	During operation	No load
	During installation	200 N

Electrical properties

at 20°C ± 5°C

Loop resistance		≤ 150 Ω/km
Resistance unbalance		≤ 2%
Insulation resistance	(500 V)	≥ 5000 MΩ*km
Mutual capacitance	at 800 Hz	Nom. 43 nF/km
Capacitance unbalance	(pair/ground)	≤ 1500 pF/km
Characteristic impedance	(1-100 MHz)	100 ± 5 Ω
	(100 - 250) MHz	100 ± 10 Ω
	(250 - 600) MHz	100 ± 15 Ω
Nominal velocity of propagation		ca. 79 %
Propagation delay		≤ 570 ns/100m
Delay skew		≤ 9 ns/100m
Test voltage	(DC, 1 min) core/core and core/screen	1000 V
Transfer impedance(Grade 1)	at 1 MHz	≤ 10 mΩ/m
	at 10 MHz	≤ 10 mΩ/m
	at 30 MHz	≤ 10 mΩ/m
	at 100MHz	≤ 20 mΩ/m
Coupling attenuation		≥ 85 dB
Segregation classification	Acc. to EN 50174-2	"D"

Electrical data (nominal)

acc. to Cat.7 (at 20°C)

F (MHZ)	Attenuation (dB/100m)	NEXT (dB)	PS-NEXT (dB)	ACR (dB/100m)	PS-ACR (dB/100m)	ELFEXT (dB/100m)	PS-ELFEXT (dB/100m)	Return loss (dB)
1,0	1,8	100	97	98	95	105	105	-
4,0	3,4	100	97	97	94	105	102	27
10,0	5,4	100	97	95	92	97	94	30
16,0	6,8	100	97	93	90	93	90	30
20,0	7,7	100	97	92	89	91	88	30
31,2	9,6	100	97	90	87	87	84	30
62,5	13,7	100	97	86	83	81	78	30
100,0	17,4	100	97	83	80	77	74	30
125,0	19,5	95	92	75	72	75	72	26
155,5	21,9	94	91	72	69	73	70	26
175,0	23,3	93	90	70	67	72	69	25
200,0	25,0	92	89	67	64	71	68	25
250,0	28,1	90	87	62	59	69	66	24
300,0	30,9	89	86	58	55	67	64	24
450,0	38,3	87	84	48	45	64	61	23
600,0	44,8	85	82	40	37	61	58	22

Technical data

Part no.	Description	Colour	Outer diameter mm	Fire load		Weight kg/km
				MJ/km	kWh/m	
1022322	ToughCat7S S/FTP 4x2/0.56	Grey RAL7035	7,6	670	0,186	64

Product Code Table

Product Description	Product Code	PG Reference Code	PG Part Number
ToughCat C7S LSHF-FR 4x2/0.56		60015280	60015280
ToughCat C7S LSHF-FR 4x2/0.56 500DP	1022322-00500DP	60015280	60015282

ICS IE ToughCat 5e

S/FTP Installation Cable for tougher environments



Application

Generic Data transmission. This cable is a **Cat5e S/FTP** cable meant for use as installation(horizontal) cable in tougher electrical and mechanical environment, including ships and offshore units.

Standards

EN 50173-1; EN 50288-2-1

ISO/IEC 11801; IEC 61156-5

Power over Ethernet(PoE/PoE+)

Det Norske Veritas (DNV) specification No. 6-827.50-2 and Lloyd Register approval system, 2002

Fire rating

LSHF-FR(SHF1)

: IEC 60754-2; IEC 61034, IEC 60332-3-24

Chemical resistance

Mineral oils IRM 902 (IEC60811-2-1)

: 7 days/23°C, 4 hours/70°C

Diesel - IRM 903 (IEC60811-2-1)

: 7 days/23°C, 4 hours/70°C

Certification

This cable is certified by: Det Norske Veritas (DNV) and Lloyd Register.

Construction

Conductor	Stranded copper wire Ø 0.22 mm ² , AWG24
Insulation	PE, Ø 1.4 mm
Twisting	2 cores to the pair
Cable lay up	4 pairs
Pair screen	Al-laminated plastic foil around each pair
Overall screen	Copper braid, tinned Ø 6,2 mm
Sheath	Oil resistant, Fire retardant and halogen free LSHF-FR(SHF1).

Mechanical Properties

Bending radius	Installation	8 x D
	Installed	4 x D
Temperature range	During operation	-40°C to + 85°C
	During installation	-15°C to + 50°C
Fire load	4 pair	515 MJ/km
Maximum tensile load	During operation	No load
	During installation	100 N

Electrical Properties

at 20°C

DC loop resistance		$\leq 158 \Omega/\text{km}$
Resistance unbalance		$\leq 2\%$
Insulation resistance	(500 V)	$\geq 5000 \text{ M}\Omega \times \text{km}$
Capacitance	at 800 Hz	Nom. 43 nF/km
Capacitance unbalance	(pair to ground)	$\leq 1500 \text{ pF/km}$
Mean Characteristic impedance	@ 100 MHz	$100 \pm 5 \Omega$
Nominal velocity of propagation		0,75c
Propagation delay		$\leq 450 \text{ ns/100 m}$
Delay skew		$\leq 15 \text{ ns/100 m}$
Transfer impedance	at 1 MHz	$\leq 10 \text{ m}\Omega / \text{m}$
	at 10 MHz	$\leq 8 \text{ m}\Omega / \text{m}$
	at 30 MHz	$\leq 10 \text{ m}\Omega / \text{m}$
Coupling attenuation		$\geq 85 \text{ dB}$
Segregation classification	Acc. to EN 50174-2	"D"

Nominal Transmission characteristics

at 20°C

F (MHz)	Attenuation (dB/100m)	NEXT (dB)	ACR (dB/100m)	Return loss (dB)	PS-NEXT (dB)	PS-ACR (dB/100m)	ELFEXT (dB/100m)	PS-ELFEXT (dB/100m)
1	2,1	90	88		87	85	85	82
4	4,0	90	86	27	87	83	85	82
10	6,3	90	84	30	87	81	79	76
16	8,0	90	82	30	87	79	75	72
20	9,0	90	81	30	87	78	73	70
31.25	11,4	90	79	30	87	76	69	66
62.50	16,5	86	70	30	83	67	63	60
100	21,3	83	62	30	80	59	59	56
155.00	24,2	81	57	26	78	54	57	54
200.00	31,5	78	47	25	75	44	53	50
250.00	35,8	77	41	25	74	38	51	48
300.00	47,1	73	26	23	70	23	47	44
600.00	60,1	71	11	20	68	8	44	41

Technical data

Part no.	Description	Colour	Outer diameter mm	Fire load		Weight kg/km
				MJ/km	kWh/m	
1000745	ToughCat5 S/FTP 4x2/0,22mm ²	Grey RAL7035	7,6	515	0,143	65

Product Code Table

Product Description	Product Code	PG Reference Code	PG Part Number
ToughCat C5e LSHF-FR 4x2/0.22mm ²	1000745	60011599	60011599
ToughCat C5e LSHF-FR 4x2/0.22mm ² 500DP	1000745-00500DP	60011599	60015830
ToughCat C5e LSHF-FR 4x2/0.22mm ² 1000DP	1000745-01000DP	60011599	60015833

UC^{FIBRE} I DI LSHF-FR ES9 2 - 24 fibres

On board distribution cable with ES9 tight buffer and FireRes[®] sheath, J-V(ZN)H



Application and Installation

This distribution or mini-break-out cable can be used for many on-board communication applications. The cable features Draka's ES9 tight buffer. Typical cable applications include: LAN and WAN backbones, central office interconnections, backbones in data centres, and many other. The cable features aramid yarns for ease of installation. It is suited for installation in ducts and on trays. The cable features an UV stabilised, water and moisture resistant FireRes[®] sheathing, the cable is thus well suited for shorter outdoor runs.

Standards

ISO 11801 2nd edition, EN 187 000, IEC 60794-2, EN 50 173-1, IEC 60794-2-20

Flame resistance

LSHF-FR (FRNC): IEC 60332-1-2; IEC 60332-3-24, IEC 60754-2; IEC 61034

Construction

Fibre	2 - 24 tightly buffered fibres 900 µm ± 50 µm.		
Fibre colour code	1	Red	13 Yellow w/mark every 70 mm
	2	Green	14 White w/mark every 70 mm
	3	Blue	15 Grey w/mark every 70 mm
	4	Yellow	16 Turquoise w/mark every 70 mm
	5	White	17 Orange w/mark every 70 mm
	6	Grey	18 Pink w/mark every 70 mm
	7	Brown	19 Yellow w/mark every 35 mm
	8	Violet	20 White w/mark every 35 mm
	9	Turquoise	21 Grey w/mark every 35 mm
	10	Black	22 Turquoise w/mark every 35 mm
	11	Orange	23 Orange w/mark every 35 mm
	12	Pink	24 Pink w/mark every 35 mm
Strength member	Ultra high modulus aramid yarns		
Sheath colours	Cable with SM fibres		Yellow, RAL 1021
	Cable with MaxCap-BB-OM2		Orange, RAL 7037
	Cable with OM1 fibres		Grey, RAL 2003
	Cable with MaxCap-BB-OM3 and MaxCap-BB-OM4		Aqua, RAL 6027
Sheath	Halogen free, flame resistant thermoplastic sheathing compound acc. to (SHF1) according IEC 60092-360, UV stabilised		
Sheath marking	Draka UC ^{FIBRE} I DI N LSHF-FR ES9 <fibre count> <Fibre type><Fibre brand><Item No>05<Batch Number><Meter mark> J-V(ZN)H <fibre count> <Fibre family> <Mode field diameter> /125 <Transmission Class>		

Physical properties

IEC 60974-1-2

Attribute	Method	Limits						
Fibre count		2	4	6	8	12	16	24
Nominal diameter [mm]	-	4.5	5	5.5	6	6.5	7	8
Nominal weight [kg/km]	-	21	26	30	35	45	50	65
Maximum installation load (a few hours) [N]	-	1000	1000	1000	1000	1200	1200	1500
Short term tensile strength (some days) [N]	E1	560	560	560	560	680	680	800
Permanent tensile strength [N]	E1	280	280	280	280	340	340	400
Impact [J]	E4	20 J						
Crush (compressive strength)	E3	3000 N/ 100 mm						
Torsion	E7	5 cycles $\pm$ 1 turn						
Minimum bending radius	E11	50	50	50	50	75	75	115
Minimum bending radius under tension	E18A	100	100	100	100	130	130	230
Temperature range	F1	Operation and Installation			-20 °C to 70 °C			
		Storage			-40 °C to 70 °C			
Minimum bending radius of the 900 μ m buffered fibres	G01	With standard fibres			20 mm			
		With MaxCap-BB-OMx fibres			7.5 mm			
		With BendBright-XS fibers:			7.5 mm			
Heat of combustion [MJ/km] – [kW/m]		370	475	575	660	900	1000	1400
		0.10	0.13	0.16	0.18	0.25	0.28	0.39

