

The logo for lynxéo, with 'lyn' in white, 'x' in orange, and 'éo' in white. The background of the entire page is a high-speed train in a tunnel with blue light trails.A large orange circular graphic in the top right corner.

Wired to electrify industry

FLAMEX[®]
cables to design
mobility solutions



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FLAMEX® RANGE: EN 50200

FLAMEX® FR TYPE EN 50306-2 MSZ

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FLAMEX®

Cable Solutions & Services

FLAMEX® A COMPLETE RANGE OF PRODUCTS

Lynxéo can supply the hundreds of specialty products necessary to fit out a complete trainset. FLAMEX® cables conform to EN 45545-2 i.e. products are halogen-free, non-toxic, non-corrosive, low smoke, flame and fire retardant.

Control cables EN 50306 series

Thin wall single or multi-core, shielded or unshielded are used for the wiring of electronic equipment in low voltage applications: doors, lighting, converters/transformers.

Power cables EN 50264 3 & EN 50382-2 series

Flexible single and multi-core cables to meet the power needs. Silicone-based Power cables are designed to withstand extreme operating temperatures.

Tailored Communication cables

Databus cables that meet Profibus, MVB, WTB or Ethernet protocols for passenger video services/surveillance and vital equipment. Coaxial cables for multimedia and GSM radio transmissions. Optical fiber cables to bring high bandwidth for onboard services i.e. passenger information and train.



Fire resistant cables EN 50200

A wide range of fire resistant control, power and communication cables for safety systems (emergency lighting, fire detection, warning systems, door opening, etc.)

HV cable assemblies

High voltage tailored assemblies for 25kV. A wide range of cable cross-sections allows to fit with any project requirement.

Jumpers/Hybrids

Reliable flexible power or customized hybrid cables for intercars and bogies.



Smart Inventory Management

Reduce costs in operation, optimize cash flow, free up warehouse space, simplify project management.

This Solution is using RFID technology on drums to monitor the inventory of cables along the entire supply chain. The benefits are manifold:

- 100% material availability with a reduced inventory and storage space need
- 24/7 real time visibility of the entire cable portfolio
- Simplification of ordering process, incoming goods reception, expedition processes

A TAILORED SERVICE PACKAGE TO SUPPORT YOUR OPERATIONAL CONCERNS AND CHALLENGES

Engineering of electrical cabling

Assess and improve reliability of the electrical wiring, reduce the total cost-of-ownership, make cable purchases leaner.

70% of the total cost of an electrical system is driven and locked by the design. Finding the optimum balance between power efficiency, reliability and cost competitiveness is a tremendous challenge. Architecture design service consists in re-engineering cabling systems to optimize cable sizing and routing, reduce the complexity of the bill of materials thanks to state of the art simulation and methodologies.

Cable Recycling

Receive money back in exchange for your leftover cables, to positively contribute to the environment, to respect regulations on waste.

Rolling stock companies in Europe rely in Lynxéo's expertise to recycle their cable waste.

This service allows you to comply with the increasing environment regulations and at the same time provides a source of revenues from scraps. Lynxéo, as a recycling expert ensures an end-to-end service including the collection and transport of cable scraps, recovery in its own treatment plants, and release of the official traceability and compliance documentation and of course the payment.



LOW VOLTAGE CONTROL CABLES

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LOW VOLTAGE CONTROL CABLES

FLAMEX® EN 50306

Thin wall halogen-free wires & cables for low voltage applications

APPLICATIONS

FLAMEX® control cables are particularly recommended for the wiring of electronic equipment in low voltage applications. Designed to conform to EN 50306, the control cables are intended for rolling stock applications where special fire performances are required: flame and fire retardant, halogen-free, low smoke emission, low toxicity and low corrosivity of fumes.

A 125°C conductor temperature is allowed for a 20,000 hours cumulate working time.

ADVANTAGES

- Developed by the Lynxéo R&D laboratories, the cross-linked insulation shows an excellent mechanical resistance to abrasion, notch propagation and cut through, but also a very good resistance to chemical agents
- Flexible and easy to strip, this single-layer insulation is designed to meet the stringent requirements of our customers during cabling operations allowing weight and space saving (thin wall insulation: 0.2 to 0.3 mm insulation thickness).

MAIN CHARACTERISTICS

- FLAMEX® EN 50306 cables are available in every type of construction for internal and external uses:
 - single core (unscreened or screened and sheathed)
 - multicore and pairs
 - other constructions on request (triple, etc.)
- Operating temperature: from - 40°C up to +105°C able to withstand -50°C
- Rating voltage: 300 V AC / 410 V DC acc. EN 50355 table 2
- Cross-sections: from 0.50 mm² to 2.5 mm² in standard version

MAIN PROPERTIES

- Low smoke emission according to IEC/EN 61034-2
- Low toxicity (ITC≤3) and corrosivity of released gases after burning:
 - Halogen-free content according to IEC/EN 60754-1
 - pH ≥ 4.3 according to IEC/EN 60754-2
 - Conductivity ≤ 10 µS/mm to IEC 60754-2
- High mechanical resistance (against abrasion, notch propagation and cut through): no additional protection required
- Excellent chemical resistance (against acid, alkali, oil, fuel...)

STANDARDS

- FLAMEX® EN 50306 wires and cables comply with the internationally recognised EN 45545-2, which is the leading global standard for the protection of materials used in the manufacture of rolling stock against the effects of fire and smoke.



GUIDELINES

EN 50306 TYPES	SINGLE CORE CABLES	MULTICORE CABLES	MULTIPAIR CABLES	OVERALL SCREEN	OUTER SHEATH MINIMUM THICKNESS	PAGE
EN 50306-2 Category M	•				-	13
EN 50306-3 Category MMS		•		•	0.20 mm	14
EN 50306-4 Table 1 Class P Category MM Short designation: EN 50306-4 1P		•			0.42 mm	16
EN 50306-4 Table 1 Class E Category MM Short designation: EN 50306-4 1E		•			1.00 mm	17
EN 50306-4 Table 3 Class P Category MMS Short designation: EN 50306-4 3P		•		•	0.42 mm	18
EN 50306-4 Table 3 Class E Category MMS Short designation: EN 50306-4 3E		•		•	1.00 mm	19
EN 50306-4 Table 5 Class P Category MMMS Short designation: EN 50306-4 5P			•		0.56 mm	20
EN 50306-4 Table 5 Class E Category MMMS Short designation: EN 50306-4 5E			•		1.00 mm	21
EN 50306-4 Table 7 Class P Category MMS Short designation: EN 50306-4 P			•	•	0.56 mm	22
EN 50306-4 Table 7 Class E Category MMS Short designation: EN 50306-4 E			•	•	1.00 mm	23

M: extra low temperature & extra oil and fuel resistance of insulation and sheath acc. to EN 50306-1.

S: metallic screen braid.

FIRE PROPERTIES

PARAMETER	VALUE	STANDARD
Hazard level	HL3	EN 45545-2
Flame propagation	-	IEC/EN 60332-1-2
Fire propagation - bunched cables	-	EN 50305-9.1
Evaluation of Fluor	≤ 0.1 %	IEC/EN 60684-2
pH	≥ 4.3	IEC/EN 60754-2
Conductivity	≤ 10 μS/mm	IEC/EN 60754-2
Smoke emission	≥ 70 %	IEC/EN 61034-2
Toxicity index of insulation	≤ 6	EN 50305-9.2
Toxicity index of sheath (for sheathed types)	≤ 3	EN 50305-9.2

LOW VOLTAGE CONTROL CABLES

EN 50306-2 and EN 50306-3 are used for rolling stock as fixed wiring or wiring where limited flexing in operation is encountered.

EN 50306-4 types are specified used in PROTECTED situations (Class P: minimum thickness of sheath 0.42 mm) and EXPOSED situations (Class E minimum thickness of sheath 1 mm). They are used for rolling stock as fixed wiring or wiring where limited flexing in operation is encountered. The class E cables could be installed outside the vehicles.





FLAMEX® EN 50306

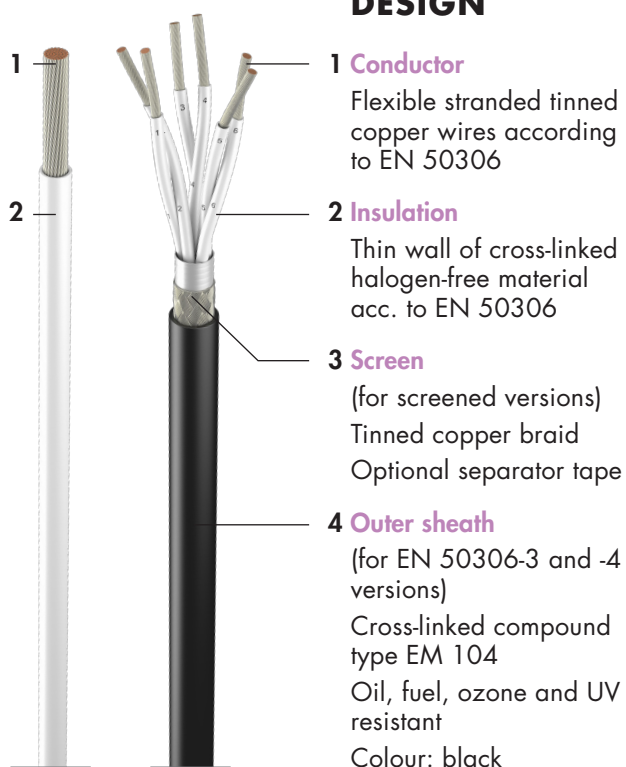
FLEXIBLE THIN WALL INSULATED WIRES AND CABLES

APPLICATION

Strictly halogen-free, these control wires and cables combine the advantages of small size, lightweight, high chemical resistance and high mechanical properties. They are recommended for installation in all types of railway vehicles. A 125°C conductor temperature is allowed during 20,000 hours cumulative working time for EN 50306-2 and 120°C for EN 50306-3 and EN 50306-4.

Conductor temperature: -40°C/+105°C/+125°C for EN 50306-2
-40°C/+90°C/+120°C for EN 50306-3 or -4

DESIGN



Unscreened wires Screened multicore/pair cables

COLOUR CODES

Insulation:
white, numbered 1 to n

BENDING RADIUS

Static use:
- 3 x outer diameter
- 10 x outer diameter for shielded cables
- For installation and occasional movements:
10 x outer diameter

MARKING

Marking of FLAMEX® cables complies with EN 50306

FIRE SAFETY STANDARDS

FLAMEX® EN 50306 cables comply with the internationally recognised EN 45545-2 standard.

GUIDE TO USE

Permissible current capacities and cabling rules given in EN 50355 and EN 50343



Operating temp
- 40°C to
+105°C



Good chemical
Resistance
(oil, fuel, acid...)



Flame and Fire
retardant
IEC/EN 60332-1-2 IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Flexible



Screened
version

FLAMEX® - EN 50306-2 CATEGORY M
Unscreened and unsheathed single core cables
Thin wall insulation

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	CONDUCTOR		INSULATION		MAX. COND. RESISTANCE [Ohm/km]	APPROX. WEIGHT [kg/km]
		Construction n x diam. [mm]	Max. diameter [mm]	Min. diameter [mm]	Max. diameter [mm]		
2PG198	1 x 0.5	19 x 0.18	0.95	1.15	1.45	40.1	6.0
2PG199	1 x 0.75	19 x 0.23	1.15	1.35	1.65	26.7	8.5
2PG200	1 x 1.0	19 x 0.25	1.30	1.45	1.80	20.0	10.5
2PF779	1 x 1.5	19 x 0.30	1.60	1.95	2.30	13.7	16.0
2PG201	1 x 2.5	19 x 0.40	2.00	2.50	2.85	8.21	26.5

Marking

FLAMEX 239 EN 50306-2 - 300 V - 1 x cross-section - M - week/year

FLAMEX® EN 50306-3

FLEXIBLE THIN WALL INSULATED WIRES AND CABLES

FLAMEX® - EN 50306-3 CATEGORY MM - S

Single core and multicore cables (pairs, triples and quads) screened and thin wall sheathed
Thin wall insulation/Thin wall sheath (minimum 0.20 mm) type EM 104

Base core

Each insulated single core is conform to the requirements given in EN 50306-2



LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PH184	1 x 0.50	2.30	2.80	14
2PG960	2 x 0.50	3.50	4.30	25
2PG963	3 x 0.50	3.70	4.50	33
2PH189	4 x 0.50	4.00	5.00	43
2PI378	6 x 0.50	5.50	6.50	75
2PI811	8 x 0.50	6.10	7.10	88
2PH185	1 x 0.75	2.50	3.00	17
2PG961	2 x 0.75	3.90	4.70	31
2PG964	3 x 0.75	4.00	5.00	43
2PH190	4 x 0.75	4.50	5.50	56
2PJ942	6 x 0.75	6.10	7.10	92
2PI361	8 x 0.75	7.30	8.30	119
2PH186	1 x 1.00	2.70	3.20	20
2PG962	2 x 1.00	4.20	5.20	37
2PG965	3 x 1.00	4.50	5.50	52
2PG966	4 x 1.00	5.00	6.00	65
2PM688	6 x 1.00	6.30	7.30	104
2PM706	8 x 1.00	7.50	8.50	125
2PH187	1 x 1.50	3.10	3.60	28
2PF780	2 x 1.50	5.10	6.10	55
2PH191	3 x 1.50	5.40	6.40	75
2PH192	4 x 1.50	6.00	7.00	100
2PH188	1 x 2.50	3.60	4.40	43
2PH193	2 x 2.50	6.40	7.40	87
2PH194	3 x 2.50	6.80	7.80	124
2PH195	4 x 2.50	7.50	8.50	158

Other constructions on request

Marking

Cores: by printed numbers

External sheath: FLAMEX 239 EN 50306-3 - 300 V - number of cores x cross-section - MM-S-90 - week/year - batch number

FLAMEX® EN 50306-3 MMS

LOW VOLTAGE
CONTROL CABLES

FLAMEX® EN 50306-4 TABLE 1 CLASS P CATEGORY MM

Unscreened and sheathed multicore cables

Thin wall insulation/Standard wall sheath (minimum 0.42 mm) type EM 104

Base core

Each insulated single core is conform to the requirements given in EN 50306-2



LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PH304	2 x 0.50	3.50	4.50	27
2PH305	3 x 0.50	3.80	4.80	34
2PG693	4 x 0.50	4.10	5.10	41
2PH306	7 x 0.50	4.90	5.90	63
2PH307	13 x 0.50	7.30	8.30	121
2PH308	19 x 0.50	8.10	9.10	160
2PH309	37 x 0.50	10.80	12.00	286
2PG694	2 x 0.75	3.95	4.95	33
2PG695	3 x 0.75	4.20	5.20	43
2PG696	4 x 0.75	4.60	5.60	54
2PH310	7 x 0.75	5.50	6.50	84
2PH311	13 x 0.75	8.20	9.20	161
2PH312	19 x 0.75	9.00	10.20	216
2PH313	37 x 0.75	12.20	13.40	390
2PH314	48 x 0.75	13.90	15.50	497
2PG697	2 x 1.00	4.30	5.30	41
2PG698	3 x 1.00	4.60	5.60	46
2PG699	4 x 1.00	4.90	5.90	58
2PG700	7 x 1.00	6.00	7.00	105
2PG701	13 x 1.00	8.70	9.90	198
2PG702	19 x 1.00	9.80	11.00	268
2PH315	37 x 1.00	13.30	14.50	491
2PG703	2 x 1.50	5.00	6.00	51
2PG704	3 x 1.50	5.30	6.30	67
2PG705	4 x 1.50	6.00	7.00	85
2PG706	7 x 1.50	7.70	8.70	158
2PG707	13 x 1.50	10.70	11.90	277
2PG708	19 x 1.50	12.00	13.20	378
2PG709	37 x 1.50	16.20	17.80	715
2PG710	2 x 2.50	6.70	7.70	86
2PG711	3 x 2.50	7.70	8.10	119
2PG712	4 x 2.50	7.90	8.90	147