Product codes – ordering information

Prysmian group material code	Prysmian Group material description	Draka Material code	Fibre count	Fibre type	Fibre data sheet
	UC ^{FIBRE} I DI LSHF-FR ES9 2 OM2B	1020481	2	MaxCap-BB-OM2 50/125	C34
60011370	UC ^{FIBRE} I DI LSHF-FR ES9 4 OM2B	1018952	4	MaxCap-BB-OM2 50/125	C34
60041217	UC ^{FIBRE} I DI LSHF-FR ES9 6 OM2B	1020001	6	MaxCap-BB-OM2 50/125	C34
	UC ^{FIBRE} I DI LSHF-FR ES9 8 OM2B	1020002	8	MaxCap-BB-OM2 50/125	C34
	UC ^{FIBRE} I DI LSHF-FR ES9 12 OM2B	1019028	12	MaxCap-BB-OM2 50/125	C34
	UC ^{FIBRE} I DI LSHF-FR ES9 24 OM2B	1020003	24	MaxCap-BB-OM2 50/125	C34
60019145	UC ^{FIBRE} I DI LSHF-FR ES9 4 OM3B	1020008	4	MaxCap-BB-OM3	C31
60019146	UC ^{FIBRE} I DI LSHF-FR ES9 12 OM3B	1020009	12	MaxCap-BB-OM3	C31
60026046	UC ^{FIBRE} I DI LSHF-FR ES9 4 MM61	1020004	4	OM1 62.5/125 multi mode	C02
	UC ^{FIBRE} I DI LSHF-FR ES9 6 MM61	1020005	6	OM1 62.5/125 multi mode	C02
	UC ^{FIBRE} I DI LSHF-FR ES9 8 MM61	1020006	8	OM2 62.5/125 multi mode	C02
	UC ^{FIBRE} I DI LSHF-FR ES9 12 MM61	1020007	12	OM1 62.5/125 multi mode	C02
60019147	UC ^{FIBRE} I DI LSHF-FR ES9 4 SM2D	1020010	4	OS2 single mode	C03e
60019148	UC ^{FIBRE} I DI LSHF-FR ES9 6 SM2D	1020011	6	OS2 single mode	C03e
60019149	UC ^{FIBRE} I DI LSHF-FR ES9 8 SM2D	1020012	8	OS2 single mode	C03e
60019150	UC ^{FIBRE} I DI LSHF-FR ES9 12 SM2D	1020013	12	OS2 single mode	C03e
60019151	UC ^{FIBRE} I DI LSHF-FR ES9 24 SM2D	1020014	24	OS2 single mode	C03e
60018920	UC ^{FIBRE} I D LSHF-FR ES9 12 SM7B	1018987	12	BendBright®XS G.657.A2	C24

RG213 FRNC

RG-Cables acc. to MIL-C-17G



Application

see product overview

Standards

acc. to MIL-C-17G

Flame resistance

acc. to IEC 60332-1

Construction

Inner conductor	stranded copper wires, bare 7 x 0.75, diameter 2.25 ± 0.10 mm
Insulation	PE, diameter 7.25 ± 0.10 mm
Braid	bare, 96% optical coverage
Sheath	Flame Retardant Non Corrosive material, diameter 10.30 ± 0.15 mm
Marking	DRAKA RG213 MIL-C-17G FRNC and batch number

Mechanical properties

Minimum bending radius	without load	5 x outer diameter
	with load	10 x outer diameter
Temperature	during operation	-45° C to + 85° C
	during installation	-15° C to + 55° C
Corrosivity of fire gases		acc. to IEC 60754-1 & 2
Smoke density		acc. to IEC 61034-1 and 2

Electrical properties

at 20°C

DC resistance	Inner conductor	5.7 Ω /km
	Outer conductor	3.9 Ω /km
Mutual capacitance		100 pF/m
Characteristic impedance		50 $\Omega \pm 2 \Omega$
Velocity ratio		66 %
Operating voltage		3.7 kV _{rms}
Test voltage	Inner/Outer conductor	10.0 kV _{rms}

Electrical data

at 20°C

Frequency (MHz)	Attenuation (dB/100m)	Max. power rating (Watts) (ambient temperature 25°C and max. inner conductor temperature 70°C)	Return loss (dB) several peaks are allowed	
			Frequency (MHz)	
10	1.8	2300	1-1000	28-23.5
100	6.8	920		
200	9.0	570		
400	14.4	380		
1000	24.7	210		
1500	31.5	170		
2000	36.4	140		
3000	46.6	100		
5200	62.0	73		
5800	67.0	67		

All other requirements acc. to MIL-C-17G

Technical data

Product code	Designation	Type	Brand name	Outer diameter	Weight	Standard delivery length	Drum size	Gross weight	Copper content	Tensile force
				mm	kg/km	m	*PWD/ringing	kg		
1002819 CK2675400	2YCH	2.25L/7.25	M17/74- RG213 FRNC	10.3	157	1000	760/360/ 420	169	86.7	470

*PWD (Plywood drum)

Product Code Table

Product Description	Product Code	PG Reference Code	PG Part Number
DR RG213 50 2.25S/7.25 LSHF BK 500DW	1002819-00500DW	60011360	60017551
DR RG213 50 2.25S/7.25 LSHF BK 1000DW	1002819-01000DW	60011360	60017552

RG214 FRNC

RG-Cables acc. to MIL-C-17G



Application

see product overview

Standards

acc. to MIL-C-17G

Flame resistance

acc. to IEC 60332-1

Construction

Inner conductor	stranded copper wires, silver plated 7 x 0.75, diameter 2.25 ± 0.10 mm
Insulation	PE, diameter 7.25 ± 0.10 mm
1 st braid	silver plated, 94% optical coverage
2 nd braid	silver plated, 97% optical coverage
Sheath	Flame Retardant Non Corrosive Copolymer, colour black RAL 9005, diameter 10.80 ± 0.15 mm
Marking	DRAKA - M17/75 - RG214 FRNC + meter marking + batch number

Mechanical properties

Minimum bending radius	without load	5 x outer diameter
	with load	10 x outer diameter
Temperature	during operation	-45° C to + 85° C
	during installation	-15° C to + 55° C
Corrosivity of fire gases		acc. to IEC 60754-2
Smoke density		acc. to IEC 61034-1 and 2

Electrical properties

at 20°C

DC resistance	Inner conductor	5.7 Ω /km
	1 st braid	6.2 Ω /km
	2 nd braid	6.2 Ω /km
Mutual capacitance		100 pF/m
Characteristic impedance		50 $\Omega \pm 2 \Omega$
Velocity ratio		66 %
Maximum operating frequency		11 GHz
Operating voltage		3.7 kV _{rms}
Test voltage	Inner/Outer conductor	10.0 kV _{rms}

Electrical data

at 20°C

Frequency (MHz)	Attenuation (dB/100m)	Max. power rating (Watts) (ambient temperature 25°C and max. inner conductor temperature 70°C)	Return loss (dB) several peaks are allowed	
			Frequency (MHz)	
50	4.8	1500	100	≥ 23
100	7.1	920	1000	≥ 20
400	15.9	330	3000	≥ 19
1000	28.4	160	5000	≥ 18
3000	62.0	75	11000	≥ 17
5200	92.5	61		
5800	100.0	56		

All other requirements acc. to MIL-C-17G

Technical data

Product code	Designation	Type	Brand name	Outer diameter	Weight	Standard delivery length	Drum size	Gross weight	Copper content	Tensile force
				mm	kg/km	m	*PWD/ring	kg		N
1002757 CK295090 1	2YCCH	2.25Ls/7.25 Ds	M17/75- RG214 FRNC	10.8	200	1000	760/360/5 80	212	132.9	730

*PWD (Plywood drum)

Product Code Table

Product Description	Product Code	PG Reference Code	PG Part Number
DR RG214 50 2.25S/7.25 LSHF BK		60017547	60017547
DR RG214 50 2.25S/7.25 LSHF BK 500DW	1002757-00500DW	60017547	60017548
DR RG214 50 2.25S/7.25 LSHF BK 1000DW	1002757-01000DW	60017547	60017549

RG223 FRNC

RG-Cables acc. to MIL-C-17G



Application

see product overview

Standards

acc. to MIL-C-17F and MIL-C-17G

Flame resistance

acc. to IEC 60332-1

Construction

Inner conductor	copper wire, silver plated, diameter 0.90 ± 0.01 mm
Insulation	PE, diameter 2.95 ± 0.05
1 st braid	silver plated, 96% optical coverage
2 nd braid	silver plated, 96% optical coverage
Sheath	Flame Retardant Non Corrosive Copolymer, colour black RAL 9005, diameter 5.40 ± 0.10
Marking	DRAKA - M17/84 - RG223 FRNC <batch no.> <meter marking> m

Mechanical properties

Minimum bending radius	without load	5 x outer diameter
	with load	10 x outer diameter
Temperature	during operation	-40° C to + 85° C
	during installation	-15° C to + 55° C
Corrosivity of fire gases		acc. to IEC 60754-1 & 2
Smoke density		acc. to IEC 61034-1 and 2

All other requirements acc. to MIL-C-17G

Electrical properties

at 20°C

DC resistance	Inner conductor	29.1 Ω/km
	1 st braid	13.5 Ω/km
	2 nd braid	15.5 Ω/km
Mutual capacitance		100 pF/m
Characteristic impedance		50 Ω ± 2 Ω
Velocity ratio		66 %
Max. operating frequency		12.4 GHz
Operating voltage		1.4 kV _{rms}
Test voltage	Inner/Outer conductor	5.0 kV _{rms}

Electrical data

at 20°C

Frequency (MHz)	Attenuation (dB/100m)	Max. power rating (Watts) (ambient temperature 25°C and max. inner conductor temperature 70°C)	Return loss (dB) several peaks are allowed	
	nominal	maximum	Frequency (MHz)	
50	9.8	350	100	≥ 27
400	28.4	86	1 GHz	≥ 23.5
1000	45.9	50	2 GHz	≥ 21.5
3000	83.1	32	4-5 GHz	≥ 21.0
5200	112.7	24	10 GHz	≥ 20
5800	120.6	22		

Technical data

Product code	Designation	Type	Brand name	Outer diameter	Weight	Standard delivery length	Drum size	Gross weight	Copper content	Tensile force
				mm	kg/km	m	*PWD	kg		
1002773 CK767650 0	2YCCH	0.89s/2.95Ds	M17/84-RG223 FRNC	5.4	56.2	1000	400/120/280	60	40.5	240

*PWD (plywood drum)

Product Code Table

Product Description	Product Code	PG Reference Code	PG Part Number
RG223 MIL-C-17G FRNC 500DP	1002773-00500DP	60011581	60011580
RG223 MIL-C-17G FRNC		60011581	60011581
RG223 MIL-C-17G FRNC 200DP	1002773-00200DP	60011581	60013872
RG223 MIL-C-17G FRNC 300DP	1002773-00300DP	60011581	60013874
RG223 M07/84 50-C FRNC BK 500DW	1002773-00500DW	60011581	60013876
RG223 MIL-C-17G FRNC 1000DW	1002773-01000DW	60011581	60013878

Marine cables



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MARINE CABLES (DEFENCE)

MGGO/MGSGO 0,6/1 kV

Power cables for marine according to VG 95218 part 60



Application

For fixed installation on ships in all locations and on open decks. The definitions for installation in BV 3400 apply. The cables are certified from the Bundesamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr (BAAINBw).

Global data

Type designation	MGGO/MGSGO
Standard	VG 95218 Part 60

Design features

Conductor	Copper, round stranded, in accordance with VG 95218 part 60
Insulation	Ethylene propylene rubber (EPR)
Core identification	According to VG 95218 part 60
Core arrangement	Transparent foil over the single or laid-up cores
Inner covering	Only for MGSGO types: Halogen free filler compound
Screen	Only for MGSGO types: Plain copper wire braid. Transparent foil over the braid
Outer sheath	Compound from crosslinked elastomer, colour: black

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC test voltage	3.5 kV
Current Carrying Capacity description	The definitions in BV 3400 apply

Chemical parameters

Smoke emission	according to VG 95218-2
Acidity of fire gases	according to VG 95218-2
Flame propagation	According to VG 95218-2
Resistance to oil	according to VG 95218-2
Resistance to chemicals	according to VG 95218-2

Thermal parameters

Max. operating temperature of the conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Bending radii min.	4 x D for all types with flexible conductor (F) 5 x D for all other types

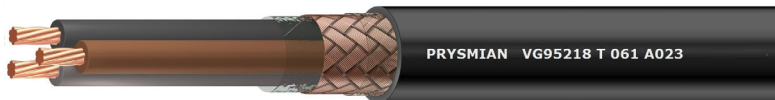
Number of cores x cross section	MLFB Number	Part number	Designation acc. to VG 95218-60 Dash No.	Conductor diameter max. mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Weight (approx.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
Type A (1 core)										
1x4	5BG5 400	20173653	001	2.7	7.5	8.5	43	150	200	45
1x6	5BG5 401	20113199	002	3.3	8.4	9.4	47	160	300	65
1x10	5BG5 402	20173654	003	4.2	9.5	10.5	53	220	500	80
1x16	5BG5 403	20155662	004	5.3	10	11.2	56	290	800	120
1x25	5BG5 404	20113198	005	6.6	12	13	65	420	1250	154
1x35	5BG5 405	20026164	006	7.9	13	14	70	540	1750	197
1x50	5BG5 406	20113200	007	9.1	15	16.2	81	680	2500	239
1x70	5BG5 407	20113831	008	11	17	18.2	91	910	3500	307
1x95	5BG5 408	20008525	009	12.9	19.5	20.5	103	1230	4750	367
1x95F	5BG5 456	20026167	016	13	19.6	21	84	1210	4750	367
1x120	5BG5 410	20026165	010	14.5	21	22.4	112	1510	6000	435
1x120F	5BG5 457	20160099	017	14.6	21.8	23	92	1500	6000	435
1x150	5BG5 411	20113197	011	16.2	23	24.5	123	1790	7500	502
1x150F	5BG5 458	20113377	018	16.3	24	25.2	101	1830	7500	502
1x185	5BG5 412	20016059	012	18	25.5	27	135	2200	9250	571
1x185F	5BG5 450	20026166	015	18.1	26.2	27.4	110	2190	9250	571
1x240	5BG5 413	20113832	013	20.6	29	30.5	153	2850	12000	678
1x240F	5BG5 460	20026258	019	20.7	29.5	31	124	2780	12000	678
1x300	5BG5 414		014	23.1	31.5	33	165	3240	15000	785
1x300F	5BG5 461		020	23.2	32.5	34	136	3340	15000	785
Type B (2 core)										
2x1,5	5BG5 463	20136687	034	1.7	11.5	12.7	64	250	150	23
2x2,5	5BG5 464	20135967	035	2.2	12.5	13.5	68	300	250	31
2x4	5BG5 465	20135392	036	2.7	13.4	14.7	74	360	400	40
2x6	5BG5 466	20135393	037	3.3	14.7	16	80	450	600	55
2x10	5BG5 467	20135394	038	4.2	16.2	17.9	90	590	1000	75
2x16	5BG5 468	20154011	039	5.3	19	20.5	103	800	1600	100
2x25	5BG5 470	20154012	040	6.6	22	24	120	1130	2500	130
Type B (3 core)										
3x1,5	5BG5 471	20135395	041	1.7	12	13.2	66	290	225	20
3x2,5	5BG5 472	20153438	042	2.2	13	14.2	71	350	375	28
3x4	5BG5 473	20135396	043	2.7	14	15.2	76	430	600	35
3x6	5BG5 474	20136273	044	3.3	15.5	17	85	540	900	47
3x10	5BG5 475	20136163	045	4.2	17.6	19.1	96	740	1500	65
3x16	5BG5 476	20016239	046	5.3	20	21.6	108	1010	2400	90
3x16F	5BG5 370	20135963	065	5.3	20	21.6	87	970	2400	90
3x25	5BG5 477	20016240	047	6.6	24	25.6	128	1460	3750	120
3x25F	5BG5 371	20135964	066	6.6	24	25.6	103	1410	3750	120
3x35	5BG5 478	20016241	048	7.9	26	28.2	141	1870	5250	137
3x35F	5BG5 372	20160098	067	8	26.6	28.4	114	1820	5250	137
3x50	5BG5 480	20016242	049	9.1	30	32.4	162	2460	7500	167
3x50F	5BG5 373	20135965	068	9.5	31	33.2	133	2500	7500	167
3x70	5BG5 481	20173652	050	11	34.5	36.7	184	3270	10500	214
3x70F	5BG5 495	20016243	063	11.2	36	38.2	153	3460	10500	214
3x95	5BG5 482	20171199	051	12.9	39.7	42.2	211	4650	14250	259
3x95F	5BG5 494	20016244	062	13	41.6	43.8	176	4540	14250	259
3x120	5BG5 483	20171200	052	14.5	43	45.7	229	5340	18000	301

Number of cores x cross section	MLFB Number	Part number	Designation acc. to VG 95218-60 Dash No.	Conductor diameter max. mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Weight (approx.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
3x120F	5BG5 374	20016245	069	14.6	44.5	46.5	186	5350	18000	301
Type B (4 core)										
4x4	5BG5 484	20136164	053	2.7	15.2	16.7	84	530	800	30
4x6	5BG5 485	20136165	054	3.3	17	18.5	93	660	1200	40
4x10	5BG5 486	20136166	055	4.2	19.4	20.9	105	890	2000	55
4x16	5BG5 487	20153887	056	5.3	22	23.7	119	1250	3200	75
4x16F	5BG5 375	20141936	070	5.3	22	23.7	95	1210	3200	75
4x25	5BG5 488	20163664	057	6.6	26.4	28	140	1810	5000	101
4x25F	5BG5 376	20136686	071	6.6	26.4	28.2	113	1740	5000	101
4x35	5BG5 490	20153888	058	7.9	29.2	31.2	156	2330	7000	115
4x35F	5BG5 496	20135968	064	8	31	33	132	2410	7000	115
4x50	5BG5 491	20153889	059	9.1	33.5	36	180	3150	10000	140
4x50F	5BG5 377	20135966	072	9.5	34.3	37	148	3190	10000	140
4x70	5BG5 492		060	11	38.2	40.9	205	4350	14000	180
4x70F	5BG5 378	20170211	073	11.2	38.6	42.5	170	4390	14000	180
4x95	5BG5 493		061	12.9	44.2	46.7	234	5500	19000	220
4x95F	5BG5 380	20170212	074	12.9	45.5	48.2	193	5610	19000	220
Type B (33 core)										
33x0,75	5BG5 453	20113834	030	1.2	22.5	24.5	123	920	1237.5	-
Type C (1 core)										
1x25	5BG5 392		005	6.6	10.7	12.4	62	350	1250	154
1x35	5BG5 393		006	7.9	12	13.7	69	465	1750	197
1x50	5BG5 394		007	9.1	13.2	14.9	75	590	2500	239
1x70	5BG5 395		008	11	15.7	17.4	87	785	3500	307
1x95	5BG5 396		009	12.9	18.2	19.9	100	1070	4750	367
1x95F	5BG5 398		011	13	18.3	20	80	1080	4750	367
1x120	5BG5 397		010	14.5	19.8	21.5	108	1190	6000	435
1x120F	5BG5 399		012	14.6	20.1	21.8	88	1225	6000	435
1x150	5BG5 454		001	16.2	21.5	24	120	1600	7500	502
1x150F	5BG5 389		013	16.3	21.6	23	92	1620	7500	502
1x185F	5BG5 455	20026137	002	18.1	24.7	26.2	106	1960	9250	571
1x240F	5BG5 390		003	20.5	27.3	28.9	116	2490	12000	678
1x300F	5BG5 391		004	22.7	30	31.5	126	3010	15000	785
Type D (19 core)										
19x6F	5BG5 452	20141125	001	3.2	29.4	30.8	124	1830	5700	-

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LMGSGO 300/500 V

Light power cables for marine according to VG 95218 part 61



Application

For fixed installation on ships in all locations and on open decks. The definitions for installation in BV 3400 apply. The cables are certified from the Bundesamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr (BAAINBw).

Global data

Type designation	LMGSGO
Standard	VG 95218 Part 61

Design features

Conductor	Copper, round stranded, in accordance with VG 95218 part 61
Insulation	Crosslinked polyalkene compound
Core identification	According to VG 95218 part 61
Core arrangement	Lapped foil over the laid-up cores
Screen	Plain copper wire braid. Over the braid is a transparent foil.
Outer sheath	Compound from crosslinked elastomer, colour: black

Electrical parameters

Rated voltage	300/500 V
Max. permissible operating voltage AC	0.318/0.55 kV
Max. permissible operating voltage DC	0.413/0.825 kV
AC test voltage	2.5 kV
Current Carrying Capacity description	The definitions in BV 3400 apply

Chemical parameters

Smoke emission	according to VG 95218-2
Acidity of fire gases	according to VG 95218-2
Flame propagation	According to VG 95218-2
Resistance to oil	according to VG 95218-2
Resistance to chemicals	according to VG 95218-2

Thermal parameters

Max. operating temperature of the conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Bending radii min.	5 x D

Number of cores x cross section	Part number	Designation acc. to VG 95218-61 Dash No.	Conductor diameter max. mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Weight (approx.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
Type A (2 core)									
2x1,5	20136683	019	1.7	7	8	40	110	150	20
2x2,5	20136684	020	2.2	7.7	8.8	44	150	250	25
Type A (3 core)									
3x1,5	20136167	021	1.7	7.2	8.4	42	120	225	15
3G1,5	20136688	022	1.7	7.2	8.4	42	120	225	20
3x2,5	20136168	023	2.2	8	9.4	47	170	375	20
3G2,5	20136169	024	2.2	8	9.4	47	170	375	25
Type A (4 core)									
4x1,5	20136170	025	1.7	7.8	9.4	47	160	300	13
4x2,5	20136681	026	2.2	8.7	10.4	52	210	500	15
Type A (5 core)									
5x1,5	20136682	027	1.7	8.3	9.6	48	190	375	13
5G1,5	20136685	028	1.7	8.3	9.6	48	190	375	13
Type A (multicore)									
7x1,5	20026280	005	1.7	9.3	10.8	54	240	525	12
7G1,5	20026291	105	1.7	9.3	10.8	54	240	525	12
7x2,5	20026288	017	2.2	10.3	12	60	320	875	11
10x1,5	20026281	006	1.7	10.8	12.5	62.5	330	750	11
10G1,5	20039506	106	1.7	10.8	12.5	62.5	330	750	11
12x1,5	20026282	007	1.7	12	13.5	67.5	370	900	10
14x1,5	20026283	008	1.7	12.7	14.2	71	420	1050	10
16x1,5	20038696	009	1.7	13.2	14.8	74	470	1200	9
19x1,5	20113835	010	1.7	13.9	15.3	76.5	510	1425	8
24x1,5	20026284	011	1.7	15.5	17.5	87.5	660	1800	8
27x1,5	20026285	012	1.7	16.6	18.3	91.5	720	2025	7
33x1,5	20038695	013	1.7	17.5	19.5	97.5	850	2475	7
37x1,5	20026289	018	1.7	20	22	110	1000	2775	6

FMGSGO 250 V

Communication cables for marine according to VG 95218 part 62



Application

For fixed installation on ships in all locations and on open decks. The definitions for installation in BV 3400 apply. The cables are certified from the Bundesamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr (BAAINBw).

Global data

Type designation	FMGSGO
Standard	VG 95218 Part 62

Design features

Conductor	Copper, round stranded, in accordance with VG 95218 part 62
Insulation	Crosslinked polyalkene compound
Core identification	In layers with more than one quad, the black core of two quads laying next to each other have to be marked with following digits: pilot quad with "1" and the direction quad with "2". Pilot and direction shall be the same in all layers. Colour code: 2 paired cable (1 quad): black, blue, grey, brown; 4 paired cable (4 pairs): 1st pair: black, blue; 2nd pair: black, brown; 3rd pair: black, grey; 4th pair: black, grey;
Core arrangement	6 to 16 paires cables (3 to 8 quads): each quad: black, blue, grey, brown; 4 cores shall be cabled together as quad. The quads shall be cabled together in concentric layers. Only variations the four paired cable. 2 core shall be twisted as pairs and the two pairs shall be then twisted together.
Screen	Plain copper wire braid. Over the braid is a transparent foil.
Outer sheath	Compound from crosslinked olefine compound, colour: black

Electrical parameters

Rated voltage	250/250 V
Max. permissible operating voltage AC	0.355 kV
AC test voltage	2 kV
Insulation resistance at 20°C	800 MΩxkm
Mutual capacitance	max. 200nF/km (at 800 Hz)
Near-end crosstalk attenuation (NEXT)	min. 90 dB (at 10 kHz)
Transfer impedance	max. 30 mΩ/m (at 10 MHz)
Current Carrying Capacity description	The definitions in BV 3400 apply

Chemical parameters

Smoke emission	according to VG 95218-2
Acidity of fire gases	according to VG 95218-2
Flame propagation	According to VG 95218-2
Resistance to oil	according to VG 95218-2
Resistance to chemicals	according to VG 95218-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	5 x D

Number of cores x cross section	Part number	Designation acc. to VG 95218-62 Dash No.	Conductor diameter max. mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
1x2x0,75	20016551	008	1.2	6	7.2	36	70	75	8
2x2x0,75	20016548	001	1.2	6.7	8	40	95	150	8
4x2x0,75	20016398	002	1.2	9.6	11.2	56	185	300	6
6x2x0,75	20024446	003	1.2	10.8	12.5	63	245	450	5
8x2x0,75	20026293	004	1.2	11.9	13.6	68	300	600	4
10x2x0,75	20016547	005	1.2	13.7	15.4	77	370	750	4
14x2x0,75	20026294	006	1.2	14.9	16.7	84	450	1050	3
16x2x0,75	20026295	007	1.2	16.1	18.1	91	530	1200	3

FMSGSGO 250 V

Communication cables for marine with double screen according to VG 95218 part 63



Application

For fixed installation on ships in all locations and on open decks. The definitions for installation in BV 3400 apply. The cables are certified from the Bundesamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr (BAAINBw).