Other constructions on request

Marking

Cores: by printed numbers

External sheath: FLAMEX 239 EN 50306-4 - 1P - 300 V - number of cores x cross-section - MM-90 - week/year - batch number

FLAMEX® EN 50306-4 TABLE 1 CLASS E CATEGORY MM**Unscreened and sheathed multicore cables****Thin wall insulation/Standard wall sheath (minimum 1.00 mm) type EM 104**

Base core

Each insulated single core is conform to the requirements given in EN 50306-2

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PH316	2 x 0.50	4.90	5.90	48
2PH317	3 x 0.50	5.10	6.10	56
2PH318	4 x 0.50	5.50	6.50	60
2PH319	7 x 0.50	6.30	7.30	80
2PH320	13 x 0.50	8.30	9.30	132
2PH321	19 x 0.50	9.00	10.20	172
2PH322	37 x 0.50	12.30	13.50	310
2PH323	2 x 0.75	5.30	6.30	57
2PH324	3 x 0.75	5.50	6.50	67
2PH325	4 x 0.75	6.00	7.00	79
2PH326	7 x 0.75	6.90	7.90	114
2PH327	13 x 0.75	9.10	10.30	189
2PH328	19 x 0.75	10.00	11.20	246
2PH329	37 x 0.75	13.20	14.40	433
2PH330	48 x 0.75	14.80	16.40	546
2PH331	2 x 1.00	5.60	6.60	62
2PH332	3 x 1.00	5.80	6.90	75
2PG967	4 x 1.00	6.30	7.30	94
2PG968	7 x 1.00	7.30	8.30	136
2PG969	13 x 1.00	9.70	10.90	231
2PG970	19 x 1.00	10.70	11.90	300
2PH333	37 x 1.00	14.00	15.60	533
2PH334	2 x 1.50	6.30	7.30	81
2PH335	3 x 1.50	6.60	7.60	100
2PG972	4 x 1.50	7.40	8.40	123
2PG428	7 x 1.50	8.60	9.80	185
2PG973	13 x 1.50	11.70	12.90	319
2PG429	19 x 1.50	13.00	14.20	430
2PG971	37 x 1.50	17.20	18.80	768
2PH336	2 x 2.50	7.70	8.70	119
2PH337	3 x 2.50	8.10	9.10	151
2PG974	4 x 2.50	8.80	10.00	187

Other constructions on request

Marking

Cores: by printed numbers

External sheath: FLAMEX 239 EN 50306-4 - 1E - 300 V - number of cores x cross-section - MM-90 - week/year - batch number

FLAMEX® EN 50306-4 TABLE 3 CLASS P CATEGORY MM - S

Screened and sheathed multicore cables

Thin wall insulation/Standard wall sheath (minimum 0.42 mm) type EM 104

Base core

Each insulated single core is conform to the requirements given in EN 50306-2



LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PG715	2 x 0.50	4.10	5.10	36
2PG716	3 x 0.50	4.30	5.30	44
2PG413	4 x 0.50	4.70	5.70	54
2PG717	6 x 0.50	5.50	6.50	75
2PG718	8 x 0.50	6.00	7.00	90
2PG719	2 x 0.75	4.50	5.50	43
2PG720	3 x 0.75	4.70	5.70	54
2PG721	4 x 0.75	5.20	6.20	69
2PG723	8 x 0.75	6.60	7.60	118
2PG414	2 x 1.00	4.70	5.70	51
2PG415	3 x 1.00	5.10	6.00	64
2PG724	4 x 1.00	5.50	6.50	78
2PG725	6 x 1.00	6.60	7.60	111
2PG726	8 x 1.00	7.70	8.70	156
2PG727	2 x 1.50	5.70	6.70	70
2PG728	3 x 1.50	6.00	7.00	90
2PG729	4 x 1.50	6.60	7.60	114
2PG730	6 x 1.50	8.30	9.30	178
2PG731	8 x 1.50	8.90	10.10	210
2PG732	2 x 2.50	7.30	8.30	116
2PG733	3 x 2.50	7.70	8.70	151
2PG734	4 x 2.50	8.40	9.60	192

Other constructions on request

Marking

Cores: by printed numbers

External sheath: FLAMEX 239 EN 50306-4 - 3P - 300 V - number of cores x cross-section - MM-S-90 - week/year - batch number

FLAMEX® EN 50306-4 TABLE 3 CLASS E CATEGORY MM - S**Screened and sheathed multicore cables****Thin wall insulation/Standard wall sheath (minimum 1.00 mm) type EM 104**

Base core

Each insulated single core is conform to the requirements given in EN 50306-2

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PG843	2 x 0.50	5.50	6.50	58
2PG844	3 x 0.50	5.70	6.70	67
2PG845	4 x 0.50	6.10	7.10	80
2PG846	6 x 0.50	6.90	7.90	105
2PG847	8 x 0.50	7.50	8.50	122
2PG848	2 x 0.75	5.90	6.90	68
2PG849	3 x 0.75	6.20	7.20	79
2PG850	4 x 0.75	6.50	7.50	96
2PH340	6 x 0.75	7.50	8.50	128
2PG851	8 x 0.75	8.20	9.20	156
2PG426	2 x 1.00	6.20	7.20	77
2PG852	3 x 1.00	6.50	7.50	95
2PG427	4 x 1.00	6.90	7.90	109
2PG853	6 x 1.00	8.00	9.00	158
2PG854	8 x 1.00	8.60	9.80	186
2PG855	2 x 1.50	7.10	8.10	97
2PG856	3 x 1.50	7.40	8.40	119
2PG857	4 x 1.50	8.00	9.00	148
2PG858	6 x 1.50	9.20	10.40	206
2PH341	8 x 1.50	10.20	11.40	245
2PG859	2 x 2.50	8.30	9.30	138
2PH342	3 x 2.50	8.60	9.80	171
2PG860	4 x 2.50	9.40	10.60	214

Other constructions on request

Marking

Cores: by printed numbers

External sheath: FLAMEX 239 EN 50306-4 - 3E - 300 V - number of cores x cross-section - MM-S-90 - week/year - batch number

FLAMEX® EN 50306-4 TABLE 5 CLASS P CATEGORY MMMS

Individually screened and sheathed multipair cables

Thin wall insulation/Standard wall external sheath

(minimum 0.56 mm) type EM 104

Base core

Each insulated single core is conform to the requirements given in EN 50306-2



LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PH478	2 x 2 x 0.50	9.00	10.20	110
2PH479	3 x 2 x 0.50	9.60	10.80	150
2PH480	4 x 2 x 0.50	10.70	11.90	181
2PH481	7 x 2 x 0.50	13.00	14.20	282
2PH482	2 x 2 x 0.75	9.80	11.00	146
2PH483	3 x 2 x 0.75	10.5	11.70	185
2PH484	4 x 2 x 0.75	11.60	12.80	216
2PH485	7 x 2 x 0.75	14.00	15.60	335
2PH486	2 x 2 x 1.00	10.20	11.60	154
2PH487	3 x 2 x 1.00	10.90	12.10	196
2PH488	4 x 2 x 1.00	12.10	13.30	235
2PH489	7 x 2 x 1.00	14.60	16.20	390
2PH490	2 x 2 x 1.50	12.00	13.40	226
2PH491	3 x 2 x 1.50	13.10	14.30	288
2PH492	4 x 2 x 1.50	14.30	15.90	336
2PH493	7 x 2 x 1.50	17.60	19.20	563

Other constructions on request

Marking

Cores: by printed numbers

External sheath: FLAMEX 239 EN 50306-4 - 5P - 300 V - number of cores x 2 x section - MMM-90 - week/year - batch number

FLAMEX® EN 50306-4 TABLE 5 CLASS E CATEGORY MMMS**Individually screened and sheathed multipair cables****Thin wall insulation/Standard wall external sheath (minimum 1.00 mm) type EM 104**

Base core

Each insulated single core is conform to the requirements given in EN 50306-2

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PH343	2 x 2 x 0.50	10.10	11.30	159
2PH344	3 x 2 x 0.50	10.80	12.00	193
2PH345	4 x 2 x 0.50	11.80	13.00	200
2PH346	7 x 2 x 0.50	13.90	15.50	324
2PH347	2 x 2 x 0.75	10.90	12.10	185
2PH348	3 x 2 x 0.75	11.60	12.80	227
2PH349	4 x 2 x 0.75	12.80	14.00	267
2PH350	7 x 2 x 0.75	15.10	16.70	390
2PH351	2 x 2 x 1.00	11.30	12.50	195
2PH352	3 x 2 x 1.00	12.00	13.20	238
2PH353	4 x 2 x 1.00	13.20	14.40	279
2PH354	7 x 2 x 1.00	15.70	17.30	417
2PH355	2 x 2 x 1.50	13.30	14.50	275
2PF781	3 x 2 x 1.50	14.00	15.60	330
2PH356	4 x 2 x 1.50	15.50	17.10	393
2PG975	7 x 2 x 1.50	18.70	20.30	610

Other constructions on request

Marking

Cores: by printed numbers

External sheath: FLAMEX 239 EN 50306-4 - 5E - 300 V - number of cores x 2 x section - MMM-90 - week/year - batch number

FLAMEX® EN 50306-4

FLEXIBLE THIN WALL INSULATED WIRES AND CABLES

FLAMEX® EN 50306-4 TABLE 7 CLASS P CATEGORY MM - S

Screened and sheathed multipair cables (overall screen)

Thin wall insulation/Standard wall sheath (minimum 0.42 mm) type EM 104

Base core

Each insulated single core is conform to the requirements given in EN 50306-2



LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PG735	2 x 2 x 0.50	6.20	7.40	73
2PG736	3 x 2 x 0.50	6.50	7.70	86
2PG737	4 x 2 x 0.50	7.40	8.60	112
2PG738	7 x 2 x 0.50	8.80	10.00	163
2PG739	2 x 2 x 0.75	7.00	8.20	95
2PG740	3 x 2 x 0.75	7.30	8.50	113
2PG741	4 x 2 x 0.75	8.20	9.40	140
2PG742	7 x 2 x 0.75	9.90	11.10	215
2PG743	2 x 2 x 1.00	7.60	8.80	108
2PG744	3 x 2 x 1.00	7.90	9.10	130
2PG745	4 x 2 x 1.00	8.80	10.00	160
2PG746	7 x 2 x 1.00	10.80	12.00	252
2PG747	2 x 2 x 1.50	8.70	9.90	145
2PG748	3 x 2 x 1.50	9.20	10.40	181
2PG749	4 x 2 x 1.50	10.40	11.60	232
2PG750	7 x 2 x 1.50	13.10	14.30	386

Other constructions on request

Marking

Pairs: by printed numbers

External sheath: FLAMEX 239 EN 50306-4 - 7P - 300 V - number of cores x 2 x section - MM-S-90 - week/year - batch number

FLAMEX® EN 50306-4 TABLE 7 CLASS E CATEGORY MM - S**Screened and sheathed multipair cables (overall screen)****Thin wall insulation/Standard wall sheath (minimum 1.00 mm) type EM 104**

Base core

Each insulated single core is conform to the requirements given in EN 50306-2

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PG861	2 x 2 x 0.50	7.20	8.40	85
2PG862	3 x 2 x 0.50	7.50	8.70	99
2PG863	4 x 2 x 0.50	8.40	9.60	124
2PH357	7 x 2 x 0.50	9.75	10.95	177
2PG864	2 x 2 x 0.75	8.00	9.20	108
2PH358	3 x 2 x 0.75	8.35	9.55	128
2PH359	4 x 2 x 0.75	9.15	10.35	154
2PH360	7 x 2 x 0.75	10.75	11.95	226
2PG865	2 x 2 x 1.00	8.60	9.80	121
2PG866	3 x 2 x 1.00	8.90	10.10	145
2PH361	4 x 2 x 1.00	9.80	11.00	176
2PH362	7 x 2 x 1.00	11.55	12.75	260
2PH363	2 x 2 x 1.50	9.70	10.90	165
2PH364	3 x 2 x 1.50	10.10	11.30	196
2PH365	4 x 2 x 1.50	11.20	12.40	242
2PH366	7 x 2 x 1.50	13.50	14.70	382

Other constructions on request

Marking

Pairs: by printed numbers

External sheath: FLAMEX 239 EN 50306-4 - 7E - 300 V - number of cores x 2 x section - MM-S-90 - week/year - batch number



POWER CABLES REDUCED INSULATION THICKNESS

FLAMEX® RANGE: EN 50264	26
FLAMEX® EN 50264-3-1 M & MM.....	28
FLAMEX® EN 50264-3-1 MMS.....	32
FLAMEX® EN 50264-3-2 MM.....	34
FLAMEX® EN 50264-3-2 MMS.....	36

POWER CABLES REDUCED INSULATION THICKNESS

FLAMEX® EN 50264

Power halogen-free cables with reduced insulation thickness

APPLICATIONS

FLAMEX® power cables are recommended for protected installation in railway vehicles (locomotives, trains, trolleybuses, etc.), switching station and control panels for installation in cable ducts, pipes and tubes. Designed to conform to EN 50264, the power cables are intended for rolling stock applications where special fire performances are required: flame and fire retardant, halogen-free, low smoke emission, low toxicity and low corrosivity of fumes. A 120°C conductor temperature is allowed for a 20,000 hours cumulate working time.

ADVANTAGES

- Developed by the Lynxéo R&D laboratories, these halogen-free cross-linked materials show an excellent mechanical resistance to abrasion, tensile strength and cut through, but also a very good resistance to chemical agents.
- Flexible and easy to strip, our cables are designed to meet the stringent requirements of our customers during cabling operations.

MAIN CHARACTERISTICS

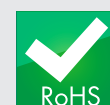
- FLAMEX® EN 50264 cables are available in every type of construction for internal and external uses:
 - single core (unscreened or screened and sheathed)
 - multicore (unscreened and screened)
- Operating temperature: from - 40°C up to 90°C
- Rated voltage:
From 0.6/1 kV AC (0.9 kV DC acc. EN 50355 table 2) to 3.6/6kV AC (5.4 kV DC)
- Cross-sections:
from 1 to 240 mm²

MAIN PROPERTIES

- Low smoke emission according to IEC/EN 61034-2
- Low toxicity (ITC≤3) and corrosivity of released gases after burning:
 - Halogen-free content according to IEC/EN 60754-1
 - pH ≥ 4.3 according to IEC/EN 60754-2
 - Conductivity ≤ 10 µS/mm to IEC/EN 60754-2
- High mechanical resistance (against abrasion, tensile strength and cut through): no additional protection required
- Excellent chemical resistance (against acid, alkali, oil, fuel...)