Global data

Type designation	FMSGSGO
Standard	VG 95218 Part 63

Design features

Conductor	Copper, round stranded, in accordance with VG 95218 part 63
Insulation	Crosslinked polyalkene compound
Core identification	2 paired cable: 1st pair: black, blue; 2nd pair: black, brown; 4 to 24 paired cable, in each layer: 1st pair: black, blue (pilot pair); 2nd pair: black, brown (direction pair); 3rd pair and other: black, grey;
Individual screen	Plain copper wire braid over pairs. Over the braid is a transparent foil.
Core arrangement	2 cores shall be cabled together as pairs. The shielded pairs shall be cabled together in concentric layers. Pilot and direction shall be the same in all layers.
Screen	Plain copper wire braid. Over the braid is a transparent foil.
Outer sheath	Compound from crosslinked olefine compound, colour: black

Electrical parameters

Rated voltage	250/250 V
Max. permissible operating voltage AC	0.355 kV
AC test voltage	2 kV
Insulation resistance at 20°C	800 MΩxkm
Mutual capacitance	max. 250nF/km (at 800 Hz)
Near-end crosstalk attenuation (NEXT)	min. 90 dB (at 10 kHz)
Transfer impedance	max. 30 mΩ/m (at 10 MHz)
Current Carrying Capacity description	The definitions in BV 3400 apply

Chemical parameters

Smoke emission	according to VG 95218-2
Acidity of fire gases	according to VG 95218-2
Flame propagation	according to VG 95218-2
Resistance to oil	according to VG 95218-2
Resistance to chemicals	according to VG 95218-2

Thermal parameters

Max. permissible temperature at conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	50 N/mm ²
Min. bending radius	5 x D

Number of cores x cross section	Part number	MLFB Number	Designation acc. to VG 95218-63 Dash No.	Conductor diameter max. mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Weight (ca.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
2x2x0,75	20026296	5BG5 575	001	1.2	11.1	12.5	63	220	150	8
4x2x0,75	20001774	5BG5 576	002	1.2	12.9	14.5	73	330	300	6
7x2x0,75	20026298	5BG5 577	003	1.2	14.9	16.4	82	450	525	5
11x2x0,75	20026299	5BG5 578	004	1.2	19.6	21.4	107	710	825	4
14x2x0,75	20026300	5BG5 580	005	1.2	20.8	22.8	114	850	1050	3
19x2x0,75	20026301	5BG5 581	006	1.2	23.4	25.4	127	1100	1425	3
24x2x0,75	20154153	5BG5 582	007	1.2	26.4	28.4	142	1310	1800	2

Marine cables



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OTHER DEFENCE CABLES (NOT FOR NORMAL MARINE APPLICATION)

GI-LTG 450/750V VG 95218 T010A

Heavy tough-rubber sheathed cable acc. to VG 95218 part 10



Application

These cables are intended for use in heavy current installations and for connection of equipment. They are intended for high-duty service in dry and damp rooms, in open air and explosion hazardous areas. These cables are approved for application in road traffic within the limits of GGVS (Gefahrenregutverordnung Straße). In other respects the specifications of DIN VDE 0298 part 300 apply.

Global data

Type designation	GI-LTG
Standard	VG 95218-10

Design features

Conductor	round stranded, tinned copper wires acc. to. class 5 of IEC 60228
Insulation	Cross linked, EPR based rubber compound
Core identification	According to VG 95218 part 10
Core arrangement	cores round stranded, 7 core version with central filler, 12 core versions in two layers
Inner sheath	Cross linked, EPR based rubber compound; colour: black
Outer sheath	Cross linked, CR based rubber compound; colour: black

Electrical parameters

Rated voltage	450/750 V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC test voltage	2.5 kV
Current Carrying Capacity description	According to VG 95218-5, values are valid for one cable free in air at 30°C ambient temperature

Chemical parameters

Smoke emission	according to VG 95218-2
Flame propagation	IEC 60332-1-2
Resistance to oil	according to VG 95218-2
UV-resistance	according to VG 95218-2
Ozone resistance	according to VG 95218-2

Thermal parameters

Max. operating temperature of the conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-46 °C
Laying temperature min.	-15 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm ²
Bending radii min.	moving: 5 X D; fixed installed min: 4 X D

Number of cores x cross section	MLFB Number	Part number	Designation acc. to VG 95218-Txxx Dash No.	Conductor diameter max. mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
3G1,5	5DH17500	20006629	T010A006	1.5	12	14	56	70	240	68	19
3G2,5	5DH17510	20006630	T010A007	1.9	13.5	15.5	62	78	300	113	26
7X1,5	5DH17520		T010A003	1.5	18.5	20.5	82	103	490	158	14
12X1,5	5DH17530	20048332	T010A004	1.5	18.5	19.5	78	98	550	270	11
12X1,5	5DH17540	20028332	T010A005	1.5	22	23	92	115	790	270	11

H07RN-F VG95218-13 450/750V

Rubber insulated cables and insulated wires acc. to VG 95218 part 13 A



Application

Suitable for use in dry, humid or moist rooms and outdoor for transportable motors or machines on building sites or in agricultural works. Medium mechanical stresses, e.g. for industrial and agricultural workshop appliances, large boiling installations, heating plates, inspection lamps, electric tools such as drills, circular saws, domestic electric tools. Can be used in workshops having an explosive atmosphere. When a cable is used in the presence of explosive or flammable atmosphere, guidance should be respected with reference to EN 60079 series of specifications and guidance should be sought in selecting the suitable cables. Applicable in fixed installations e.g. on rough-cast in temporary buildings for accommodation purposes, also for wiring of constructional components in lifting appliances and machinery. Usage up to 1000 V A/C is permitted for fixed, protected installation (in conduit or in appliances) and also for motor connections of hoisting motors and the like. The cables are not suitable for applications involving permanent immersion in water. In other aspects the specifications of DIN VDE 0298 part 300 apply. Oil resistant to EN 60811-404. Resistant to ozone (EN 50363-1 for insulation and EN 50363-2-1 for the outer sheath).

Global data

Brand	OZOFLEX
Type designation	H07RN-F
Standard	VG 95218 part 13 A
	DIN EN 50525-2-21

Design features

Conductor	round stranded, tinned copper wires acc. to. class 5 of IEC 60228
Insulation	Cross linked, EPR based rubber compound
Core identification	According to EN50525-1
Core arrangement	cores round stranded, 7 core versions with central filler, 12 & 18 core versions in two layers
Inner sheath	When applicable: Cross linked, EPR based rubber compound; colour: black
Outer sheath	Cross linked, CPE based rubber compound; colour: black

Electrical parameters

Rated voltage	450/750 V
Max. permissible operating voltage AC	0.476/0.825 kV
Max. permissible operating voltage DC	0.619/1.238 kV
AC test voltage	2.5 kV
Current Carrying Capacity description	According to VG 95218-5, values are valid for one cable free in air at 30°C ambient temperature

Chemical parameters

Flame propagation	IEC 60332-1-2
Resistance to oil	EN 60811-404
UV-resistance	according to VG 95218-2
Ozone resistance	according to VG 95218-2

Thermal parameters

Max. operating temperature of the conductor	60 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Laying temperature min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm ²
Bending radii min.	5 x D (one-time bending without tension)
	10 x D (repeated bending with tension)

Number of cores x cross section	Part number	MLFB Number	Designation acc. to VG 95218-Txxx Dash No.	Conductor diameter max. mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
1X1,5	20006329	5DH21045	T013A020	1.5	5.7	6.7	34	67	100	23	18
1X2,5	20003787	5DH21055	T013A021	1.9	6.2	7.2	36	72	120	38	26
1X4	20003788	5DH21065	T013A022	2.4	7.2	8.2	41	82	140	60	34
1X6	20003790	5DH21075	T013A023	2.9	7.9	9.2	46	92	160	90	43
1X10	20003792	5DH21105	T013A024	3.9	9.7	10.7	54	107	220	150	64
1X16	20003793	5DH21125	T013A025	4.9	10.8	13	65	130	300	240	82
1X25	20003794	5DH21135	T013A026	6.3	12.8	14	70	140	410	375	115
1X35	20003795	5DH21145	T013A027	7.4	14.3	15.3	77	153	530	525	145
1X50	20003796	5DH21155	T013A028	8.8	16.5	17.8	89	178	720	750	190
1X70	20003797	5DH21165	T013A029	10.7	18.6	19.9	100	199	920	1050	230
1X95	20003798	5DH21175	T013A030	12.2	21	22.3	112	223	1230	1425	280
1X120	20003799	5DH21185	T013A031	14.2	23.4	24.5	123	245	1450	1800	330
2X1	20003803	5DH22035	T013A009	1.3	7.7	9	45	90	110	30	11
2X1,5	20003804	5DH22045	T013A032	1.5	8.6	10	50	100	140	45	14
2X2,5	20015097	5DH22055	T013A033	1.9	10.2	11.5	58	115	200	75	21
2X4	20003809	5DH22065	T013A034	2.4	11.8	13	65	130	250	120	27
2X6		5DH22325	T013A035	2.9	13.7	15	75	150	380	180	34
2X10		5DH22105	T013A036	3.9	18.5	20.2	101	202	650	300	51
3G1	20003812	5DH23035	T013A037	1.3	8.3	9.5	48	95	140	45	10
3G1,5	20003814	5DH23045	T013A010	1.5	9.2	10.3	52	103	160	68	13
3G2,5	20003816	5DH23055	T013A038	1.9	10.9	12.2	61	122	230	113	19
3G4	20003818	5DH23065	T013A039	2.4	12.7	14	70	140	310	180	25
3X4		5DH28575	T013A040	2.4	12.7	14	70	140	310	180	25
3G6	20003819	5DH23075	T013A041	2.9	14.1	15.5	78	155	400	270	32
3X6		5DH28585	T013A042	2.9	14.1	15.5	78	155	400	270	32
3G10	20003820	5DH23105	T013A043	3.9	19.6	21	105	210	710	450	47
3G16	20003821	5DH23125	T013A044	4.9	22.3	23.5	118	235	980	720	61
3G95		5DH23175	T013A045	12.2	43.3	46.2	231	462	4320	4275	207
4G1	20008313	5DH24035	T013A046	1.3	9.2	10.6	53	106	170	60	9
4G1,5	20003826	5DH24045	T013A047	1.5	10.2	11.5	58	115	200	90	12
4G2,5	20003828	5DH24055	T013A048	1.9	12.1	13.2	66	132	280	150	17
4G4	20015051	5DH24065	T013A049	2.4	14	15.2	76	152	390	240	22
4G6	20015052	5DH24075	T013A050	2.9	15.7	17	85	170	490	360	28
4G10	20015093	5DH24105	T013A051	3.9	21.3	22.5	113	225	930	600	42
4G16	20015094	5DH24125	T013A052	4.9	24.3	25.5	128	255	1230	960	54
4G25	20015095	5DH24135	T013A053	6.3	29.2	31	155	310	1800	1500	76
4G35	20015096	5DH24145	T013A054	7.4	32.5	34.3	172	343	2300	2100	96
4G50	20003838	5DH24155	T013A055	8.8	37.7	40.3	202	403	3200	3000	125
4G70	20003839	5DH24165	T013A056	10.7	42.7	45.2	226	452	4120	4200	152
4G95	20003840	5DH24175	T013A057	12.2	48.4	51.7	259	517	5430	5700	185
5G1,5	20003845	5DH25045	T013A012	1.5	11.3	12.4	62	124	270	113	11
5G2,5	20003847	5DH25055	T013A013	1.9	13.3	14.4	72	144	370	188	16
5G4	20015098	5DH25065	T013A014	2.4	15.6	16.6	83	166	610	300	21
5G6	20015099	5DH25075	T013A015	2.9	17.5	18.2	91	182	780	450	27
5G10	20015100	5DH25105	T013A016	3.9	23.6	24.7	124	247	1300	750	40
5G16	20015101	5DH25125	T013A017	4.9	26.7	28.4	142	284	1750	1200	51
5G25	20003857	5DH25135	T013A018	6.3	32	33.5	168	335	2700	1875	71
5G35	20003858	5DH25145	T013A019	7.4	35.7	37.9	190	379	3100	2625	90

Number of cores x cross section	Part number	MLFB Number	Designation acc. to VG 95218-Txxx Dash No.	Conductor diameter max. mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
5G50	20003859	5DH25155	T013A058	8.8	41.8	44.2	221	442	4320	3750	118
5G120		5DH25185	T013A059	14.2	58.5	61.5	308	615	9220	9000	205
7X1,5	20015113	5DH28775	T013A008	1.5	14.7	15.7	79	157	440	158	10
7G2,5	20015114	5DH25905	T013A060	1.9	17.2	18.5	93	185	540	263	14
7X2,5		5DH25895	T013A061	1.9	17.2	18.5	93	185	540	263	14
12G1,5	20003864	5DH25835	T013A062	1.5	17.6	19.5	98	195	580	270	8
12X1,5		5DH25834	T013A063	1.5	17.6	19.5	98	195	580	270	8
12X2,5	20003868	5DH25995	T013A064	1.9	20.6	22.3	112	223	810	450	11
18G1,5	20003865	5DH25855	T013A065	1.5	21	22.5	113	225	860	405	6
18X1,5		5DH25854	T013A066	1.5	21	22.5	113	225	860	405	6

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

NSSHOEU 0,6/1 kV VG 95218 T013C

Rubber insulated cables and insulated wires acc. to VG 95218 part 13 C



Application

For flexible use and fixed installation open-cast mining applications, in quarries, on construction sites and similar applications, with heavy mechanical stresses. The cables can be used indoors as well as outdoors, in explosion-hazard areas, in industry and in agriculture. They can be used permanently in waste water up to 40°C at a depth of max. 2000 m and in industrial water, cooling water, surface water, rainwater and mixed water - and in groundwater and seawater to a more limited extent. The requirements for accessibility and inspection depend on the consistency of the water. In aggressive water or composed of special substances, the cable's resistance properties should be tested. In other respects the specifications of DIN VDE 0298 part 3 applies.

Global data

Brand	PROTOMONT
Type designation	NSSHOEU
Standard	VG 95218 part 13 C
	DIN VDE 0250-812

Design features

Conductor	round stranded, tinned copper wires acc. to. class 5 of IEC 60228
Insulation	Cross linked, EPR based rubber compound
Core identification	According to VG 95218 part 13
Core arrangement	round stranded, tinned copper wires acc. to. class 5 of IEC 60228
Inner sheath	Cross linked, EPR based rubber compound
Outer sheath	Cross linked, CPE based rubber compound; colour: yellow

Electrical parameters

Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage AC	0.7/1.2 kV
Max. permissible operating voltage DC	0.9/1.8 kV
AC test voltage	3 kV
Current Carrying Capacity description	According to VG 95218-5, values are valid for one cable free in air at 30°C ambient temperature

Chemical parameters

Flame propagation	IEC 60332-1-2
Resistance to oil	EN 60811-404
UV-resistance	according to VG 95218-2
Ozone resistance	according to VG 95218-2

Thermal parameters

Max. operating temperature of the conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fix installation min.	-40 °C
Laying temperature min.	-25 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm ²
Bending radii min.	5 x D (one-time bending without tension)
	10 x D (repeated bending with tension)

Number of cores x cross section	Part number	MLFB Number	Designation acc. to VG 95218-Txxx Dash No.	Conductor diameter max. mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
1X25	20008654	5DL11130	T013C003	6.3	12.8	16.5	83	165	500	375	165
1X70	20004814	5DL11160	T013C001	10.7	17.7	22	110	220	1000	1050	325
1X120	20004816	5DL11180	T013C002	14.2	22.4	27.5	138	275	1600	1800	480

S05ZZH2-F 300/500V VG 95218 T1008

Rubber insulated cables for illumination chains, halogenfree,
low fire hazard acc. to VG 95218 part 1008



Application

These cables are intended for indoor or outdoor use as decorative / lighting chains and with designated lampholders in the Bundeswehr, also on board of ships. In other respects the specifications of DIN VDE 0298 part 300 apply.

Global data

Type designation	S05ZZH2-F
Standard	VG 95218 part 1008 A

Design features

Conductor	round stranded, tinned copper wires acc. to. class 5 of IEC 60228
Insulation	Cross linked, EPR based rubber compound
Core identification	blue and brown
Core arrangement	2 parallel cores
Outer sheath	Cross linked, EVA based rubber compound; colour: black

Electrical parameters

Rated voltage	300/500V (600V)
Max. permissible operating voltage AC	0.318/0.55 kV
Max. permissible operating voltage DC	0.413/0.825 kV
AC test voltage	2 kV
Current Carrying Capacity description	According to VG 95218-5, values are valid for one cable free in air at 30°C ambient temperature

Chemical parameters

Flame propagation	IEC 60332-1-2
Resistance to oil	according to VG 95218-2
Ozone resistance	according to VG 95218-2

Thermal parameters

Max. operating temperature of the conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Laying temperature min.	-30 °C

Mechanical parameters

Max. tensile load on the conductor	15 N/mm ²
Bending radii min.	5 x D (one-time bending without tension)
	10 x D (repeated bending with tension)

Number of cores x cross section	Part number	MLFB Number	Designation acc. to VG 95218-Txxx Dash No.	Conductor diameter max. mm	Min. Height (for flat cable) mm	Max. Height (for flat cable) mm	Min. Width (for flat cable) mm	Max. Width (for flat cable) mm	Bending radius fixed min. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Permissible tensile force max. N	Current carrying capacity (1) A
2X1,5	20160295	5DH99800	T1008A001	1.5	5	6	13	14	30	60	150	45	14
2X2,5		5DH99810	T1008A002	1.9	5	6	13	14	30	60	200	75	21

Marine cables



Technical Annex

General

Marine Cables (ship wiring cables, ship board cables)

Marine cables are for the installation on board ships. They have been type approved by classification societies and their construction follows standards for marine cables.

Conductor

Marine cable conductors are of stranded annealed copper combining the flexibility and small dimensions to provide excellent installation possibilities and economical solutions. To minimize the cable diameter and weight sector shaped conductors are used for bigger crosssections.

Insulation Material

XLPE (cross-linked polyethylene) is used as the main insulation material. It withstands higher temperatures than ordinary thermoplastic polyethylene. It is resistant against deformation and various chemicals. It has excellent mechanical and electrical properties. The maximum conductor temperature stipulated by IEC 60092-360 marine cable standard is 90 °C.

Sheathing Material

The sheath (jacket) is composed of halogen free, flame retardant thermoplastic or thermoset compound. It fulfils the criterion of SHF1 resp. SHF2 according to IEC 60092-360. In case of fire the sheathing material offers advantages such as reduced emission of smoke and corrosive toxic gases.

Quality Control

Each manufactured cable goes through a test procedure according to the IEC 60092-300 series standards.

Fire Testing Methods

Flame retardance of a single cable is tested in accordance with IEC 60332-1. It is performed on a 60 cm cable sample with a gas flame for 1-4 min depending on the cable diameter. The cable has to be self-extinguishing within certain limits to fulfil the test. Please see figure 1.

Fire retardance is tested on bunched cables in accordance with IEC 60332-3, simulating the fire behaviour of the cables installed in a bunch. The main category that is used is A. This is based on an amount of 7 litres of combustible material per metre.

The bunch of cables has to be minimum 3.5 m high when it is in a burning chamber subjected to fire from a burner directed at the cables for fourty minutes. The cable bunch may not burn more than 2.5 m above the burner. Please see figure 2.

Fire resistance test proves the behaviour of a cable that must work even when it is burning. There are different testing methods, IEC 60331-21 or IEC 60331-1 resp. IEC 60331-2, used for power and control cables. Ship cable standards require the IEC 60331-21 test, where the cable sample is subjected to a flame at 750 °C for 90 minutes followed by a 15 minutes cooling period while the rated voltage is being applied between the conductors. No breakdown or short circuit is permitted during the test. Please see figure 3. The optional testing method for cables, are the more rigorous IEC 60331-1 resp. IEC 60331-2 tests, in which a bent cable, affected by mechanical impacts, is subjected to a 830 °C flame for 120 minutes.

Smoke density is tested according to IEC 61034-1 (apparatus) and IEC 61034-2 (procedure and requirements). It is done by placing cable in a "smoke cube" (3x3x3 m). When the cable is burning, the light transmittance is measured using a photometric system. This test is aimed at simulating visibility when cables are burning on board a ship 60 % (70% for a single cable) visibility is satisfactory if it is attained throughout the test.

Halogens

To test whether a material is halogen free or not, the tests IEC 60754-1 and 60754-2 are used. The acidity of the gases from burning materials is measured. Being halogen-free means that the materials used in the cables do not contain any halogens – such as chlorine, bromine, iodine and fluorine. In order to attain the self-extinguishing effects that halogens have in cables, ATH based materials are used alternatively. The negative effects of halogens (corrosivity, toxicity etc.) are avoided.

Vertical flame propagation test

IEC 60332-1

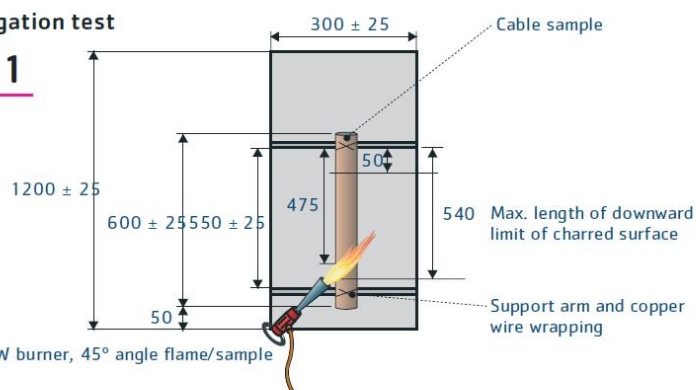


Figure 1.

1 kW burner, 45° angle flame/sample

Vertical flame spread of bunched cables

IEC 60332-3-22/-24 (Cat.C)

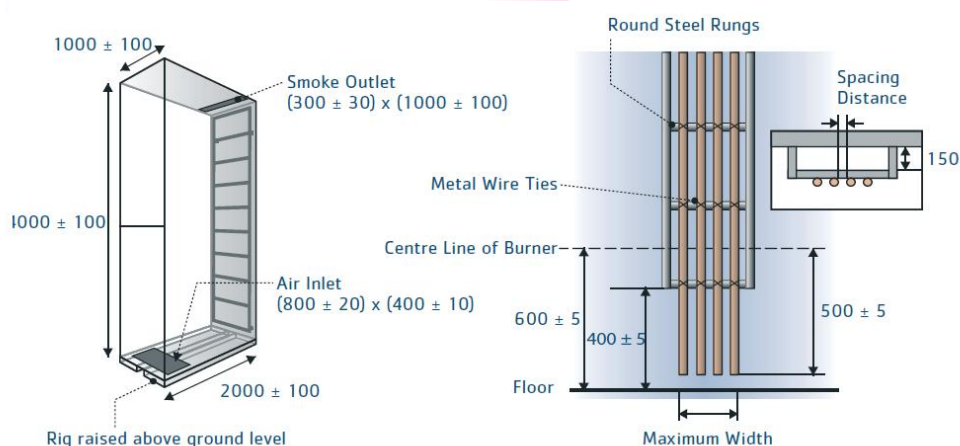


Figure 2.

Fire resistance test

IEC 60331-21

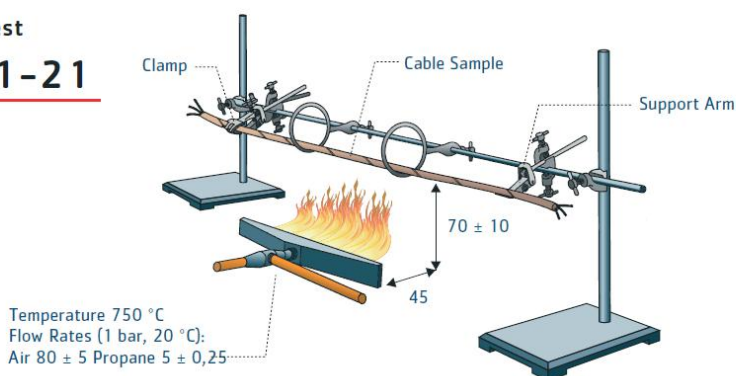


Figure 3.