STANDARDS

- FLAMEX® EN 50264 cables comply with the internationally recognised EN 45545-2, which is the leading global standard for the protection of materials used in the manufacture of rolling stock against the effects of fire and smoke.



FLAMEX® - EN 50264

Properties

GUIDELINES

EN 50264 TYPES	SINGLE CORE CABLES	MULTICORE CABLES	INSUL. EN 50264-1 EI 109	SCREENED	SHEATH EN 50264-1 EM 104	PAGE
EN 50264-3-1 0.6/1 kV - Category M	•		•			29
EN 50264-3-1 1.8/3 kV - Category M	•		•			29
EN 50264-3-1 1.8/3 kV - Category MM	•		•		•	30
EN 50264-3-1 1.8/3 kV - Category MMS	•		•	•	•	33
EN 50264-3-1 3.6/6 kV - Category MM	•		•		•	31
EN 50264-3-1 3.6/6 kV - Category MMS	•		•	•	•	33
EN 50264-3-2 0.6/1 kV - Category MM		•	•		•	35
EN 50264-3-2 0.6/1 kV - Category MMS		•	•	•	•	37

M: extra low temperature & extra oil and fuel resistance of insulation and sheath acc. to EN 50264-1.

S: metallic screen braid.

FIRE PROPERTIES

PARAMETER	VALUE	STANDARD
Hazard level	HL3	EN 45545-2
Flame propagation	-	IEC/EN 60332-1-2
Fire propagation - bunched cables	-	EN 60332-3-24/25 or EN 50305 depending on diameter
Evaluation of Fluor	≤ 0.1 %	IEC/EN 60684-2
pH	≥ 4.3	IEC/EN 60754-2
Conductivity	≤ 10 µS/mm	IEC/EN 60754-2
Smoke emission	≥ 70 %	IEC/EN 61034-2
Toxicity index	≤ 3	EN 50305-9.2

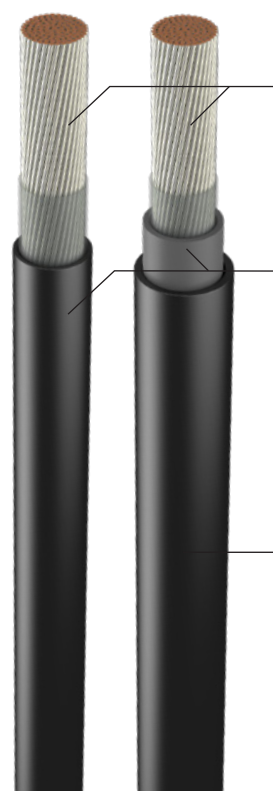
FLAMEX® EN 50264-3-1 M & MM 0.6/1 kV to 3.6/6 kV

SINGLE CORE POWER CABLE

APPLICATION

FLAMEX® EN 50264-3-1 M & MM power cables are used for fixed and protected installations. This product range is recommended for narrow spaces where an optimal bending radius is required. FLAMEX® cables are designed to withstand tough working conditions (oil, ozone, temperature variation, etc.). A 120°C conductor temperature is allowed for a 20,000 hours cumulative working time.

Conductor temperature: -40°C/+90°C/+120°C



DESIGN

- 1 Conductor**
Flexible stranded
tinned copper class
5 according to
IEC/EN 60228
Optional separator tape
- 2 Insulation**
Cross-linked compound
type EI 109 according
to EN 50264-1
Oil, diesel, ozone
and UV resistant
Colour: black (green/
yellow on request)
- 3 Outer sheath
for Type MM**
Cross-linked compound
type EM 104 according
to EN 50264-1
Oil, diesel, ozone
and UV resistant
Colour: black

BENDING RADIUS

0.6/1 kV
Static use:
3 x outer diameter
For installation and
occasional movements:
5 x outer diameter

1.8/3 kV
Static use:
3 x outer diameter
(5 x D if D>10mm)
For installation and
occasional movements:
6x outer diameter (M),
10x outer diameter (MM)

3.6/6 kV
Static use:
4 x outer diameter
(5 x D if D>10mm)
For installation and
occasional movements:
10 x outer diameter

FIRE SAFETY STANDARDS

FLAMEX® EN 50264
cables are conform
to EN 45545-2.

GUIDE TO USE

Permissible current
capacities and cabling
rules given in
EN 50355 and
EN 50343



Operating temp
- 40°C to
+90°C



Good
resistance
to UV,
humidity
and ozone



Good chemical
Resistance
(oil, fuel, acid...)



Flame and Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC 61034-2



Low corrosivity
of combustion gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Flexible
Class 5

FLAMEX® EN 50264-3-1 0.6/1 kV M**Single core cables**

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
79462201	1 x 1	2.50	2.70	14
79462301	1 x 1.5	2.80	3.20	20
79462401	1 x 2.5	3.20	3.60	29
79462501	1 x 4	3.90	4.30	44
79462601	1 x 6	4.40	4.80	62
79462701	1 x 10	5.50	5.90	102
79462801	1 x 16	6.50	7.10	161
79462901	1 x 25	8.40	9.00	248
79463001	1 x 35	9.40	10.00	326
79463101	1 x 50	11.30	11.90	477
79463201	1 x 70	13.20	13.80	666
79463301	1 x 95	15.00	15.60	868
79463401	1 x 120	16.70	17.30	1,106
79463501	1 x 150	18.70	19.30	1,390
79463601	1 x 185	21.00	21.60	1,689
79463701	1 x 240	23.80	24.60	2,178

Marking

FLAMEX® EN 50264-3-1 600 V cross-section M (N)HXAF 0,6/1 kV | LYNXEO | week/year batch number

FLAMEX® EN 50264-3-1 - 1.8/3 kV M**Single core cables**

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
79462320	1 x 1.5	5.70	5.90	50
79462420	1 x 2.5	6.05	6.35	63
79462520	1 x 4	6.55	6.85	78
79462620	1 x 6	7.05	7.35	99
79462720	1 x 10	7.90	8.30	146
79462820	1 x 16	9.00	9.40	213
79462920	1 x 25	10.30	10.90	301
79463020	1 x 35	11.40	12.00	385
79463120	1 x 50	13.30	13.90	538
79463220	1 x 70	15.30	15.90	740
79463320	1 x 95	17.00	17.60	957
79463420	1 x 120	19.30	19.90	1,219
79463520	1 x 150	21.60	22.20	1,525
79463620	1 x 185	23.50	24.10	1,817
79463720	1 x 240	26.60	27.20	2,347

Marking

FLAMEX® EN 50264-3-1 1800 V cross-section M | LYNXEO | week/year batch - number

FLAMEX® EN 50264-3-1 M & MM 0.6/1 kV 1.8/3 kV 3.6/6 kV

SINGLE CORE POWER CABLE

FLAMEX® EN 50264-3-1 1.8/3 kV MM

Single core cables

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
79462424	1 x 2.5	6.25	6.55	67
79462524	1 x 4	6.8	7.2	82
79462624	1 x 6	7.4	7.8	105
79462724	1 x 10	8.7	9.3	159
79462824	1 x 16	9.8	10.6	228
79462924	1 x 25	12.30	13.10	347
79463024	1 x 35	13.30	14.10	435
79463124	1 x 50	14.60	15.60	594
79463224	1 x 70	16.70	17.70	796
79463324	1 x 95	19.20	20.20	1,061
79463424	1 x 120	20.80	21.80	1,294
79463524	1 x 150	22.90	23.90	1,600
79463624	1 x 185	25.50	26.50	1,933
79463724	1 x 240	27.90	29.30	2,435

Marking

FLAMEX® EN 50264-3-1 1800 V cross-section MM NSHXAFOE 1,8/3 kV | LYNXEO | week/year - batch number

FLAMEX® EN 50264-3-1 3.6/6 kV MM

Single core cables

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
79462430	1 x 2.5	8.90	9.30	114
79462530	1 x 4	9.60	10.00	137
79462630	1 x 6	10.30	10.70	167
79462730	1 x 10	11.10	11.70	222
79462830	1 x 16	12.90	13.50	304
79462930	1 x 25	14.70	15.30	422
79463030	1 x 35	16.00	16.60	524
79463130	1 x 50	17.50	18.10	692
79463230	1 x 70	19.20	19.80	900
79463330	1 x 95	21.50	22.10	1,150
79463430	1 x 120	23.50	24.10	1,417
79463530	1 x 150	24.70	25.50	1,688
79463630	1 x 185	26.90	27.70	2,029
79463730	1 x 240	29.90	30.70	2,669

FLAMEX® EN 50264-3-1 M & MM

POWER CABLES REDUCED
INSULATION THICKNESS

Marking

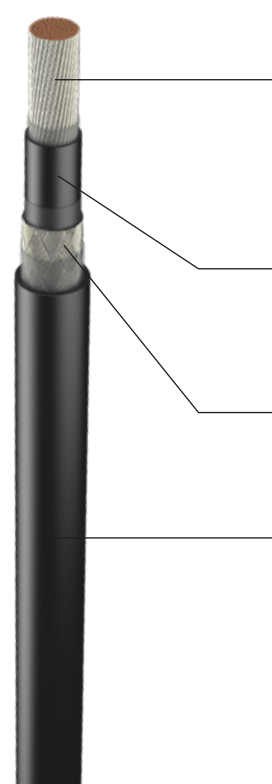
FLAMEX® EN 50264-3-1 3600 V cross-section MM NSHXAFOE 3,6/6 kV | LYNXEO | week/year - batch number

FLAMEX® EN 50264-3-1 MMS 1.8/3 kV 3.6/6 kV SHIELDED SINGLE CORE POWER CABLE

APPLICATION

FLAMEX® EN 50264-3-1 MMS shielded power cables are used for protected installations where enhanced electrical screening (EMC) is required. This product range is recommended for installations and connections in narrow spaces where an optimal bending radius is required. FLAMEX® cables are designed to withstand tough working conditions (oil, ozone, temperature variation, etc.). A 120°C conductor temperature is allowed for a 20,000 hours cumulative working time.

Conductor temperature: -40°C/+90°C/+120°C



DESIGN

- 1 Conductor**
Flexible stranded
tinned copper class
5 according to
IEC/EN 60228
Optional separator tape
- 2 Insulation**
Cross-linked compound
type EI 109 according
to EN 50264-1
- 3 Screen**
Tinned copper braid
Optional separator tape
- 4 Outer sheath**
Cross-linked compound
type EM 104 according
to EN 50264-1
Oil, diesel, ozone
and UV resistant
Colour: black

BENDING RADIUS

1.8/3 kV
Static use:
3 x outer diameter
(5 x D if D>10mm)
For installation and
occasional movements:
10 x outer diameter

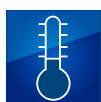
3.6/6 kV
Static use:
5 x outer diameter
(6 x D if D>10mm)
For installation and
occasional movements:
10 x outer diameter

FIRE SAFETY STANDARDS

FLAMEX® EN 50264
cables are conform
to EN 45545-2.

GUIDE TO USE

Permissible current
capacities and cabling
rules given in
EN 50355 and
EN 50343



Operating temp
- 40°C to
+90°C



Good
resistance
to UV,
humidity
and ozone



Good
chemical
Resistance
(oil, fuel,
acid...)



Flame and Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC/EN 61034-2



Low corrosivity of
combustion gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Flexible
Class 5



FLAMEX® EN 50264-3-1 1.8/3 kV MMS

Shielded single core cables

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	DIAMETER ON SCREEN [mm]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
			Minimum [mm]	Maximum [mm]	
79463022	1 x 35	12.8	14.90	15.50	539
79463122	1 x 50	14.6	16.40	17.20	707
79463222	1 x 70	16.5	17.50	18.50	921
79463322	1 x 95	18.3	20.60	21.60	1,181
79463422	1 x 120	20.3	21.90	22.90	1,430
79463522	1 x 150	22.0	24.10	25.10	1,751
79463622	1 x 185	23.8	25.90	26.90	2,053

Marking

FLAMEX® EN 50264-3-1 1800V cross-section MMS (N)SHXAFCOE - 1,8/3 kV | LYNXEO | week/year batch number

FLAMEX® EN 50264-3-1 3.6/6 kV MMS

Shielded single core cables

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	DIAMETER ON SCREEN [mm]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
			Minimum [mm]	Maximum [mm]	
79463031	1 x 35	16.0	17.40	18.00	631
79463131	1 x 50	17.7	18.60	19.20	780
79463231	1 x 70	18.5	20.50	21.10	988
79463331	1 x 95	22.0	22.20	22.80	1,314
79463431	1 x 120	23.2	24.40	25.00	1,565
79463531	1 x 150	25.0	27.00	28.00	1,923
79463631	1 x 185	26.1	28.40	29.40	2,220

Marking

FLAMEX® EN 50264-3-1 3600V cross-section MMS (N)SHXAFCOE - 3,6/6 kV | LYNXEO | week/year - batch number

FLAMEX® EN 50264-3-1 MMS

POWER CABLES REDUCED
INSULATION THICKNESS

FLAMEX® EN 50264-3-2 MM 0.6/1 kV

MULTICORE POWER CABLE

APPLICATION

FLAMEX® EN 50264-3-2 MM multicore power and control cables are used for fixed and protected installations. This product range is recommended for narrow spaces where an optimal bending radius is required. FLAMEX® cables are designed to withstand tough working conditions (oil, ozone, temperature variation, etc.).

A 120°C conductor temperature is allowed for a 20,000 hours cumulative working time.

Conductor temperature: -40°C/+90°C/+120°C



DESIGN

- 1 Conductor**
Flexible stranded
tinned copper class
5 according to
IEC/EN 60228
Optional separator tape
- 2 Insulation**
Cross-linked compound
type EI 109 according
to EN 50264-1
- 3 Outer sheath**
Cross-linked compound
type EM 104 according
to EN 50264-1
Oil, diesel, ozone
and UV resistant
Colour: black

COLOUR CODES

Insulation: black, core
identification by printed
numbers in white

FIRE SAFETY STANDARDS

FLAMEX® EN 50264
cables are conform
to EN 45545-2.

BENDING RADIUS

Static use:
4 x outer diameter
For installation and
occasional movements:
5 x outer diameter

GUIDE TO USE

Permissible current
capacities and
cabling rules given
in EN 50355 and
EN 50343



Operating temp
- 40°C to
+90°C



Good
resistance
to UV,
humidity
and ozone



Good chemical
Resistance
(oil, fuel, acid...)