Marine cables

Approvals / Standards

All above mentioned tests are part of the IEC test procedures for marine cables. As a confirmation of the successfully passed test our products have type approval certificates from the following classification societies:

ABS American Bureau of Shipping

BV Bureau Veritas

DNV GL DNV GL Group

LRS Lloyd's Register of Shipping

RMRS Russian Marine Register of Shipping

Electrical information

Conductor cross section	Current rating for continuous service.									
	Conductor temperature max. +90°C, ambient max. +45°C.									
	According to IEC 60092-352, table B.4 for 0,6/1kV cables.									
	Up to 6 cables bunched together.									
Cores	1	2	3	4	5	7	12	19	27	37
Reduction factors	1,00	0,85	0,70	0,70	0,58	0,52	0,44	0,37	0,33	0,30
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
1,5	23	20	16	16	13	12	10	9	8	7
2,5	30	26	21	21	18	16	13	11	10	9
4	41	35	29	29	24					
6	52	44	36	36	30					
10	72	61	50	50	42					
16	96	82	67	67	56					
25	127	108	89	89	74					
35	157	133	110	110	92					
50	196	167	137	137						
70	242	206	169	169						
95	293	249	205	205						
120	339	288	237	237						
150	389	331	272	272						
185	444	377	311	311						
240	522	444	365	365						
300	601	511	421	421						

Ambient temperature correction factors according to IEC 60092-352									
Temperature (°C)	35	40	45	50	55	60	65	70	75
Correction factor	1,10	1,05	1,00	0,94	0,88	0,82	0,74	0,67	0,58

Short time duty and intermittent service load correction factors according to IEC 60092-352					
Cable diameter	Time constant	Critical duration (rest time between service periods)	Service time correction factor		Intermittent service correction factor
D (mm)	T (min)	3xT (min)	30 min	60 min	4 min load + 6 min rest
5	2,2	6,5	1,058	1,058	1,083
6	2,8	8,3	1,058	1,058	1,127
7	3,4	10	1,058	1,058	1,17
8	4,1	12	1,059	1,058	1,208
9	4,8	14	1,059	1,058	1,242
10	5,5	16	1,061	1,058	1,273
15	9,5	28	1,081	1,059	1,376
20	14	42	1,126	1,066	1,433
25	19	57	1,186	1,081	1,468
30	24	73	1,255	1,105	1,49
35	30	89	1,328	1,137	1,506
40	36	107	1,403	1,173	1,518
45	42	125	1,479	1,212	1,527
50	48	145	1,554	1,254	1,534
60	62	185	1,705	1,341	1,544
70	76	228	1,852	1,432	1,551
80	91	273	1,996	1,522	1,556
90	107	320	2,136	1,613	1,559
100	123	368	2,273	1,702	1,562

Marine cables

Electrical information

Conductor Resistance and Inductance					
Cable Type (L)M2XH, (L)M2XCH, M2XH, M2XCH, MHXH FE 120, MHXCH FE 120, MGCHX	Cross Section	Conductor Resistance (IEC 60228) R (Ω /km)			Inductance L
(n x mm ²)	(mm ²)	at +20°C	at +45°C	at +90°C	(mH/km)
1 x 35	35	0,524	0,575	0,668	0,316
1 x 50	50	0,387	0,425	0,493	0,315
1 x 70	70	0,268	0,294	0,342	0,303
1 x 95	95	0,193	0,212	0,246	0,292
1 x 120	120	0,153	0,168	0,195	0,284
1 x 150	150	0,124	0,136	0,158	0,286
1 x 185	185	0,0991	0,109	0,126	0,281
1 x 240	240	0,0754	0,083	0,096	0,276
1 x 300	300	0,0601	0,066	0,077	0,288
2 x 1,5	1,5	12,1	13,289	15,429	0,336
2 x 2,5	2,5	7,41	8,138	9,448	0,313
3 x 1,5	1,5	12,1	13,289	15,429	0,336
3 x 2,5	2,5	7,41	8,138	9,448	0,313
3 x 4	4	4,61	5,063	5,878	0,293
3 x 6	6	3,08	3,383	3,927	0,281
3 x 10	10	1,83	2,01	2,333	0,266
3 x 16	16	1,15	1,263	1,466	0,254
3 x 25	25	0,727	0,798	0,927	0,211
3 x 35	35	0,524	0,575	0,668	0,202
3 x 50	50	0,387	0,425	0,493	0,200
3 x 70	70	0,268	0,294	0,342	0,197
3 x 95	95	0,193	0,212	0,246	0,190
3 x 120	120	0,153	0,168	0,195	0,189
3 x 150	150	0,124	0,136	0,158	0,191
3 x 185	185	0,0991	0,109	0,126	0,193
4 x 1,5	1,5	12,1	13,289	15,429	0,359
4 x 2,5	2,5	7,41	8,138	9,448	0,336
4 x 4	4	4,61	5,063	5,878	0,317
4 x 6	6	3,08	3,383	3,927	0,304
4 x 10	10	1,83	2,01	2,333	0,289
4 x 16	16	1,15	1,263	1,466	0,278
4 x 25	25	0,727	0,798	0,927	0,267
4 x 35	35	0,524	0,575	0,668	0,258
4 x 50	50	0,387	0,425	0,493	0,217
4 x 70	70	0,268	0,294	0,342	0,213
4 x 95	95	0,193	0,212	0,246	0,206
4 x 120	120	0,153	0,168	0,195	0,205

Permissible short-circuit current at max. permissible short-circuit temperatures of the conductor surface and for a fault duration $t_{kr} = 1$ s

Cross-section mm ²	1	1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300	400
Short-circuit current (kA)																		
	0.143	0.215	0.358	0.572	0.858	1.43	2.29	3.58	5.01	7.15	10.01	13.6	17.16	21.45	26.46	34.32	42.9	71.5

The short-circuit current-carrying capacity I_{thz} for a short-circuit duration t_k deviating from $t_{kr} = 1$ s, is:

$$I_{thz} = I_{thr} \cdot \sqrt{\frac{t_{kr}}{t_k}}$$

Voltage drop:

$$\Delta U = \sqrt{3} \times I_b \times l \times (R'_{w20} \times \cos \varphi + X'_L \times \sin \varphi)$$

For deviating conductor temperatures (e.g. 90°C instead of 20°C) the effective resistance R'_w has to be converted:

$$R'_{w90} = R'_{w20} (1 + (0.004 \times 70k))$$

For the practical use a more easier calculation may be sufficient:

$$\Delta U = \sqrt{3} \times I_b \times l \times R'_{w\theta} \times \cos \varphi$$

I_b = load current [A]

l = cable length [km]

R'_{w20} = effective resistance per unit length and 20°C [Ω /km]

X'_L = Reactance per unit length [Ω /km]

φ = phase-angle

Marine cables

Electrical parameters

Current rating for continuous service

- Communication cable FM2XCH / FMHXCH FE120 250V
- maximum permissible temperatures at the conductor with continuous load
- maximum 4 cables bunched directly at the wall, the floors or in conduits with full current load
- Air circulation around the cable bundle

n° of cores	Cross section 0,75 mm ²							
	Ambient temperature °C							
	40	45	50	55	60	65	70	75
	max. current carrying capacity							
	A	A	A	A	A	A	A	A
1x2x0,75	11,1	10,5	9,9	9,1	8,3	7,5	6,4	5,3
2x2x	8,0	7,5	7,1	6,5	5,9	5,3	4,6	3,8
4x2x	6,4	6,0	5,6	5,2	4,7	4,3	3,7	3,0
7x2x	4,8	4,5	4,2	3,9	3,6	3,2	2,7	2,3
10x2x	4,2	4,0	3,8	3,5	3,2	2,8	2,4	2,0
14x2x	3,7	3,5	3,3	3,0	2,8	2,5	2,1	1,8
19x2x	3,7	3,5	3,3	3,0	2,8	2,5	2,1	1,8
24x2x	3,2	3,0	2,8	2,6	2,4	2,1	1,8	1,5

Current rating for continuous service

- BUS-cable M-02Y(ST)CHX... cross section 0,35mm², 2 conductor

Ambient temperature °C						
40	45	50	55	60	65	max. 70
max. current carrying capacity, single cable						
A	A	A	A	A	A	A
6,0	5,6	5,1	4,7	4,2	3,5	3,0

Current rating for continuous service

- Fibre optic MI-VHH 2 G62,5/125 2x1CU

Ambient temperature °C						
40	45	50	55	60	65	max. 70
max. current carrying capacity, single cable						
A	A	A	A	A	A	A
11,0	10,0	10,0	9,0	8,0	7,0	6,0

Technical information

General

The rated voltage of a cable must not be lower than the nominal voltage of the circuit in which it is used. The ambient temperature during operation should be at least 10 °C lower than the maximum conductor temperature allowed to the insulation material.

Rated Voltage

The rated voltages of cables are expressed as $U_o/U(U_m)$ where

- U_o the rated voltage between the conductor and earth, or between the conductor and the metal screen for which the cable is designed
- U the rated voltage between the conductors for which the cable is designed
- U_m the highest system voltage for which the cables may be used

Installation Temperature

The minimum installation temperature for thermoplastic sheathed cables is -15 °C. If, however, the cables are warmed up prior to installation, they can be installed at lower temperatures.

Lowest operation temperature -40 °C.

Earthing of Braids

Earthing of braids is to be carried out in accordance with the regulations of the classification society.

Bending Radius

The minimum bending radii according to IEC 60092-352 in the final fixed assembly. (Please see table)

During installation the recommended radius is 1,5 times the value given in the table. Maximum pulling tension $P = 50 \text{ N/mm}^2 \times \text{total conductor cross section mm}^2$ value of the cable.

Insulation	Outer covering	Overall diameter of cable (D)	Minimum internal radius of bend
Thermoplastic or thermosetting with circular copper conductors	Unarmoured / Unbraided	≤25mm	4D
	Unarmoured / Unbraided	≥25mm	6D
	Metal braid screened or armoured	any	6D
	Metal wire armoured, metal tape armoured or metal sheathed	any	6D
	Composite polyester/metal laminate screened units or collective tape screening	any	8D
Medium voltage cable	any	single core	12D
		3-core	12D

Marine cables

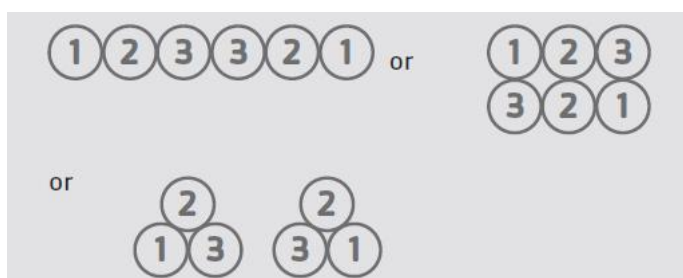
Tables / Explanations

Special precautions for single core cables for a.c. wiring

Whenever possible, a.c. wiring should be carried out with multicore cables. When it is necessary to use single core cables, they should either be unarmoured or armoured with a non-magnetic material.

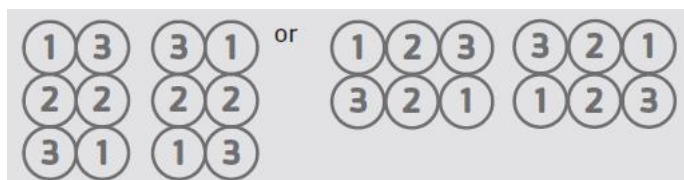
When several multi or single core cables are connected in parallel per phase, they should be of the same type and equal length.