Flame and Fire retardant
IEC/EN 60332-1-2
IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Flexible
Class 5

BASE CORE

CROSS-SECTION [mm ²]	CONDUCTOR		CORE	
	Min. diameter [mm]	Max. diameter [mm]	Min. diameter [mm]	Max. diameter [mm]
1.5	1.40	1.60	2.80	3.20
2.5	1.70	1.90	3.20	3.60
4	2.40	2.60	3.90	4.30
6	2.90	3.10	4.40	4.80
10	3.90	4.10	5.50	5.90
16	5.20	5.40	6.50	7.10

FLAMEX® EN 50264-3-2 0.6/1 kV MM

Multicore cables

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
79465253	3 x 1.5	7.7	8.3	105
79465203*	3G1.5	7.7	8.3	105
79465254	4 x 1.5	8.5	9.2	125
79465204*	4G1.5	8.5	9.2	125
79465207*	7G1.5	11.5	12.3	230
79465353	3 x 2.5	8.5	9.0	138
79465303*	3G2.5	8.5	9.0	138
79465354	4 x 2.5	9.4	10.0	178
79465355	5 x 2.5	10.4	10.9	217
79465453	3 x 4	9.7	10.6	195
79465404*	4G4	10.9	12.0	255
79465653	3 x 6	11.5	12.4	280
79465713	3 x 10	14.5	15.5	457
79465714	4 x 10	16.3	17.4	584
79465733	3 x 16	16.7	18.0	658
79465734	4 x 16	20.6	21.8	800

*Green/yellow types
Other constructions on request

Marking

FLAMEX® EN 50264-3-2 600V number of cores x cross-section MM (N) HXSLOE | LYNXEO | week/year - batch number

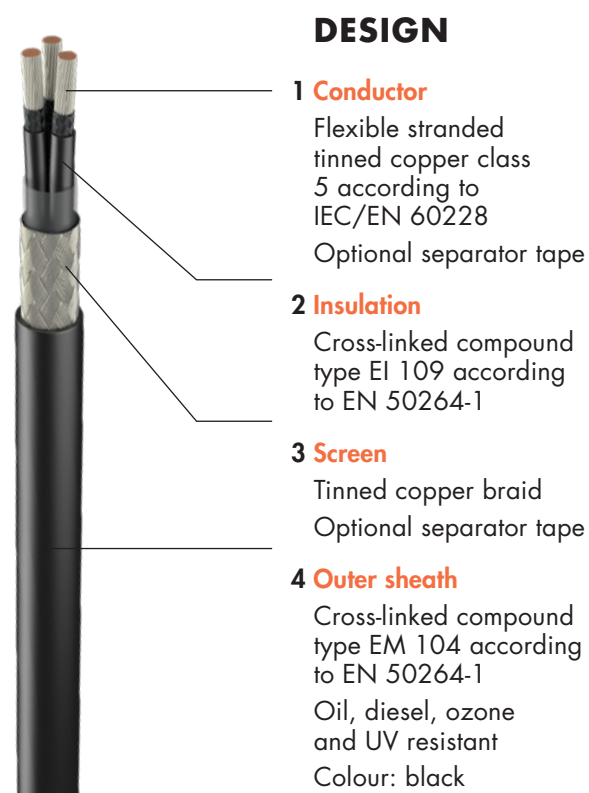
FLAMEX® EN 50264-3-2 MMS 0.6/1 kV

SHIELDED MULTICORE POWER CABLE

APPLICATION

FLAMEX® EN 50264-3-2 MMS multicore shielded power and control cables are used for protected installations where enhanced electrical screening (EMC) is required. This product range is recommended for installations and connections in narrow spaces where an optimal bending radius is required. FLAMEX® cables are designed to withstand tough working conditions (oil, ozone, temperature variation, etc.).
A 120°C conductor temperature is allowed for a 20,000 hours cumulative working time.

Conductor temperature: -40°C/+90°C/+120°C



COLOUR CODES

Insulation: black, core identification by printed numbers in white

FIRE SAFETY STANDARDS

FLAMEX® EN 50264 cables are conform to EN 45545-2.

BENDING RADIUS

Static use:
4 x outer diameter
For installation and occasional movements:
8 x outer diameter

GUIDE TO USE

Permissible current capacities and cabling rules given in EN 50355 and EN 50343



Operating temp
- 40°C to
+90°C



Good resistance
to UV,
humidity
and ozone



Good chemical
Resistance
(oil, fuel, acid...)



Flame and Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Flexible
Class 5



BASE CORE

CROSS-SECTION [mm ²]	CONDUCTOR		CORE	
	Min. diameter [mm]	Max. diameter [mm]	Min. diameter [mm]	Max. diameter [mm]
1.5	1.40	1.60	2.80	3.20
2.5	1.70	1.90	3.20	3.60
4	2.40	2.60	3.90	4.30
6	2.90	3.10	4.40	4.80
10	3.90	4.10	5.50	5.90
16	5.20	5.40	6.50	7.10

FLAMEX® EN 50264-3-2 0.6/1 kV MMS

Shielded multicore cables

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
79466203*	3G1.5	8.3	9.3	120
79466253	3 x 1.5	8.3	9.3	120
79466204*	4G1.5	9.8	10.5	150
79466353	3 x 2.5	9.5	10.4	150
79466303*	3G2.5	9.5	10.4	150
79466354	4 x 2.5	10.7	11.7	205
79466453	3 x 4	11.5	12.5	225
79466454	4 x 4	13.0	14.0	300
79466713	3 x 10	17.0	18.0	530
79466714	4 x 10	18.2	19.2	657
79466733	3 x 16	20.0	21.3	780

*Green/yellow types
Other constructions on request

Marking

FLAMEX® EN 50264-3-2 600V number of cores x cross-section MMS (N) HXCSLOE | LYNXEO | week/year - batch number

FLAMEX® EN 50264-3-2 MMS

POWER CABLES REDUCED
INSULATION THICKNESS



HIGH TEMPERATURE FLEXIBLE POWER CABLES

FLAMEX® RANGE: EN 50382-2	40
FLAMEX® EN 50382-2 F	42
FLAMEX® EN 50382-2 FF	44
FLAMEX® EN 50382-2 FXZ	46
FLAMEX® EN 50382-2 FFXS	48

HIGH TEMPERATURE FLEXIBLE POWER CABLES

FLAMEX® EN 50382

-50°C/+120°C

-50°C/+150°C

APPLICATIONS

FLAMEX® SI power cables are particularly recommended where high temperature is required to save cable weight.

Designed to conform to EN 50382, the power cables are intended for rolling stock applications where special fire performances are required: flame and fire retardant, halogen-free, low smoke emission, low toxicity and low corrosivity of fumes.

A 140°C conductor temperature is allowed for a 20,000 hours cumulate working time for the standard 120°C types.

ADVANTAGES

- Developed by the Lynxéo R&D laboratories, cross-linked silicone materials show an excellent mechanical resistance to abrasion, tensile strength and cut through, but also a very good resistance to chemical agents.
- Flexible and easy to strip, our cables are designed to meet the stringent requirements of our customers during cabling operations.

Lynxéo proposes to rolling stock manufacturers 4 main cable series of FLAMEX® EN 50382-2.

1 - Type F: with insulation only

This type is manufactured with tinned or plain copper conductor. Silicone rubber made in Lynxéo plant overlaps requirements of EN 50382-1 standard and brings installation advantages thanks to its high abrasion and tearing resistance.

2 - Type FF: with insulation and sheath

This unique version manufactured by Lynxéo is the highest performance solution made of the highest grade of insulation and sheathing compounds.

3 - Type FXZ: for mobile uses

This type with extra flexible conductor and mechanical reinforced insulation is used as jumper cables between cars or between cars and bogies.

4 - Type FFXS: with metallic screen braid for mobile uses

This product range is designed with extra flexible conductors as per jumper cables and a copper screen for enhanced electromagnetic compatibility (EMC).



MAIN CHARACTERISTICS

- Class of temperature: 120°C (tinned copper) or 150°C (plain copper)
- Voltage rate: 1.8/3 kV AC (2.7 kV DC acc. EN 50355 table 2) or 3.6/6 kV AC (5.4 kV DC)
- Silicone rubber compound performance: mechanical and thermal properties, resistance to oil, acid and alkali, cold behavior
- Cable designs: insulated or sheathed, flexible (class 5) for fixed installation or extra-flexible (class 6) to withstand movements in operation

MAIN PROPERTIES

- Low smoke emission according to IEC/EN 61034-2
- Low toxicity ($ITC \leq 3$) and corrosivity of evolved gases after burning:
 - Halogen-free content according to IEC/EN 60754-1
 - $pH \geq 4.3$ according to IEC/EN 60754-2
 - Conductivity $\leq 10 \mu S/mm$ to IEC/EN 60754-2
- High mechanical resistance (against abrasion, tensile strength and cut through): no additional protection required
- Excellent chemical resistance (against acids, alkalis, oil...)

STANDARDS

FLAMEX® high temperature power cables comply with the internationally recognised EN 45545-2, which is the leading global standard for the protection of materials used in the manufacture of rolling stock against the effects of fire and smoke.



FLAMEX® EN 50382-2 F 1.8/3 kV or 3.6/6kV

SINGLE CORE POWER CABLE

APPLICATION

FLAMEX® EN 50382-2 F cables are designed and dedicated to be used on rolling stock equipment where high operating temperature is required to save cable weight. Thanks to its high flexibility, these cables with low bending radius are frequently installed on locomotive equipment.

Conductor temperature: -50°C/+120°C/+140°C
or **-50°C/+150°C/+170°C**



DESIGN

- 1 Conductor**
Flexible class 5 copper according to IEC/EN 60228
- tinned copper for 120°C class
- plain copper for 150°C class
- 2 Separator**
Non woven tape
- 3 Insulation**
Twin layer of cross-linked silicone compound type EI 111 according to EN 50382-1
Colour: black outer layer



High Flexibility
Class 5 +
silicone

BENDING RADIUS

Static use:
3 x outer diameter
(4 x D if D > 12 mm)
For installation and occasional movements:
6 x outer diameter

FIRE SAFETY STANDARDS

FLAMEX® EN 50382 cables are conform to EN 45545-2.

GUIDE TO USE

The current carrying capacities and wiring rules are specified in EN 50355 and EN 50343



Operating temp
- 50°C to +120°C
- 50°C to +150°C



Good resistance
to UV,
humidity
and ozone



Good chemical
Resistance
(oil, fuel, acid...)



Flame and Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2

FLAMEX® EN 50382-2 (TABLE 1) 1.8/3 kV F 120°C

Unsheathed flexible single core cables

NUMBER OF CORES X CROSS-SECTION [mm²]	NOMINAL CONDUCTOR DIAMETER [mm]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
1 x 2.5	1.9	6.7	7.9	65
1 x 4	2.5	7.3	8.5	83
1 x 6	3.0	7.8	9.0	104
1 x 10	3.9	8.9	10.0	153
1 x 16	5.0	10.0	11.2	219
1 x 25	6.4	11.1	12.3	308
1 x 35	7.7	12.5	13.7	402
1 x 50	9.2	13.9	15.1	536
1 x 70	11.0	15.5	16.7	741
1 x 95	12.5	18.1	19.3	967
1 x 120	14.2	19.5	20.7	1,202
1 x 150	15.8	20.8	22.0	1,425
1 x 185	17.5	22.0	23.2	1,760
1 x 240	20.1	25.6	26.8	2,280
1 x 300	22.5	26.4	30.9	2,715

Marking

FLAMEX® EN 50382-2 1800 V cross-section F 120°C or 150°C LYNXEO week/year - batch number

FLAMEX® EN 50382-2 (TABLE 3) 3.6/6 kV F 120°C

Unsheathed flexible single core cables

NUMBER OF CORES X CROSS-SECTION [mm²]	NOMINAL CONDUCTOR DIAMETER [mm]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
1 x 2.5	1.9	7.7	8.9	80
1 x 4	2.5	8.3	9.5	99
1 x 6	3.0	9.2	10.4	128
1 x 10	3.9	9.7	10.9	168
1 x 16	5.0	10.8	12.0	236
1 x 25	6.4	12.1	13.3	331
1 x 35	7.7	13.5	14.7	428
1 x 50	9.2	14.9	16.1	564
1 x 70	11.0	16.5	17.7	773
1 x 95	12.5	18.7	19.9	989
1 x 120	14.2	20.3	21.5	1,233
1 x 150	15.8	21.6	22.8	1,460
1 x 185	17.5	23.0	24.2	1,805
1 x 240	20.1	27.0	28.2	2,351
1 x 300	22.5	28.3	32.4	2,863

Marking

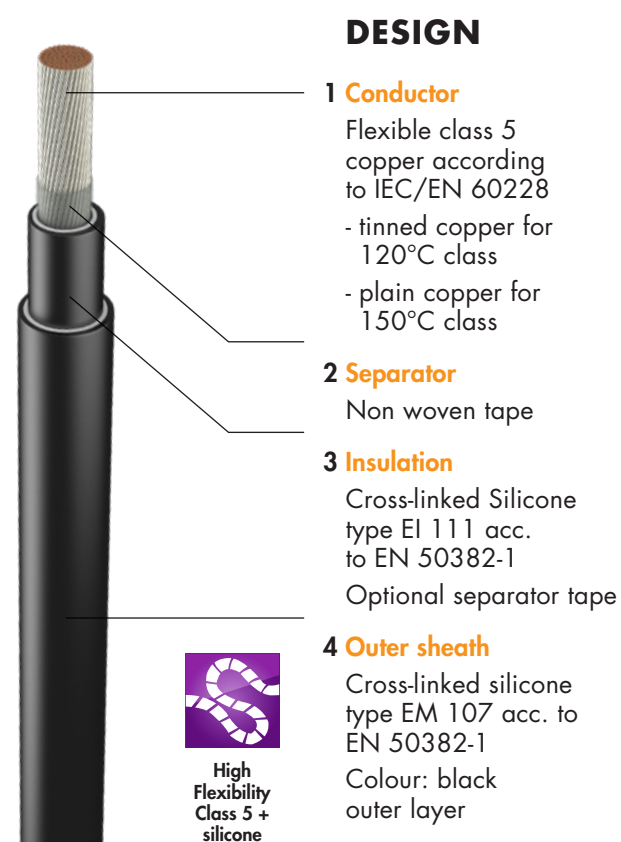
FLAMEX® EN 50382-2 3600 V cross-section F 120°C or 150°C LYNXEO week/year - batch number

FLAMEX® EN 50382-2 FF 1.8/3 kV or 3.6/6kV SHEATHED SINGLE CORE POWER CABLE

APPLICATION

FLAMEX® EN 50382-2 FF cables are designed and dedicated to be used on rolling stock equipment where high operating temperature is required to save cable weight. These sheathed products offer better mechanical protection than the regular Type F. Thanks to its high flexibility, these cables with low bending radius are frequently installed on locomotive equipment.

Conductor temperature: -50°C/+120°C/+140°C



BENDING RADIUS

Static use:
4 x outer diameter
For installation and occasional movements:
6 x outer diameter

FIRE SAFETY STANDARDS

FLAMEX® EN 50382 cables are conform to EN 45545-2.

GUIDE TO USE

The current carrying capacities and wiring rules are specified in EN 50355 and EN 50343



Operating temp
- 50°C to +120°C
- 50°C to +150°C



Good resistance to UV, humidity and ozone



Good chemical Resistance (oil, fuel, acid...)



Flame and Fire retardant
IEC/EN 60332-1-2
IEC/EN 60332-3



Low smoke emission
IEC/EN 61034-2



Low corrosivity of combustion gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2

FLAMEX® EN 50382-2 (TABLE 2) 1.8/3 kV FF 120°C

Insulated and sheathed flexible single core cables

NUMBER OF CORES X CROSS-SECTION [mm²]	NOMINAL CONDUCTOR DIAMETER [mm]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
1 x 50	9.2	15.0	17.5	620
1 x 70	11.0	16.8	19.7	840
1 x 95	12.5	19.0	22.2	1,097
1 x 120	14.2	20.8	24.3	1,355
1 x 150	15.8	22.3	26.1	1,620
1 x 185	17.5	24.5	28.6	1,993
1 x 240	20.1	27.1	31.7	2,514

Marking

FLAMEX® EN 50382-2 1800 V cross-section FF 120°C or 150°C LYNXEO week/year - batch number

FLAMEX® EN 50382-2 (TABLE 5) 3.6/6 kV FF 120°C

Insulated and sheathed flexible single core cables

NUMBER OF CORES X CROSS-SECTION [mm²]	NOMINAL CONDUCTOR DIAMETER [mm]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
1 x 50	9.2	17.5	20.6	715
1 x 70	11.0	19.2	22.4	936
1 x 95	12.5	20.8	24.3	1,176
1 x 120	14.2	22.4	26.2	1,428
1 x 150	15.8	24.1	28.2	1,712
1 x 185	17.5	26.4	30.9	2,106
1 x 240	20.1	29.4	34.4	2,667

Marking

FLAMEX® EN 50382-2 3600 V cross-section FF 120°C or 150°C LYNXEO week/year - batch number

FLAMEX® EN 50382-2 FXZ 3.6/6kV

REINFORCED SINGLE CORE JUMPER CABLE

APPLICATION

FLAMEX® EN 50382-2 FXZ cables are designed with extra flexible conductors and reinforced with textile braid to be used as a jumper cable between vehicles. Able to withstand higher operating temperatures, these silicone-based cables allow to save cable weight.

Conductor temperature: -50°C/+120°C/+140°C



BENDING RADIUS

Static use:
4 x outer diameter
For installation and occasional movements:
6 x outer diameter

FIRE SAFETY STANDARDS

FLAMEX® EN 50382 cables are conform to EN 45545-2.

GUIDE TO USE

The current carrying capacities and wiring rules are specified in EN 50355 and EN 50343



Operating temp
- 50°C to +120°C



Good resistance
to UV,
humidity
and ozone



Good chemical
Resistance
(oil, fuel, acid...)



Flame and Fire
retardant
IEC/EN 60332-1-2 IEC/EN 60332-3



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2

FLAMEX® EN 50382-2 (TABLE 4) 3.6/6 kV FXZ 120°C

Extra flexible single core cables

NUMBER OF CORES X CROSS-SECTION [mm²]	NOMINAL CONDUCTOR DIAMETER [mm]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
1 x 25*	7.3	11.8	14.6	350
1 x 35*	7.7	13.6	14.7	452
1 x 50	9.2	15.6	18.6	680
1 x 70	11.0	17.3	20.6	935
1 x 95	12.5	18.7	21.5	1,150
1 x 120	14.2	20.5	24.3	1,480
1 x 150	15.8	22.0	26.1	1,800
1 x 185	17.5	23.8	28.2	2,240
1 x 240*	21.4	26.4	31.5	2,629

* Constructions not defined in the standard

Marking

FLAMEX® EN 50382-2 3600 V cross-section FXZ 120°C LYNXEO week/year - batch number

FLAMEX® EN 50382-2 FXZ

HIGH TEMPERATURE
FLEXIBLE POWER CABLES

FLAMEX® EN 50382-2 FFXS 1.8/3 kV or 3.6/6 kV SHIELDED SINGLE CORE POWER CABLE

APPLICATION

FLAMEX® EN 50382-2 FFXS shielded power cables are designed with extra flexible conductors as per jumper cables. They are used for installations where enhanced electrical screening (EMC) is required. Able to withstand higher operating temperatures, these silicone-based cables allow to save cable weight.

**Conductor temperature: -50°C/+120°C/+140°C
or -50°C/+150°C/+170°C**



BENDING RADIUS

Static use:
10 x outer diameter
For installation and occasional movements:
12 x outer diameter

FIRE SAFETY STANDARDS

FLAMEX® EN 50382 cables are conform to EN 45545-2

GUIDE TO USE

The current carrying capacities and wiring rules are specified in EN 50355 and EN 50343



Operating temp
- 50°C to +120°C
- 50°C to +150°C



Good resistance to UV, humidity and ozone



Good chemical Resistance (oil, fuel, acid...)



Flame and Fire retardant
IEC/EN 60332-1-2
IEC/EN 60332-3



Low smoke emission
IEC/EN 61034-2



Low corrosivity of combustion gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Screened versions

FLAMEX® EN 50382-2 (TABLE 2) 1.8/3 kV FFXS 120°C OR 150°C**Shielded single core cables**

CROSS SECTION [mm²]	CONDUCTOR DIAM. [mm]	BRAID SECTION [mm²]	MIN.OUTER DIAM. [mm]	MAX.OUTER DIAM. [mm]	APPROX. WEIGHT [kg/km]
1 x 70	11.4	8.5	18.3	20.6	865
1 x 95	12.9	8.5	20.5	23.1	1,170
1 x 120	14.4	10	22.1	24.9	1,386
1 x 150	17.1	11	24.7	27.8	1,726
1 x 185	18.3	12	26.4	29.4	2,018

Marking

FLAMEX® EN 50382-2 1800 V cross-section FFXS 120°C or 150°C LYNXEO week/year - batch number

FLAMEX® EN 50382-2 (TABLE 5) 3.6/6 kV FFXS 120°C OR 150°C**Shielded single core cables**

CROSS SECTION [mm²]	CONDUCTOR DIAM. [mm]	BRAID SECTION [mm²]	MIN.OUTER DIAM. [mm]	MAX.OUTER DIAM. [mm]	APPROX.WEIGHT [kg/km]
1 x 70	11.4	13	21.0	23.5	1,000
1 x 95	12.9	15	22.5	25.3	1,286
1 x 120	14.4	16	23.9	26.9	1,461
1 x 150	17.1	16.5	26.7	30.0	1,868
1 x 185	18.3	19	28.6	32.2	2,186

Marking

FLAMEX® EN 50382-2 3600 V cross-section FFXS 120°C or 150°C LYNXEO week/year - batch number



COMMUNICATION CABLES

FLAMEX® ETHERNET, WTB, MVB, CAN BUS	54
FLAMEX® OPTICAL FIBER CABLES	58
FLAMEX® LOW LOSS COAXIAL.....	60
FLAMEX® KX/RG COAXIAL.....	62

FLAMEX® - Multimedia & Data transmission cables

High transmission performances

APPLICATIONS

This range of products meets the current needs of the market especially regarding the interoperability of trains and railway equipment throughout Europe (ERTMS).

These cables are adapted for data transmission up to 1 GHz, with performance of Category 7A cables.

Lynxéo experience in the design of shielding technology enables us to propose all constructions with high EMC protection.

ADVANTAGES

- Lynxéo develops halogen-free communication cables for higher transmission performances to address emerging applications: easy to pool, quick to connect and compatible with standard connectors, and designed to improve the protection against electrical disturbances, electromagnetic noises.
- These features make FLAMEX® cables the ideal choice for new builds and retrofitting projects.

MAIN CHARACTERISTICS

Connector compatibility
Our cables are compatible with most available connectors for rolling stock, field RJ 45, shielded and M 12 connectors.

Supported Protocols

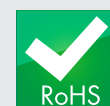
- WTB (Wire Train Bus):
 - connectivity between coaches, Plug & Play concept,
 - coaches can be coupled and uncoupled while in service
- MVB (Multifunction Vehicle Bus):
 - connectivity within one car,
 - can be used within a set of carsMVB & WTB are a part of the TCN protocol defined in the IEC 61375
- PROFIBUS
- ETHERNET 100 Ω base T
video on request, audio...

MAIN PROPERTIES

- Low smoke emission according to IEC/EN 61034-2
- Low toxicity (ITC $\leq$ 3) and corrosivity of evolved gases after burning:
 - Halogen-free content according to IEC/EN 60754-1
 - pH $\geq$ 4.3 according to IEC 60754-2
 - Conductivity $\leq$ 10 μ S/mm to IEC/EN 60754-2
- High mechanical resistance (against abrasion, notch propagation and cut through):
no additional protection required
- Excellent chemical resistance (against acid, alkali, oil, fuel...)

STANDARDS

- FLAMEX® communication cables comply with the internationally recognised EN 45545-2, which is the leading global standard for the protection of materials used in the manufacture of rolling stock against the effects of fire and smoke.





MULTIMEDIA & DATA TRANSMISSION CABLES

ON-BOARD EQUIPMENT

APPLICATION

Multimedia & Data Transmission cables for on-board railway equipment. Using the FLAMEX® technology, these halogen-free cables are intended for applications where flame retardancy is required.

Customized products - 100 Ω to 150 Ω



DESIGN

1 Conductor

Flexible stranded tinner copper in metric or American wire gauge (AWG) sizes

2 Insulation

Special halogen-free polyolefin for demanding data transmission

3 Screen

Tinner copper braid
Optional aluminum/polyester or separator tapes

4 Sheath

Cross-linked compound type EM 104 or EM 101 acc. to EN 50264-1
Oil, ozone and UV resistant

FIRE SAFETY STANDARDS

FLAMEX® communication cables are conform to EN 45545-2.

BENDING RADIUS

Static use:
6 x outer diameter

CONNECTOR COMPATIBILITY

Our cables are compatible with most available connectors for rolling stock:

- 'Field RJ 45' connectors
- Shielded connectors
- M 12 connectors



Operating temp
-25°C to +85°C
-40°C to +85°C



Good chemical
Resistance
(oil, fuel, acid...)



Flame
and Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Flexible



Screened
versions

ETHERNET CABLES 100 Ω

LYNXEO REF.	DEDICATED NETWORK	CONSTRUCTION [n × mm ² or AWG]	SCREEN	NOMINAL DIAMETER [mm]	APPROX. WEIGHT [kg/km]	COLOR CODING CORES	COLOR OF THE SHEATH	LOW TEMP.
2PM617	CAT 7A	4 × (2 × 0,25 ²)	I+S	8.5	85	A	Blue	-40°C
2PM615	CAT 7	4 × (2 × 0,25 ²)	I+S	8.5	82	A	Blue	-40°C
2PM622	CAT 7	4 × (2 × AWG 24/7)	I+S	8.1	71	A	Black	-40°C
2PM697	CAT7	4 × (2 × AWG 26/7)	I+S	7,1	55	A	Black	-40°C
2PM577	CAT 6A	4 × (2 × 0,25 ²)	I+S	8.5	80	A	Blue	-40°C
2PN189	CAT 6A	4 × (2 × 0,25 ²)	I+S	8.5	80	A	Blue	-25°C
2PM578	CAT 6A	4 × (2 × 0,50 ²)	I+S	11.9	147	A	Blue	-40°C
2PN260	CAT 6A	4 × (2 × 0,50 ²)	I+S	11.9	147	A	Blue	-25°C
2PK319	CAT 5E	4 × 0,25 ²	S	6.7	65	C	Blue	-25°C
2PK699	CAT 5E	4 × 0,25 ²	S	6.7	65	C	Blue	-40°C
2PM022	CAT 5E	4 × AWG 22/7 (0,34 ²)	S	6.5	62	C	Blue	-25°C
2PG229	CAT 5E	4 × AWG 22/7 (0,34 ²)	S	6.5	62	D	Black	-25°C
2PM676	CAT 5E	4 × AWG 22/7 (0,34 ²)	S	6.5	62	C	Black	-40°C
2PK847	CAT 5E	4 × AWG 22/7 (0,34 ²)	S	6.5	62	D	Black	-40°C
2PK211	CAT 5E	4 × 0,50 ²	S	8.5	96	C	Blue	-25°C
2PK698	CAT 5E	4 × 0,50 ²	S	8.5	96	C	Blue	-40°C
2PC912	CAT 5E	2 × (2 × 0,25 ²)	S	6.5	55	A	Black	-25°C
2PK592	CAT 5E	2 × (2 × 0,50 ²)	S	9.7	120	B	Black	-25°C
2PI232	CAT 5E	2 × (2 × 0,50 ²)	S	9.7	120	B	Black	-40°C

S: Outer screen made of aluminum foil + tinned copper braid
I+S: Individual screen made of aluminum foil + general tinned copper braid

A: Color coding for pairs:
N°1: white + blue
N°2: white + orange
N°3: white + green
N°4: white + brown

B: Color coding for pairs:
N°1: white + blue
N°2: yellow + orange

C: Color coding for quads:
N°1: white + blue
N°2: yellow + orange

D: Color coding for quads:
N°1: white + yellow
N°2: red + black

MULTIMEDIA & DATA TRANSMISSION CABLES

ON-BOARD EQUIPMENT

WIRE TRAIN BUS & MULTIFUNCTION VEHICLE BUS 120 Ω

LYNXEO REF.	DEDICATED NETWORK	CONSTRUCTION [n × mm ² or AWG]	NOMINAL DIAMETER [mm]	APPROX. WEIGHT [kg/km]	COLOR CODING CORES	COLOR OF THE SHEATH	LOW TEMP.
2PK595	WTB	2 × 0,75 ²	8.5	92	F	Turquoise	-25°C
2PF578	WTB	2 × 0,75 ²	8.2	87	F	Black	-40°C
2PE993	MVB	4 × 0,50 ²	8.0	86	D	Turquoise	-25°C
2PK697	MVB	4 × 0,50 ²	8.0	86	D	Turquoise	-40°C
2PK596	MVB	2 × 0,50 ²	8.0	84	F	Turquoise	-25°C
2PF580	MVB	2 × 0,50 ²	8.0	84	F	Turquoise	-40°C

PROFIBUS 150 Ω & CAN BUS 120 Ω

LYNXEO REF.	DEDICATED NETWORK	CONSTRUCTION [n × mm ² or AWG]	NOMINAL DIAMETER [mm]	APPROX. WEIGHT [kg/km]	COLOR CODING CORES	COLOR OF THE SHEATH	LOW TEMP.
2PF164	PROFIBUS	2 × 0,34 ²	8.0	82	G	Purple	-25°C
2PJ623	PROFIBUS	2 × 0,34 ²	8.0	82	G	Purple	-40°C
2PK478	CAN BUS	2 × 0,50 ² + 1 × 0,50 ²	6.8	62	H	Black	-25°C
2PI096	CAN BUS	2 × 0,50 ² + 1 × 0,50 ²	6.8	62	H	Black	-40°C

D: Color coding for quads
N°1: white + yellow
N°2: red + black

F: Color coding for pairs
black + white

G: Color coding for pairs
white + pink

H: Color coding for pairs & core
red + blue & black

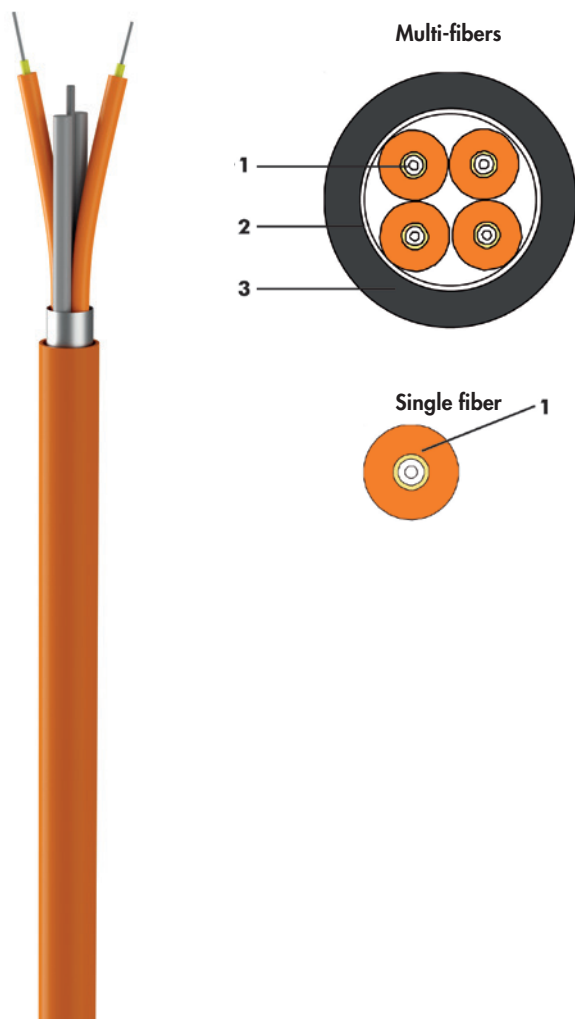
FLAMEX® OPTICAL FIBER CABLES

HALOGEN-FREE MONO AND MULTI-FIBERS

APPLICATION

Lynxéo produces a range of optical fiber cables for onboard communication and data transmission. With FLAMEX® halogen-free insulation and jacket, optical fiber cables comply with the most stringent rolling stock requirements.