All cables pertaining to the same phase should be alternated with those of the other phases to avoid unequal division of the current. In the case of two cables per phase, for example, the correct dispositions to conform with IEC 60092-352 (phases 1, 2 and 3) are:

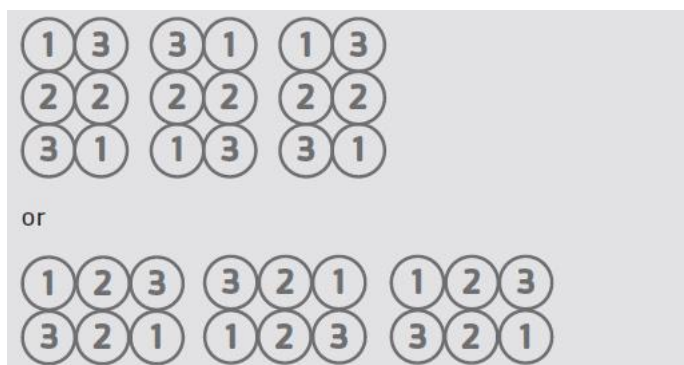


Some other installation examples of single core cables (phases 1, 2 and 3)

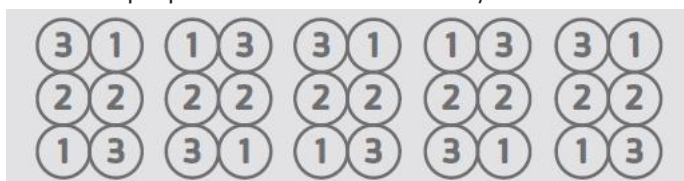
Four cables per phase



Six cables per phase



Ten cables per phase on the same cable tray



EMC-Criteria

Electromagnetic compatibility

Electromagnetic compatibility is the capability of an electrical or electronic device to function correctly in its electromagnetic environment and not to cause interference to the environment to an impermissible degree. This matter is of immediate concern for all those engaged in planning and manufacturing electrical equipment and installations. On the one hand, the EMC legislation introduced in Germany from 1st January 1996, and, on the other hand, the high processing speed and transmission rates of modern electronics necessitate increased attention being paid to the question of the influence of transmitted and received interference. Non-observance of the currently valid EMC standards can lead to imposition of fines.

Standards

Standards, which directly address the question of cable construction or cable characteristics, do not exist. Whether a cable causes interference or not, is solely dependent on the manner in which it is used. From the point of view of the user, those standards, which specify limit values for permissible levels of interference, are relevant. These refer to equipment, plants or other electrical installations and thus refer indirectly to the cables. Those responsible for erection or manufacture thereof must confirm or prove that their equipment meets the EMC requirements. The currently valid standards and regulations, which are important for use of insulated cables, are listed in the figure on the next page.

Criteria for EMC cable selection

Selection of the most suitable cable and application/connection at site from the point of view of EMC can be carried out employing the criteria listed below:

- Use of a cable shield with low transfer impedance
- Symmetrical design and operation of the cable
- Choice of suitable materials by reason of the higher voltage
- Stress of the insulation by reflections at frequencies above 100 MHz; low loss figure
- Large clearance between the interference source and the interference sink (power cables laid spatially separated from the data cables)
- Earthing at both ends and coaxial connection of the shield
- Use of filters
- Laying on earthed surfaces

The design of a cable is of decisive importance for the evaluation of EMC. The most commonly employed constructional designs of power and control cables regarding their EMC characteristics are listed in the figure on the next page.

Selection of EMC cables for applications on ships (Power cables)

In recent years, a new generation of high-speed switching transistors (IGBT) has been employed for converters for variable-speed motors. Use of such converters results in high rates of voltage rise and high-frequency harmonics. For this reason consequent interference must be taken into account. In order to counteract this interference, special measures are required for the power cables. We recommend the use of SIENOPYR-FR ship cables FC. As a result of an optimized design regarding shield, materials and geometry, this cable type fulfills all the requirements with respect to mechanical characteristics for cables and is also distinguished by superior shield characteristics.

EMC-Criteria

Consequently interference emission is reduced to an acceptable degree or even completely suppressed.

Moreover, the SIENOPYR-FR ship cable FC design helps manufacturers and operators of electrical installations to maintain the limit values specified in the EMC legislation.

Control cables, data transmission and bus cables (e.g. PROFIBUS)

Interference-free data transmission can only be achieved, especially when power and data transmission cables lie close together, by implementation of special measures. Cable designs with twisted and shielded pairs have proven their suitability for such applications, in particular as bus cables. The laid-up length and the shield are matched so that the transfer impedance and the shield attenuation are optimized at 30 MHz. The following cable designs are eminently suitable for use as data and bus cables:

SIENOPYR-FR

- FM2XCH
- FMHXCH FE 120
- M-02Y(ST) CHX Profibus

Cables with fibre-optics

The optimum solution regards EMC is the use of glass fibre-optics. For ships SIENOPYR-FR MI-VHH 2G62,5/125.

Standards and regulations relevant to EMC of cables

- **IEC 60801-3** This standard defines electromagnetic compatibility for instrumentation and control equipment for industrial process applications. It describes methods for evaluation of the susceptibility to electromagnetic interference. It further describes tests, by means of which the influence of electromagnetic interference from external sources on the operational behaviour of cables and their maximum achievable transmission rates can be determined.
- **IEC 60801-4** Tests based on this standard reveal the maximum loading limits of LAN cables as a result of uniform, random and periodic interference.
- **EN 55011 (DIN VDE 0875, Part 11)** In this standard the limit values and measuring procedures for radio frequency interference caused by industrial, scientific and medical high-frequency equipment (ISM devices) are defined.
- **EN 55022** This standard corresponds to DIN VDE 0878, Part 3: Limit values and measuring procedures for radio frequency interference caused by information processing equipment (ITE). The radiated energy of a cable can be measured in simulated operation. In addition, the limit value classes A and B for radio frequency interference voltages are defined.
- **Official Journal Regulation 243/1991** This regulation of the German Federal Ministry for Post and Telecommunication deals with radio frequency interference and interference voltage emission.

Information on this subject is also to be found in FTZ TL-6145-3000 issued by the Research and Technology Centre of the German Post Office.

Electrical parameters

Construction		Shield	EMC evaluation	EMC power cables
	Symmetrical 3 + 3	Cu braid (possibly with Cu fleece)	Optimum	
	Symmetrical 3-core	Cu braid (single core)	Good	
	Unsymmetrical 4-core	Cu braid (possibly with Cu fleece)	Good	
	Symmetrical 3 + 3	-	Satisfactory	
	Unsymmetrical 4-core	-	Mediocre	
	Unsymmetrical parallel cores or flat cable	Cu braid	Mediocre	
	Unsymmetrical parallel cores or flat cable	-	Poor	EMC control cables
Construction		Shield	EMC evaluation	
	Symmetrical 2-core	Cu braid (possibly with Cu fleece)	Optimum	
	Symmetrical 2-core	-	Very good	
	Symmetrical 4-core	-	Good (with symmetrical operation)	
	Unsymmetrical concentrically stranded	Cu braid overall shield	Often adequate (with adjacent cores)	
	Unsymmetrical concentrically stranded	Cu braid individually shielded cores	Often adequate (with adjacent cores)	
	Unsymmetrical concentrically stranded	-	Poor	

Chemical parameters

Resistance to chemicals

The individual basic types of materials used for electrical cables as ship board cables, such as XLPE, SHF-1 or EPR can be very different from each other in their resistance to chemicals depending on the required properties. Furthermore, the properties of the materials can vary greatly from manufacturer to manufacturer.

Other factors which influence electrical cables as ship board cables, such as the concentration and degree of wetting of the chemicals, their temperature and the penetration time have different effects on the resistance to chemicals and have to be investigated from case to case.

The chemical industry has drawn up a table which shows a rough summary of the resistance to chemicals of various basic types of material; the overview on the next page is not to be deemed a substitute for a detailed examination.

Ship board cables are not foreseen to be painted with ship painting colours. In case the ship board cables have to be painted, the suitability of the painting with the cable sheath material has to be tested in advance. Different ship approval companies require such tests.

Chemical

	Material				
	EPR	PVC	CSM	PCP	PU
Aceton	Resistant	Non-resistant	Limited resistance	Limited resistance	Not tested
Acetic acid, 30 %	Non-resistant	Non-resistant	Limited resistance	Limited resistance	Limited resistance
Aluminium chloride solution	Resistant	Resistant	Resistant	Resistant	Not tested
Aluminium sulfate solution	Resistant	Resistant	Limited resistance	Limited resistance	Not tested
Ammonia, anhydrous	Resistant	Limited resistance	Resistant	Resistant	Not tested
Ammonium chloride solution	Resistant	Resistant	Resistant	Resistant	Not tested
Ammonium hydroxide solution	Resistant	Resistant	Resistant	Resistant	Not tested
Ammonium sulfate solution	Resistant	Resistant	Resistant	Resistant	Not tested
Amyl acetate	Limited resistance	Not tested	Limited resistance	Limited resistance	Not tested
Aniline	Limited resistance	Non-resistant	Non-resistant	Non-resistant	Not tested
Asphalt	Non-resistant	Limited resistance	Limited resistance	Limited resistance	Resistant
Benzene	Non-resistant	Non-resistant	Limited resistance	Resistant	Resistant
Benzole	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Non-resistant
Borax solution	Resistant	Resistant	Resistant	Resistant	Not tested
Boric acid solution	Resistant	Resistant	Resistant	Resistant	Not tested
Butyl acetate	Limited resistance	Non-resistant	Non-resistant	Non-resistant	Not tested
Calcium bisulphite solution	Resistant	Not tested	Limited resistance	Limited resistance	Not tested
Calcium chloride solution	Resistant	Resistant	Resistant	Resistant	Not tested
Calcium hydroxide solution	Resistant	Not tested	Resistant	Resistant	Not tested
Carbon disulphide	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Carbon tetrachloride	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Chlorobenzene	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Chloroacetic acid	Limited resistance	Not tested	Limited resistance	Limited resistance	Not tested
Chlorine gas, wet	Limited resistance	Non-resistant	Limited resistance	Limited resistance	Not tested
Chlorine gas, dry	Limited resistance	Non-resistant	Limited resistance	Limited resistance	Not tested
Chloroform	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Copper chloride solution	Resistant	Not tested	Resistant	Resistant	Not tested
Copper sulphate solution	Resistant	Not tested	Resistant	Resistant	Not tested
Cyclohexane	Non-resistant	Non-resistant	Limited resistance	Non-resistant	Not tested
Dibutylphthalate	Limited resistance	Non-resistant	Not tested	Non-resistant	Not tested
Diesel oils	Non-resistant	Resistant	Resistant	Resistant	Resistant
Ethyl acetate	Limited resistance	Non-resistant	Non-resistant	Non-resistant	Not tested
Ethyl alcohol	Resistant	Not tested	Not tested	Not tested	Not tested
Ethylene glycol	Resistant	Limited resistance	Resistant	Resistant	Resistant
Ethylene oxide	Non-resistant	Not tested	Limited resistance	Non-resistant	Not tested
Formaldehyde, 10 %	Resistant	Not tested	Resistant	Resistant	Not tested
Fuel oil	Non-resistant	Not tested	Limited resistance	Limited resistance	Not tested
Glycerine	Resistant	Not tested	Resistant	Resistant	Not tested
Hydraulic oils	Non-resistant	Limited resistance	Resistant	Resistant	Resistant
Hydrochloric acid, 20 %	Resistant	Resistant	Resistant	Limited resistance	Non-resistant
Hydrogen sulphide	Resistant	Resistant	Resistant	Limited resistance	Not tested
Kerosene	Non-resistant	Limited resistance	Non-resistant	Non-resistant	Not tested
Lactic acid	Resistant	Not tested	Resistant	Limited resistance	Not tested
Linseed oil	Non-resistant	Not tested	Limited resistance	Limited resistance	Not tested
Lubricating oils	Non-resistant	Resistant	Limited resistance	Limited resistance	Not tested