OPTICAL FIBER OM3 (50/125 µm)



DESIGN

1 Patch cord

Core: glass OM 3
Diameter = 50µm

Cladding: glass
Diameter = 125 ± 3 µm

Coating: acrylate
Diameter = 245 ± 10 µm

Buffer:
Thermoplastic elastomer
Diameter = 900 ± 50 µm

Reinforcement: Aramid
yarns

Sheath:
Cross-linked compound
according to
EN 50264-1
type EM101
Diameter = 2.00 ± 0.15 mm

2 Tape (for multi-fibers)

3 Outer sheath

Cross-linked compound
according to
EN 50264-1
type EM101

FIRE SAFETY STANDARDS

FLAMEX® optical fiber cables are conform to EN 45545-2.

MARKING

Example:
FLAMEX part - number - number of
fibers x 50/125
week/year batch number



Operating temp
- 25°C to
+90°C



Good chemical
Resistance
(oil, fuel, acid...)



Flame
and
Fire retardant
IEC/EN 60332-1-2
IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Screened
version

OM3 (50/125 µm) multi-mode fiber cables

PHYSICAL & MECHANICAL CHARACTERISTICS	2PN429	2PN426	2PN427	2PN428
Number of fibers	2	4	6	8
Cable diameter [mm]	7.0	7.0	8.0	8.5
Approx. weight [kg/km]	50	40	60	80
Max. loading (IEC 60794-1)				
Static [N]	500	1000	1500	2000
For installation and occasional movements [N]	250	500	750	1000
Mini. bending radius (IEC 60794-1)				
Static [mm]	60	70	80	85
For installation and occasional movements [mm]	120	140	160	170
Crush resistance (IEC 60974-1)	250 N/cm			

ATTENUATION	VALUE	UNIT
850 nm (cabled)	≤ 3.0	dB/Km
1300 nm (cabled)	≤ 1.0	dB/Km

FLAMEX® LLC

LOW LOSS COAXIAL CABLES

APPLICATION

FLAMEX® LLC are intended for antenna wireless communication systems. This product range offers superior RF shielding effectiveness.

Coaxial cables 50 Ω



DESIGN

- 1 Conductor**
Bare copper
- 2 Insulation**
Foam polyethylene
- 3 Screen**
Aluminum/polyester tape
Tinned copper braid
Separator tape
- 4 Outer sheath**
Cross-linked material EM 104 acc. EN 50264-1
Oil, diesel, ozone and UV resistant
Colour: black

FIRE SAFETY STANDARDS

FLAMEX® LLC cables are conform to EN 45545-2.

CONNECTORS

Compatible with all standard coaxial connectors

MARKING

Example:
FLAMEX ANTENNA COAXIAL 50 OHMS LOW LOSS 240 - LYNXEO 239 - part number - week/year batch number



Operating temp
-40°C to +85°C



Good chemical
Resistance
(oil, fuel, acid...)



Flame
and Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Screened
versions

Low Loss Coaxial Cables 50 Ω

PHYSICAL & MECHANICAL CHARACTERISTICS

	LLC 240 2PM719	LLC 400 2PM720	LLC 500 2PN366
Cable diameter [mm]	6.10 ± 0.20	10.30 ± 0.20	12.7 ± 0.20
Approx. weight [kg/km]	60	170	235
Bending radius [mm]	60	100	120

ELECTRICAL CHARACTERISTICS

	LLC 240 2PM719	LLC 400 2PM720	LLC 500 2PN366
Inner conductor resistance at 20 °C [W/km]	11.2	3.4	2.1
Outer conductor resistance at 20 °C [W/km]	12.4	5.4	4.2
Propagation velocity [%]	80	80	80
Capacitance [pF/m]	78	78	78
Screening attenuation up to 6GHZ [dB]	≥ 80	≥ 90	≥ 90
Nominal structural return loss [dB]			
5 - 470 MHz	28	28	28
470 - 1000 MHz	26	26	26
1000 - 2000 MHz	24	24	24
2000 - 3000 MHz	20	20	20
Attenuation [dB/100 m at frequency]			
450 MHz	17.2	8.7	6.6
900 MHz	24.3	12.5	9.7
1500 MHz	32.7	16.6	13.1
1800 MHz	35.9	18.2	14.5
2000 MHz	37.9	19.3	15.4
2500 MHz	42.3	21.5	17.5
5800 MHz	66.5	34.4	23.8
6000 MHz	69.0	35.0	28.2
7200 MHz	76.0	39.0	32.0
8000 MHz	82.0	42.0	34.0

FLAMEX® KX/RG

COAXIAL CABLES

APPLICATION

Lynxéo produces a range of coaxial cables for data transmission and video signal in onboard equipment.

Coaxial cables 50 Ω and 75 Ω 

DESIGN

- 1 Conductor**
Stranded bare, tinned or silver coated copper
- 2 Dielectric**
PE
- 3 Screen**
Single or double braid in bare, tinned or silver coated copper
- 4 Sheath**
Cross-linked compound type EM 104 acc. to EN 50264-1
Colour: black
(Optional lay up with fire barrier tapes)

BENDING RADIUS

Static use:
5 x outer diameter

STANDARDS

MIL C 17 (RG) -
NF C 93 550 (KX)

CONNECTORS

Compatible with standard connector interface: SMA, SMB, TNC, BNC, N or QMA.

MARKING

«FLAMEX® RG x XX» (cable type) in white marking



Operating temp
- 30°C to
+80°C



Good chemical
Resistance
(oil, fuel, acid...)



Flame and Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Flexible



COAXIAL CABLES 50 Ω

DESIGNATION	LYNXEO REFERENCE	CONDUCTOR		DIELECTRIC Diameter [mm]	BRAID	CABLE		RATED VOLTAGE [V ac]
		Stranding*	Diameter [mm]			Ext. diam. [mm]	Weight [kg/km]	
FLAMEX® KX15 / RG58	2PM711	19 x 0.18	0.90	2.95 ± 0.10	Single braid	4.95 ± 0.10	45	1400
FLAMEX® KX15-2S	2PM712	19 x 0.18	0.90	2.95 ± 0.10	Double braid	5.38±0.10	50	1400
FLAMEX® KX4 / RG213	2PM708	7 x 0.75	2.25	7.25 ± 0.15	Single braid	10.30 ± 0.20	160	3700
FLAMEX® KX13 / RG214	2PJ749	7 x 0.75	2.25	7.25 ± 0.15	Double braid	10.80 ± 0.20	205	3700

Capacity: < 106 pF/m - Velocity of propagation: 65.9%

COAXIAL CABLES 75 Ω

DESIGNATION	LYNXEO REFERENCE	CONDUCTOR		DIELECTRIC Diameter [mm]	BRAID	CABLE		RATED VOLTAGE [V ac]
		Stranding*	Diameter [mm]			Ext. diam. [mm]	Weight [kg/km]	
FLAMEX® KX6A / RG59	2PM709	7 x 0.20	0.60	3.70 ± 0.12	Single braid	6.10 ± 0.15	57	1700
FLAMEX® KX8 / RG11	2PM710	7 x 0.40	1.20	7.25 ± 0.15	Single braid	10.30 ± 0.20	122	3700

Capacity: < 72.2 pF/m - Velocity of propagation: 65.9%

COAXIAL CABLES 95 Ω

DESIGNATION	LYNXEO REFERENCE	CONDUCTOR		DIELECTRIC Diameter [mm]	BRAID	CABLE		RATED VOLTAGE [V ac]
		Stranding*	Diameter [mm]			Ext. diam. [mm]	Weight [kg/km]	
FLAMEX® RG022	2PM713	7 x 0.40	1.20	7.24±0.15	Double braid	10.70±0.25	200	-

ATTENUATION VALUES

DESIGNATION		ATTENUATION AT X MHz [dB/100m] (nominal values)						
		50	100	200	400	1000	3000	11000
50 Ω	FLAMEX® KX15 / RG58	13.1	21.3		55.8	91.9		
	FLAMEX® KX4 / RG213	3.9	7.5		15.7	29.5		
	FLAMEX® KX13 / RG214	5.6			22.3		91.9	196.9
75 Ω	FLAMEX® KX6A / RG59			20				
	FLAMEX® KX8 / RG11			20	17.1	30.8		



FIRE RESISTANT CABLES

FLAMEX® RANGE: EN 50200	66
FLAMEX® FR TYPE EN 50306-2 MSZ	68
FLAMEX® FR TYPE EN 50306-3 & -4	70
FLAMEX® FR TYPE EN 50264-3-1	78
FLAMEX® FR TYPE EN 50382-2 SI	80
FLAMEX® FR COMMUNICATION EN 50200	82

FIRE RESISTANT CABLES

FLAMEX® - EN 50200

Fire resistant cables

APPLICATIONS

- Cables are everywhere around us and most of the time not visible once they are installed. However, in the event of fire, rolling stock equipment should remain functional to help in the evacuation process.
- Fire resistant cables are designed to be used in safety systems (emergency lighting, fire detection, warning systems, door opening, etc.) for control or power feeding.

ADVANTAGES

- Lynxéo is dedicated to improve safety in rolling stock by protecting people's lives and trail from fires with innovative fire safety cables. These cables ensure the integrity of electrical circuits for a certain time after the fire started.

The European directive for interoperability Loc & Pass 1302/2014/EU dated of November 18th 2018 and EN 45545-1 require that in case of fire on board the emergency lighting shall continue to operate at minimum to 50 % in the coaches where there is no fire detected:

- Evaluation of the availability for breaking for at least 4 minutes for category A
- Evaluation of the availability for breaking and power traction for at least 15 minutes for category B

MAIN CHARACTERISTICS

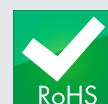
- Voltage rate:
 - 300/500 V AC (410 V DC acc. EN 50355 table 2)
 - 0.6/1 kV AC (0.9 kV DC)
 - 1.8/3 kV AC (2.7 kV DC)
- Single core and multicore (unshielded or shielded) control cables
- Single core power cables

MAIN PROPERTIES

- Low smoke emission according to IEC 61034-2
- Low toxicity (ITC $\leq$ 3) and corrosivity of evolved gases after burning:
 - Halogen-free content according to IEC/EN 60754-1
 - pH $\geq$ 4.3 according to IEC/EN 60754-2
 - Conductivity $\leq$ 10 μ S/mm to IEC/EN 60754-2
- High mechanical resistance (against abrasion, tensile strength and cut through): no additional protection required
- Excellent chemical resistance (against acid, alkali, oil, fuel...)

STANDARDS AND SPECIFICATIONS

- Fire resistance acc. to:
 - EN 50200
 - IEC 60331-1 & -2
- FLAMEX® fire resistant cables comply with the internationally recognised EN 45545-2, which is the leading global standard for the protection of materials used in the manufacture of rolling stock against the effects of fire and smoke.





FIRE RESISTANT
CABLES

FLAMEX® FR TYPE EN 50306-2 MSZ 300/500 V**FIRE RESISTANT SINGLE CORE CONTROL CABLE****APPLICATION**

FLAMEX® FR Type EN 50306-2 MSZ flexible control wires maintain circuit integrity in case of fire (tested according to EN 50200 for 120 minutes) and are fire retardant, low smoke and halogen-free satisfying safety performance requirements from EN 45545-2.

On top of that, FLAMEX® cables can withstand tough working conditions (oil, ozone, temperature variation, etc.).

Conductor temperature: -40°C/+105°C/+125°C

**DESIGN**

With reference to EN 50306-2

1 Conductor

Flexible stranded tinned copper according to EN 50306

2 Insulation

Mica tape as fire barrier and halogen-free cross-linked material acc. to EN 50306-2

Color: white



Fire resistant
EN 50200

BENDING RADIUS

Static use:

3 x outer diameter

For installation and occasional movements:
8 x outer diameter

FIRE SAFETY STANDARDS

FLAMEX® MSZ are conform to EN 45545-2

Fire resistant acc. to:
EN 50200 - 120 min
IEC 60331-2 - 120 min

GUIDE TO USE

Permissible current capacities and cabling rules given in EN 50355 and EN 50343



Operating temp
- 40°C to
+105°C



Good chemical
Resistance
(oil, fuel, acid...)



Flame and
Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Flexible



Low toxicity
EN 50305-9.2

FLAMEX® FR TYPE EN 50306-2 MSZ SINGLE CORE

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	CONDUCTOR		INSULATION		MAX. COND. RESISTANCE [Ohm/km]	APPROX. WEIGHT [kg/km]
		n x diameter [mm]	Max. diameter [mm]	Min. diam. [mm]	Max. diam. [mm]		
2PN299	1 x 0.5	19 x 0.18	0.95	1.70	2.00	40.1	7.5
2PN300	1 x 0.75	19 x 0.23	1.15	1.90	2.20	26.7	10.0
2PN301	1 x 1.0	19 x 0.25	1.30	2.00	2.30	20.0	12.1
2PN302	1 x 1.5	19 x 0.30	1.65	2.50	2.90	13.7	18.2
2PN303	1 x 2.5	19 x 0.40	2.15	2.90	3.30	8.21	27.6

PHYSICAL PROPERTIES

REQUIREMENTS

Max. tensile strength under permeation

50 N/mm² conductor cross-section

Static tensile strength and fixed laying

15 N/mm² conductor cross-section

Marking

FLAMEX 239 'part number' TYPE EN 50306-2 EN 50200 300 V 1 x cross-section M week/year

FLAMEX® FR TYPE EN 50306-3 & -4 300/500 V**FIRE RESISTANT MULTICORE CONTROL CABLE****APPLICATION**

FLAMEX® FR multicore control cables maintain circuit integrity in case of fire (according to EN 50200) thanks to our unique technology for fire resistant cables known as INFIT™. On top of the fire performances, this technology makes easier and faster the preparation and the connection of the wires with rolling stock connectors compared to older taping technologies.

FLAMEX® FR Type EN 50306-4 cables are fire retardant, low smoke and halogen-free satisfying performance requirements from EN 45545-2. They are designed to withstand tough working conditions (oil, ozone, temperature variation, etc.).

Conductor temperature: -40°C/+90°C/+110°C



Fire resistant

DESIGN

In line with
EN 50264-3-1

1 Conductor

Flexible stranded tinned copper wires according to EN 50306

2 Insulation

Special halogen-free INFIT™ fire proof material or mica tape as fire barrier with EN 50306 insulation

3 Screen

(for screened versions)
Tinned copper braid
Optional separator tape

4 Outer sheath

Cross-linked compound type EM 104
Oil, diesel, ozone and UV resistant
Colour: black

BENDING RADIUS

Static use:
5 x outer diameter

For installation and occasional movements:
10 x outer diameter

FIRE SAFETY STANDARDS

FLAMEX® FR Control cables are conform to EN 45545-2.

Fire resistant acc. to:
EN 50200 > 120 min
IEC 60331-2 > 120 min

COLOUR CODES

Insulation: white,
numbered 1 to n



Operating temp
- 40°C to
+105°C



Good chemical
Resistance
(oil, fuel, acid...)



Flame and Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Flexible



Screened
version

BASE CORE TYPE EN 50306-2 WITH INFIT™

CONDUCTOR TIN PLATED COPPER			INSULATION		MAX. COND. RESISTANCE [Ohm/km]	APPROX. WEIGHT [kg/km]
Cross Section [mm²]	Stranding n x Ø	Maximum Ø [mm]	Min. diam. [mm]	Max. diam. [mm]		
0.50	19 x 0.18	0.95	1.65	2.05	40.1	7.5
0.75	19 x 0.23	1.15	1.85	2.25	26.7	10.0
1.00	19 x 0.25	1.30	2.00	2.40	20.0	12.5
1.50	19 x 0.30	1.60	2.20	2.60	13.7	16.0
2.50	19 x 0.40	2.00	2.65	3.05	8.21	25.5

BASE CORE TYPE EN 50306-2 WITH MICA TAPE

Cross Section [mm²]	CONDUCTOR		INSULATION		MAX. COND. RESISTANCE [Ohm/km]	APPROX. WEIGHT [kg/km]
	n x diameter [mm]	Max. diameter [mm]	Min. diam. [mm]	Max. diam. [mm]		
0.50	19 x 0.18	0.95	1.60	1.80	40.1	7.0
0.75	19 x 0.23	1.15	1.80	2.00	26.7	9.50
1.00	19 x 0.25	1.30	1.95	2.15	20.0	11.5
1.50	19 x 0.30	1.60	2.20	2.50	13.7	16.5
2.50	19 x 0.40	2.00	2.75	3.05	8.21	26.0

FLAMEX® FR TYPE EN 50306-3

FLEXIBLE THIN WALL INSULATED WIRES AND CABLES

FLAMEX® FR TYPE EN 50306-3 CATEGORY MM-S EN 50200

Screened and sheathed multicore cables

Thin wall insulation/Standard wall sheath (minimum 0.20 mm) type EM 104

Base core type EN 50306-2



LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PN340*	1 x 0.50	3.20	3.80	20
2PN490*	2 x 0.50	4.60	5.20	32
2PN492*	3 x 0.50	4.90	5.50	42
2PN493*	4 x 0.50	5.30	5.90	53
2PN341*	1 x 0.75	3.40	4.00	25
2PN422*	2 x 0.75	5.10	5.70	40
2PN494*	3 x 0.75	5.30	5.90	51
2PN409*	4 x 0.75	5.80	6.40	66
2PN495*	1 x 1.00	3.20	4.00	26
2PN423*	2 x 1.00	5.20	6.00	46
2PN496*	3 x 1.00	5.60	6.40	62
2PN342*	4 x 1.00	6.10	6.90	79
2PN410*	1 x 1.50	3.80	4.60	35
2PN385*	2 x 1.50	5.90	6.60	65
2PN497*	3 x 1.50	6.30	7.30	82
2PN498*	4 x 1.50	7.00	8.00	106
2PN362*	8 x 1.50	9.50	10.50	192
2PN499*	1 x 2.50	4.10	4.90	45
2PN424*	2 x 2.50	7.00	8.20	90
2PN500*	3 x 2.50	7.70	8.70	127
2PN491*	4 x 2.50	8.40	9.60	162

Other constructions on request

* Mica tape and cross-linked halogen-free material acc. to EN 50306

Marking

Cores: by printed numbers

External sheath: FLAMEX EN 50306-3 - 300 V - number of cores x cross-section -
MM-S90 EN 50200 - week/year - batch number

FLAMEX® FR TYPE EN 50306-4**FLEXIBLE THIN WALL INSULATED WIRES AND CABLES****FLAMEX® FR TYPE EN 50306-4 TABLE 1 CLASS P CATEGORY MM EN 50200**

Unscreened and sheathed multicore cables

Thin wall insulation/Standard wall sheath (minimum 0.42 mm) type EM 104

Base core type EN 50306-2



LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PN501*	2 x 0.50	4.50	5.50	31
2PN502*	3 x 0.50	4.80	5.80	40
2PN503*	4 x 0.50	5.30	6.30	50
2PN504*	7 x 0.50	6.40	7.40	77
2PM973	13 x 0.50	9.20	10.20	137
2PM974	19 x 0.50	10.30	11.30	182
2PM975	37 x 0.50	14.00	15.00	333
2PM976	2 x 0.75	5.10	6.10	39
2PM977	3 x 0.75	5.50	6.50	51
2PN459*	4 x 0.75	6.20	7.00	64
2PM980	7 x 0.75	7.20	8.20	99
2PM981	13 x 0.75	10.10	11.10	177
2PM982	19 x 0.75	11.50	12.50	243
2PM983	37 x 0.75	15.60	16.60	445
2PM984	48 x 0.75	18.00	19.00	570
2PN334*	2 x 1.00	5.30	5.90	50
2PN505*	3 x 1.00	5.50	6.50	58
2PN335*	4 x 1.00	6.30	6.90	77
2PM989	7 x 1.00	7.70	8.70	120
2PM992	13 x 1.00	10.90	11.90	218
2PM993	19 x 1.00	12.20	13.20	294
2PM995	37 x 1.00	16.70	17.70	549
2PN460*	2 x 1.50	6.00	7.00	60
2PN506*	3 x 1.50	6.40	7.40	79
2PM998	4 x 1.50	6.80	7.80	92
2PN001	7 x 1.50	8.20	9.20	147
2PN004	13 x 1.50	11.70	12.70	271
2PN005	19 x 1.50	13.30	14.30	375
2PN006	37 x 1.50	18.30	19.30	706
2PN007	2 x 2.50	6.70	7.70	77
2PN336*	3 x 2.50	7.80	8.40	106
2PN009	4 x 2.50	7.90	8.90	134

Other constructions on request

* Mica tape and cross-linked halogen-free material acc. to EN 50306

Marking

Cores: by printed numbers

External sheath: FLAMEX EN 50306-4 - 1P - 300 V - number of cores x cross-section -

MM-90 EN 50200 - week/year - batch number

FLAMEX® FR TYPE EN 50306-4 TABLE 1 CLASS E CATEGORY MM EN 50200

Unscreened and sheathed multicore cables

Thin wall insulation/Standard wall sheath (minimum 1.00 mm) type EM 104

Base core type EN 50306-2

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PN507*	2 x 0.50	5.50	6.50	46
2PN508*	3 x 0.50	6.80	7.80	55
2PN461*	4 x 0.50	6.00	7.00	65
2PM925	7 x 0.50	7.60	8.60	95
2PM926	13 x 0.50	10.20	11.20	161
2PM927	19 x 0.50	11.30	12.30	209
2PM928	37 x 0.50	15.00	16.00	368
2PN509*	2 x 0.75	5.90	6.90	53
2PN510*	3 x 0.75	6.20	7.20	65
2PM931	4 x 0.75	7.00	8.00	80
2PM933	7 x 0.75	8.20	9.20	118
2PM934	13 x 0.75	11.10	12.10	203
2PM935	19 x 0.75	12.50	13.50	272
2PM936	37 x 0.75	16.60	17.60	484
2PM937	48 x 0.75	19.00	20.00	614
2PN511*	2 x 1.00	6.10	7.10	59
2PM939	3 x 1.00	6.80	7.80	76
2PN332*	4 x 1.00	7.00	7.70	87
2PM941	7 x 1.00	8.70	9.70	140
2PM944	13 x 1.00	11.90	12.90	246
2PM945	19 x 1.00	13.20	14.20	326
2PM947	37 x 1.00	17.70	18.70	590
2PM948	2 x 1.50	6.80	7.80	70
2PM949	3 x 1.50	7.20	8.20	90
2PN333	4 x 1.50	7.90	8.90	117
2PM953	7 x 1.50	9.20	10.20	169
2PM956	13 x 1.50	12.70	13.70	301
2PM957	19 x 1.50	14.30	15.30	409
2PM958	37 x 1.50	19.30	20.30	752
2PM959	2 x 2.50	7.70	8.70	95
2PM960	3 x 2.50	8.20	9.20	125
2PN337*	4 x 2.50	8.40	9.00	130

Other constructions on request

* Mica tape and cross-linked halogen-free material acc. to EN 50306

Marking

Cores: by printed numbers

External sheath: FLAMEX EN 50306-4 - 1E - 300 V - number of cores x cross-section -

MM-90 EN 50200 - week/year - batch number

FLAMEX® FR TYPE EN 50306-4**FLEXIBLE THIN WALL INSULATED WIRES AND CABLES****FLAMEX® FR TYPE EN 50306-4 TABLE 3 CLASS P CATEGORY MM - S EN 50200**

Screened and sheathed multicore cables

Thin wall insulation/Standard wall sheath (minimum 0.42 mm) type EM 104

Base core Type EN 50306-2



LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PN343*	2 x 0.50 + S	5.40	6.00	43
2PN348*	4 x 0.50 + S	6.10	6.80	66
2PN053	6 x 0.50 + S	7.10	8.10	92
2PN055	8 x 0.50 + S	7.70	8.70	108
2PN402*	2 x 0.75 + S	5.50	6.30	46
2PN060	4 x 0.75 + S	6.60	7.60	81
2PN061	6 x 0.75 + S	7.80	8.80	115
2PM767	2 x 1.00 + S	5.90	6.90	56
2PN065	3 x 1.00 + S	6.30	7.30	74
2PN063	8 x 0.75 + S	8.50	9.50	136
2PN066	4 x 1.00 + S	6.90	7.90	93
2PN067	6 x 1.00 + S	8.30	9.30	139
2PN069	8 x 1.00 + S	9.00	10.00	164
2PN070	2 x 1.50 + S	6.40	7.40	69
2PN071	3 x 1.50 + S	6.80	7.80	90
2PN072	4 x 1.50 + S	7.50	8.50	117
2PN075	8 x 1.50 + S	9.70	10.70	201
2PN073	6 x 1.50 + S	8.90	9.90	167
2PN076	2 x 2.50 + S	7.30	8.30	93
2PN077	3 x 2.50 + S	7.80	8.80	125
2PN078	4 x 2.50 + S	8.50	9.50	158
2PN079	6 x 2.50 + S	10.30	11.30	239
2PN081	8 x 2.50 + S	11.20	12.20	288

Other constructions on request

* Mica tape and cross-linked halogen-free material acc. to EN 50306

Marking

Cores: by printed numbers

External sheath: FLAMEX EN 50306-4 - 3P - 300 V - number of cores x cross-section -

MM-S-90 EN 50200 - week/year - batch number

FLAMEX® FR TYPE EN 50306-4 TABLE 3 CLASS E CATEGORY MM - S EN 50200

Screened and sheathed multicore cables

Thin wall insulation/Standard wall sheath (minimum 1.00 mm) type EM 104

Base core Type EN 50306-2

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PN018	2 x 0.50 + S	6.10	7.10	55
2PN349*	4 x 0.50 + S	6.80	7.50	78
2PN019	3 x 0.50 + S	6.40	7.40	66
2PN021	6 x 0.50 + S	8.10	9.10	111
2PN026	2 x 0.75 + S	6.60	7.60	65
2PN023	8 x 0.50 + S	8.70	9.70	129
2PN033	3 x 1.00 + S	7.30	8.30	92
2PN027	3 x 0.75 + S	6.90	7.90	79
2PN028	4 x 0.75 + S	7.60	8.60	99
2PN039	3 x 1.50 + S	7.80	8.80	108
2PN029	6 x 0.75 + S	8.80	9.80	136
2PN031	8 x 0.75 + S	9.50	10.50	159
2PN040	4 x 1.50 + S	8.50	9.50	137
2PN032	2 x 1.00 + S	6.90	7.90	72
2PN034	4 x 1.00 + S	7.90	8.90	112
2PN037	8 x 1.00 + S	10.00	11.00	188
2PN035	6 x 1.00 + S	9.30	10.30	161
2PN046	4 x 2.50 + S	9.50	10.50	180
2PN038	2 x 1.50 + S	7.40	8.40	86
2PN041	6 x 1.50 + S	9.90	10.90	191
2PN043	8 x 1.50 + S	10.70	11.70	226
2PN044	2 x 2.50 + S	8.30	9.30	113
2PN045	3 x 2.50 + S	8.80	9.80	146
2PN047	6 x 2.50 + S	11.30	12.30	265
2PN049	8 x 2.50 + S	12.20	13.20	317

Other constructions on request

Marking

* Mica tape and cross-linked halogen-free material acc. to EN 50306

Cores: by printed numbers

External sheath: FLAMEX EN 50306-4 - 3E - 300 V - number of cores x cross-section -

MM-S-90 EN 50200 - week/year - batch number

FLAMEX® FR TYPE EN 50306-4**FLEXIBLE THIN WALL INSULATED WIRES AND CABLES****FLAMEX® FR TYPE EN 50306-4 TABLE 7 CLASS P CATEGORY MM - S EN 50200**

Screened and sheathed multipair cables (overall screen)

Thin wall insulation/Standard wall sheath (minimum 0.42 mm) type EM 104

Base core Type EN 50306-2



LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PN138	2x2x0.50 + S	7.70	8.90	89
2PN139	3x2x0.50 + S	8.10	9.30	103
2PN143	7x2x0.50 + S	11.90	13.10	209
2PN144	2x2x0.75 + S	8.40	9.60	108
2PN146	4x2x0.75 + S	9.90	11.10	157
2PN145	3x2x0.75 + S	8.80	10.00	126
2PN149	2x2x1.00 + S	8.90	10.10	124
2PN140	4x2x0.50 + S	9.00	10.20	126
2PN151	4x2x1.00 + S	10.50	11.70	183
2PN150	3x2x1.00 + S	9.40	10.60	148
2PN154	2x2x1.50 + S	9.60	10.80	147
2PN155	3x2x1.50 + S	10.10	11.30	177
2PN156	4x2x1.50 + S	11.60	12.80	237
2PN159	2x2x2.50 + S	11.40	12.60	217
2PN148	7x2x0.75 + S	13.00	14.20	258
2PN153	7x2x1.00 + S	13.90	15.10	307
2PN158	7x2x1.50 + S	15.00	16.20	374

Other constructions on request

Marking

Pairs: by printed numbers

External sheath: FLAMEX EN 50306-4 - 7P - 300 V - number of cores x 2 x section -

MM-S-90 EN 50200 - week/year - batch number

FLAMEX® FR TYPE EN 50306-4 TABLE 7 CLASS E CATEGORY MM - S EN 50200

Screened and sheathed multipair cables (overall screen)

Thin wall insulation/Standard wall sheath (minimum 1.00 mm) type EM 104

Base core Type EN 50306-2

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm ²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
2PN115	2x2x0.50 + S	8.70	9.90	110
2PN121	2x2x0.75 + S	9.40	10.60	130
2PN126	2x2x1.00 + S	9.90	11.10	147
2PN116	3x2x0.50 + S	9.10	10.30	125
2PN122	3x2x0.75 + S	9.80	11.00	149
2PN117	4x2x0.50 + S	10.00	11.20	149
2PN132	3x2x1.50 + S	11.10	12.30	204
2PN127	3x2x1.00 + S	10.40	11.60	172
2PN131	2x2x1.50 + S	10.60	11.80	172
2PN123	4x2x0.75 + S	10.90	12.10	182
2PN135	7x2x1.50 + S	16.00	17.20	412
2PN128	4x2x1.00 + S	11.50	12.70	210
2PN133	4x2x1.50 + S	12.60	13.80	267
2PN120	7x2x0.50 + S	12.90	14.10	239
2PN125	7x2x0.75 + S	14.00	15.20	292
2PN130	7x2x1.00 + S	14.90	16.10	343

Other constructions on request

Marking

Pairs: by printed numbers

External sheath: FLAMEX EN 50306-4 - 7E - 300 V - number of cores x 2 x section -

MM-S-90 EN 50200 - week/year - batch number

FLAMEX® FR TYPE EN 50264-3-1 0.6/1 kV

FIRE RESISTANT SINGLE CORE POWER CABLE

APPLICATION

FLAMEX® FR flexible power cables maintain circuit integrity in case of fire (according to EN 50200 for 120 minutes) and are fire retardant, low smoke and halogen-free satisfying performance requirements from EN 45545-2. On top of that, FLAMEX® FR TYPE EN 50264-3-1 cables are designed to withstand tough working conditions (oil, ozone, temperature variation, etc.).