Chemical

	Material				
	EPR	PVC	CSM	PCP	PU
Magnesium chloride solution	Resistant	Resistant	Resistant	Resistant	Not tested
Methanol	Resistant	Resistant	Resistant	Resistant	Resistant
Methyl chloride	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Methyl ethyl ketone	Resistant	Non-resistant	Limited resistance	Limited resistance	Not tested
Methyl alcohol	Resistant	Limited resistance	Resistant	Resistant	Non-resistant
Mineral oil	Non-resistant	Non-resistant	Limited resistance	Limited resistance	Not tested
Naphta	Non-resistant	Not tested	Non-resistant	Limited resistance	Not tested
Naphtalene	Non-resistant	Non-resistant	Non-resistant	Limited resistance	Not tested
Nitric acid, 10 %	Resistant	Resistant	Limited resistance	Limited resistance	Not tested
Perchlor ethylene	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Petroleum	Non-resistant	Non-resistant	Limited resistance	Limited resistance	Resistant
Phenol	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Phosphoric acid	Resistant	Resistant	Resistant	Resistant	Limited resistance
Picric acid	Resistant	Resistant	Resistant	Resistant	Non-resistant
Potassium chloride	Resistant	Resistant	Resistant	Resistant	Resistant
Pyridine	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Soap solution	Resistant	Resistant	Resistant	Resistant	Not tested
Sodium hydroxide, 25 %	Resistant	Limited resistance	Resistant	Resistant	Non-resistant
Sodium hypochloride	Resistant	Not tested	Resistant	Limited resistance	Not tested
Soya bean oil	Non-resistant	Non-resistant	Limited resistance	Limited resistance	Not tested
Sulphur	Resistant	Resistant	Resistant	Resistant	Limited resistance
Sulphurous acid	Resistant	Resistant	Resistant	Limited resistance	Not tested
Sulphuric acid < 50%	Resistant	Resistant	Resistant	Resistant	Non-resistant
Stearic acid	Resistant	Limited resistance	Resistant	Resistant	Not tested
Toluene	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Transformer oil	Non-resistant	Resistant	Resistant	Resistant	Resistant
Tributyl phosphate	Limited resistance	Not tested	Non-resistant	Limited resistance	Not tested
Trichlorethylene	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Non-resistant
Triethanolamine	Resistant	Not tested	Resistant	Limited resistance	Not tested
Turpentine	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Vegetable oils and grease	Limited resistance	Limited resistance	Resistant	Resistant	Resistant
Water	Resistant	Resistant	Resistant	Resistant	Limited resistance
Xylene	Non-resistant	Non-resistant	Non-resistant	Non-resistant	Not tested
Zinc chloride solution	Resistant	Resistant	Resistant	Resistant	Not tested

Resistant	Resistant
Limited resistance	Limited resistance
Non-resistant	Non-resistant
Not tested	Not tested

Marine cables

Thermal parameters

Temperature limits				
Cables	Temperature limit during operation, installation and transport (°C)			
	of the conductor during operation	of the conductor during short-circuit	on the surface of the cable fixed installation	on the surface of the cable, during installation
MMGCEGCH	90	250	-35 to +80	-15 to +50
MMGCEGCHX	90	250	-35 to +80	-15 to +50
MMGCGCH	90	250	-35 to +80	-15 to +50
MMGCGCHX	90	250	-35 to +80	-15 to +50
MMGCEGCH FC	90	250	-35 to +80	-15 to +50
MMGCEGCHX FC	90	250	-35 to +80	-15 to +50
M2XCH FC	90	250	-35 to +80	-15 to +50
M2XCH 1,8/3 kV	90	250	-35 to +80	-15 to +50
(L)M2XCH	90	250	-35 to +80	-15 to +50
M2XCH	90	250	-35 to +80	-15 to +50
(L)M2XH	90	250	-35 to +80	-15 to +50
M2XH	90	250	-35 to +80	-15 to +50
MGCHX	90	250	-50 to +80	-35 to +50
MHXCH FE120	90	250	-35 to +80	-15 to +50
MHXH FE120	90	250	-35 to +80	-15 to +50
FM2XCH	90	250	-35 to +80	-15 to +50
FMGCHX	90	250	-50 to +80	-35 to +50
FMHXCH FE120	90	250	-35 to +80	-15 to +50
MI-VHH 2G62,5/125 Fiber Optic	80	250	-35 to +70	-15 to +50
M-02Y(ST)CHX Profibus	80	250	-35 to +70	-15 to +50
UC Multimedia 1500	60	n/a	-20 to +60	0 to +50
UC900 SS23	60	n/a	-20 to +60	0 to +50
UC900 SS27	60	n/a	-20 to +60	0 to +50
UC300 HS24	60	n/a	-20 to +60	0 to +50
ToughCat Cat7	60	n/a	-40 to +85	-15 to +50
ToughCat Cat7S	60	n/a	-40 to +85	-15 to +50
ToughCat Cat5	60	n/a	-40 to +85	-15 to +50
UCFIBRE I DI LSHF-FR ES9	60	n/a	-20 to +70	-20 to +70
RG213	60	n/a	-45 to +85	-15 to +55
RG214	60	n/a	-45 to +85	-15 to +55
RG223	60	n/a	-45 to +85	-15 to +55
VG T60, T61, T62, T63	90	250	-30 to +90	-15 to +50

Insulating and sheathing compounds

The next table gives an overview of all common compounds used for flexible electric cables. A basic distinction is made between thermoplastics and elastomers. Thermoplastics, generally known as plastic, are usually not cross-linked. Elastomers, generally known as rubber, are always cross-linked.

Serial No.	Material	Abbreviation	Type designation	
			VDE	Harm.
Thermoplastics				
1	Polyvinyl chloride	PVC	Y	V
2	Cross-linked polyvinyl chloride	PVC	X	V4
3	Polyethylene	PE	2Y	E
4	Cross-linked polyethylene	XLPE	2X	X
5	Low-pressure polyethylene	PE	2Yn	E2
6	Foam polyethylene	PE	02Y	
7	Polystyrene	PS	3Y	Q3
8	Polyamide	PA	4Y	Q4
9	Polytetrafluor ethylene	PTFE	5Y	E4
10	Perfluor ethylene propylene	PEP	6Y	E5
11	Ethylene tetrafluor ethylene	ETFE	7Y	E6
12	Polyimide	PI	8Y	Q5
13	Polypropylene	PP	9Y	E7
14	Polyvinylidene fluoride	PVDF	10Y	Q6
15	Polyurethane	TPU/PU	11Y	Q
16	Polyterephthalic acid ester	PETP	12Y	Q2
17	Polyester thermoplastic		13Y	
18	Perfluor ethylene oxyalkane	PFA	14Y	
19	Polychlorotrifluor ethylene	ECTFE	15Y	
Elastomers				
20	Natural rubber	NR	G	R
21	Synthetic rubber	SR	G	R
22	Styrene-butadiene rubber	SBR	G	R
23	Silicon rubber	SIR	2G	S
24	Isobuthylene-isoprene rubber	IIR	3G	B3
25	Ethylene-propylene rubber	EPR/EPDM	3G	B
26	Ethylene vinylacetate	EVA	4G	G
27	Chloroprene rubber	CR/PCP	5G	N
28	Chlorosulfonated polyethylene	CSM	6G	N4
29	(Hypalon)			
30	Fluor elastomers		7G	
31	Nitrile butadiene rubber	NBR	8G	N5
32	Chlorated polyethylene	CM/CPE		

Notes

Y: Type designation for a thermoplastic material

G: Type designation for an elastomeric material

X: Type designation for a cross-linked thermoplastic material (the letter „X“ replaces the „Y“ in „2X“ for cross-linked polyethylene)

0: Additional designation for foam materials (the zero is placed in front of the relevant type designation, e.g. „02Y“ for foamed PE)

Marine cables

Cable Drum Overview

Drum size	Weight	Dimensions	Volume
	kg	Ø x width cm	m ³
051	9	50 x 46	0.09
071	23	71 x 48	0.19
081	28	80 x 52	0.26
091	45	90 x 70	0.45
101	68	100 x 89	0.70
121	132	125 x 89	1.09
141	159	140 x 89	1.37
161	247	160 x 100	2.01
181	296	180 x 110	2.80
200	487	200 x 135	4.24
220	653	224 x 138	5.44
250	759	250 x 148	7.26
281	1051	280 x 164	10.10
300	1240	300 x 176	12.14
230	1340	320 x 225	18.10
340	2600	340 x 225	20.43

Comparison

Cross section metrical mm ²	mm ²	AWG-Size (American Wire Gage)
0,75	0,653	19
	0,823	18
	1,04	17
	1,31	16
1,5	1,65	15
	2,08	14
2,5	2,62	13
	3,31	12
4,0	4,17	11
	5,26	10
6,0	6,63	9
	8,37	8
	10,55	7
	13,30	6
10,0	16,77	5
	21,15	4
16,0	26,67	3
	33,63	2
25,0	42,41	1
	53,48	1/0
50,0	67,43	2/0
70,0	85,03	3/0
95,0	107,20	4/0
120,0	126,64	250 MCM
150,0	152,00	300 MCM
	177,35	350 MCM
185,0	202,71	400 MCM
240,0	253,35	500 MCM
300,0	380,00	750 MCM
400,0		
500,0	506,71	1000 MCM

Summary of fibre properties and standards

Multi mode fibres, Standards

	Type	ITU	ISO 11801 EN 50173	IEC	ANSI/TIA	Comments
C01	MM 50 µm	G 651.1	OM2	A1a.1	492AAAB	High bandwidth 50 µm MM fiber
C23	MM 50 µm	G 651.1	OM2	A1a.1	492AAAB	Standard 50 µm MM fiber,
C11	MM 50 µm	-	OM4	A1a.3	492AAAD	MaxCap-OM4. Range for 10Gbit Ethernet at 850 nm: 550 m
C12	MM 50 µm	-	OM3	A1a.2	492AAAC	MaxCap-OM3. Range for 10Gbit Ethernet at 850 nm: 300 m
C30	MM 50 µm	-	OM2	A1a	492AAAB	MaxCap-BB-OM2+ Bend insensitive laser optimised OM2 fibre with high bandwidth at 850 nm
C31	MM 50 µm	-	OM3	A1a.2	492AAAC	MaxCap-BB-OM3. Bend insensitive OM3 fibre with high bandwidth at 850 nm
C32	MM 50 µm	-	OM4	A1a.3	492AAAD	MaxCap-BB-OM4. Bend insensitive OM4 fibre with high bandwidth at 850 nm
C34	MM 50 µm	-	OM2	A1a.1	492AAAB	MaxCap-BB-OM2
C02	MM 62.5 µm	-	OM1	A1b	492AAAA	Standard 62.5 µm fibre
C36	MM 200 µm	-	-	A3c	-	Draka Elite hard clad silica step index fibre Large core HCS MM fibre 200/230/500 µm

Single mode fibres, Standards

C03	SM	G.652.D	OS1 + OS2	B1.3		Standard Enhanced SM fibre
C06	SM	G.652.D	OS1 + OS2	B1.3		Standard Enhanced SM fibre for telecom applications
C17	SM	G.657.A1*)	OS1 + OS2	B6_a		BendBright®: Special fibre reduced macro bending sensitivity particularly at 1500 nm and 1625 nm
C18	SM	G.652.D	OS1 + OS2	B1.3		DrakaElite™ SM fibre for patch cords: Special selected fibre with tight physical tolerances for connector mounting.
C20	SM	G.655.C/E G.656	-	B4 + B5		TeraLight®: Non-zero dispersion-shifted single mode fibre.
C24	SM	G.657.A2 and B2 *)	OS1 + OS2	B6_a + B6_b		BendBright®XS: Fibre with greatly reduced bend sensibility
C25	SM	G.657.A2 and B2 *)	OS1 + OS2	B6_a + B6_b		Draka BendBright®XS: Fibre with greatly reduced bend sensibility. Special selected fibre with tight physical tolerances for connector mounting
C26	SM	G.652.D	OS1 + OS2	B1.3		Low Loss Enhanced SM fibre for telecom terrestrial applications
C27	SM	G654.B	-	B.1.2		Draka LongLine™ 1550 nm optimised low loss single mode fibre G.654.B. For inshore networks.
C28	SM	G654.B	-	B.1.2		Draka LongLine™ 1550 nm optimised low loss single mode fibre G.654.B. Version with 2% proof test value for submarine applications and offshore networks
C29	SM	G.652.B	OS1	B.1.1		G.652.B classic single mode fibre
C33	SM	G.657.B3 *)				BendBright Elite
C35	SM	G.657.A2 **)				200 µm BendBright XS

*) Also G.652.D is fulfilled. **) ITU does not specify coating size, the 200µm coating is an optimized variant developed by Draka

NOTES

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Marine cables

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