Conductor temperature: -40°C/+90°C/+120°C



DESIGN

In line with
EN 50264-3-1

1 Conductor

Flexible stranded
tinned copper class 5
according to
IEC/EN 60228

2 Insulation

Mica tape as fire
barrier and cross-linked
compound type EI 109
according to
EN 50264-1

Optional separator tape
Oil, diesel, ozone and
UV resistant
Colour: black



Fire resistant

BENDING RADIUS

Static use:
3 x outer diameter
(5 x D if D > 10mm)
For installation and
occasional movements:
10 x outer diameter

GUIDE TO USE

Permissible current
capacities and cabling
rules given in
EN 50355 and
EN 50343

FIRE SAFETY STANDARDS

FLAMEX® FR cables are
conform to EN 45545-2

Fire resistant acc. to:
EN 50200 - 120 min
IEC 60331-2 - 120 min
IEC 60331-1 - 120 min



Operating temp
- 40°C to
+90°C



Good
resistance
to UV,
humidity
and ozone



Good chemical
Resistance
(oil, fuel, acid...)



Flame and
Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Flexible
Class 5

FLAMEX® FR TYPE EN 50264-3-1 0.6/1 kV M

Fire Resistant single core

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
79462214	1x1	3.1	3.3	17
79462314	1x1.5	3.4	3.8	24
79462414	1x2.5	3.8	4.2	33
79462514	1x4	4.5	4.9	48
79462614	1x6	5.0	5.4	67
79462714	1x10	6.1	6.5	107
79462814	1x16	7.1	7.7	167
79462914	1x25	8.7	9.3	256
79463014	1x35	9.8	10.4	336
79463114	1x50	11.9	12.5	494
79463214	1x70	13.8	14.4	686
79463314	1x95	15.3	15.9	885

Marking

FLAMEX® TYPE EN 50264-3-1 FR 600 V cross-section M (N)MHXAF-FR 0,6/1 kV | LYNXEO |
week/year - batch number

FLAMEX® FR TYPE EN 50264-3-1 1.8/3 kV M

Fire Resistant single core

LYNXEO REFERENCE	NUMBER OF CORES X CROSS-SECTION [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
79461429	1 x 1	3.30	3.50	15
79461430	1 x 1.5	3.70	3.90	21
79461431	1 x 2.5	4.15	4.45	33
79461432	1 x 4	4.95	5.25	55
79461433	1 x 6	5.55	5.85	75
79461434	1 x 10	6.80	7.20	115
79461435	1 x 16	8.70	9.10	190
79461436	1 x 25	10.90	11.50	290
79461437	1 x 35	12.00	12.60	400
79461438	1 x 50	13.90	14.50	550
79461439	1 x 70	15.90	16.50	750
79461440	1 x 95	17.60	18.20	970
79461441	1 x 120	19.90	20.50	1.250
79461442	1 x 150	22.20	22.80	1.550
79461443	1 x 185	24.10	24.70	1.900
79461444	1 x 240	27.20	27.80	2.450

Marking

FLAMEX® 4GKW-EN FR or HXAFOE FR 1,8/3 kV cross-section EN 50264-3-1 1800V OM | LYNXEO |
week/year - batch number

FLAMEX® FR TYPE EN 50382-2 SI 1.8/3 kV & 3.6/6 kV**FIRE RESISTANT HIGH TEMPERATURE FLEXIBLE POWER CABLE****APPLICATION**

FLAMEX® FR TYPE EN 50382-2 power cables maintain circuit integrity in case of fire (according to IEC 60331-4 for 90 minutes) and are fire retardant, low smoke and halogen-free satisfying performance requirements from EN 45545-2. These cables can withstand harsh operation conditions on rolling stock (variations in temperature, snow, rain, sunlight, heavy vibrations, etc...). FLAMEX® FR TYPE EN 50382-2 is suitable for weight saving and cabling operation in narrow spaces.

Conductor temperature: -50°C/+150°C/+170°C

**DESIGN**

In line with
EN 50264-3-1

1 Conductor

Flexible class 6 copper
according to IEC 60228

2 Insulation

Fire barrier and
cross-linked silicone
compound type EI 111
according
to EN 50382-1
Colour: black



Fire resistant

**BENDING
RADIUS**

Static use:
4 x outer diameter
For installation and
occasional movements:
6 x outer diameter

**FIRE SAFETY
STANDARDS**

FLAMEX® FR EN 50382-2
cables are conform to
EN 45545-2.

Fire resistant acc. to:
IEC 60331-4 - 90 min

GUIDE TO USE

Permissible current
capacities and cabling
rules given in
EN 50355 and
EN 50343



Operating temp
- 50°C to +150°C



Good
resistance
to UV,
humidity
and ozone



Good chemical
Resistance
(oil, fuel, acid...)



Flame and
Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2

FLAMEX® FR TYPE EN 50382-2 1.8/3 kV SI 150°C

Fire Resistant high temperature Extra flexible single core cables

NUMBER OF CORES X CROSS-SECTION [mm²]	NOMINAL CONDUCTOR DIAMETER [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
1x35	8.1	12.5	14.1	428
1x50	9.4	13.9	15.8	547
1x70	11.4	15.6	17.8	743
1x95	12.9	17.4	19.9	1,015
1x120	14.4	19.0	21.7	1,170
1x150	17.1	20.5	23.5	1,532
1x185	18.3	22.1	25.4	1,782
1x240	21.4	24.5	28.2	2,574

FLAMEX® FR TYPE EN 50382-2 3.6/6 kV SI 150°C

Fire Resistant high temperature Extra flexible single core cables

NUMBER OF CORES X CROSS-SECTION [mm²]	NOMINAL CONDUCTOR DIAMETER [mm²]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]
		Minimum [mm]	Maximum [mm]	
1x35	8.1	13.4	15.2	470
1x50	9.4	14.8	16.9	594
1x70	11.4	16.5	18.9	794
1x95	12.9	17.9	20.5	1,058
1x120	14.4	19.7	22.6	1,224
1x150	17.1	21.2	24.4	1,593
1x185	18.3	23.0	26.5	1,855
1x240	21.4	26.0	29.8	2,679

Marking

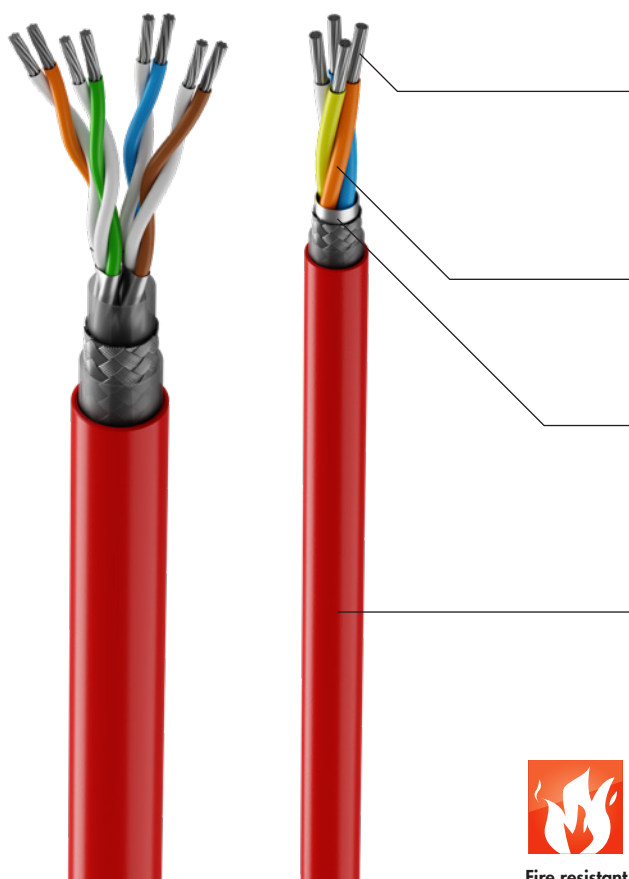
FLAMEX® FR - TYPE EN 50382-2 SI - Voltage rate (1800V or 3600V) - cross-section
mm² - FX - temperature class (150°C) Lynxéo 279 - week/year - batch number

FLAMEX® Communication EN 50200

APPLICATION

Fostering innovation, Lynxéo designed FLAMEX® Ethernet FR that can reach data transmission performances for Category 5E or 6A as described in the ISO/CEI 11801, showing no loss of data train and no drop of the transmission parameters when burnt. This unique fire performance is achievable thanks to our technology for fire resistant cables known as INFIT™. On top of the fire performances, this technology makes easier and faster the preparation and the connection of the wires with rolling stock connectors compared to older taping technologies.

FLAMEX® Communication FR cables EN 50200 are fire retardant, low smoke and halogen-free satisfying performance requirements from EN 45545-2.



DESIGN

- 1 Conductor**
Flexible stranded tinned copper in metric or American wire gauge (AWG) sizes
- 2 Insulation**
Special halogen-free INFIT™ fire proof material
- 3 Screen**
Tinned copper braid
Optional aluminum/polyester or separator tapes
- 4 Outer sheath**
Cross-linked compound type EM 101 acc. to EN 50264-1
Oil, ozone and UV resistant
Colour: red



Fire resistant

FIRE SAFETY STANDARDS

FLAMEX® communication cables are conform to EN 45545-2.

Fire resistant acc. to:
- EN 50200 PH 30-60 tested under 110 V
- EN 50200 PH 60-90 Ethernet frame loss and transmission parameter

BENDING RADIUS

Static use:
8 x outer diameter
For installation and occasional movements:
10 x outer diameter

GUIDE TO USE

Cabling rules are given in EN 50343.



Operating temp
-25°C to +85°C



Good chemical
Resistance
(oil, fuel, acid...)



Flame and
Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Low toxicity
EN 50305-9.2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Flexible



Screened
version

FIRE RESISTANT ETHERNET 100 Ω

LYNXEO REFERENCE	CABLE DESIGN	NUMBER OF CORES x CROSS- SECTION [mm ²]	DEDICATED NETWORK	CORE DIAMETER [mm]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]	FIRE SAFETY
					Min. diameter [mm]	Max. diameter [mm]		
2PN367	Pair	4x2x0.25	CAT 6A	2.4	12.0	14.0	170	EN 50200 PH 60 Ethernet protocol
2PM021	Quad	4x0.5	CAT 5E	2.6	8.1	8.5	96	EN 50200 PH 90 Ethernet protocol

FIRE RESISTANT WTB-MVB & CAN BUS 120 Ω

LYNXEO REFERENCE	CABLE DESIGN	NUMBER OF CORES x CROSS- SECTION [mm ²]	DEDICATED NETWORK	CORE DIAMETER [mm]	OVERALL DIAMETER		APPROX. WEIGHT [kg/km]	FIRE SAFETY
					Min. diameter [mm]	Max. diameter [mm]		
2PM601	Pair	1x2x0.75	WTB	4.5	11.3	11.7	160	EN 50200 PH15
2PM599	Pair	1x2x0.5	MVB	3.7	9.5	10.0	122	EN 50200 PH15
2PM600	quad	4x0.5	MVB	3.4	10.8	11.2	135	EN 50200 PH15
2PN347*	pair	1x2x0.5 + 1x0.5	CAN BUS	3.0 + 1.7	8.0	9.0	90	EN 50200 PH120

* designed with a mineral tape underneath the polyethylene-based dielectric



HV LOOPS & ACCESSORIES

FLAMEX® PANTO LEAD-FREE	86
READY-TO-INSTALL PRE-ASSEMBLED HV CABLES	88
SEPARABLE HV CONNECTORS	90
HV TERMINATIONS	92

FLAMEX® PANTO LEAD-FREE 26/45 kV

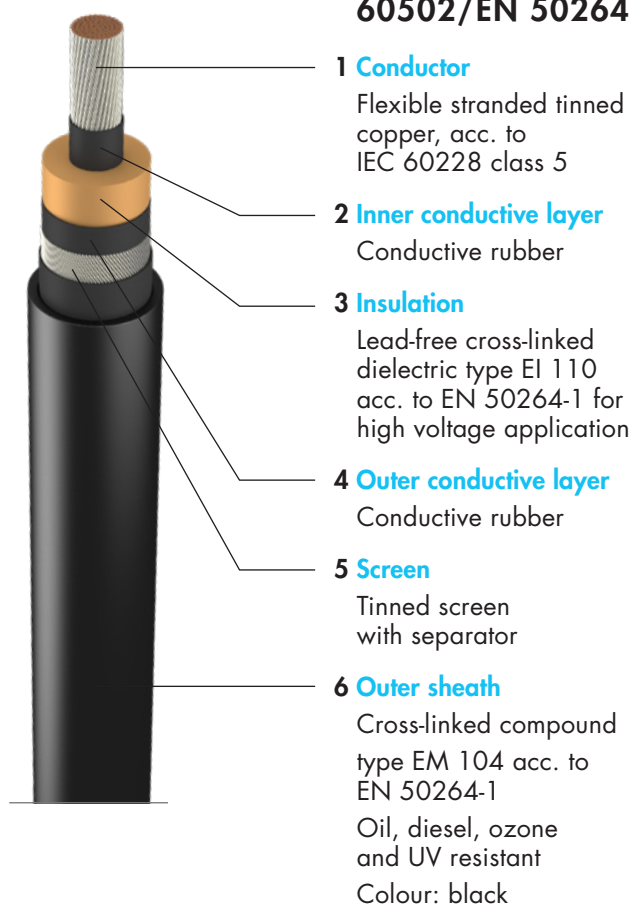
HV SINGLE CORE POWER CABLE

APPLICATION

For inside and outside use in railway vehicles. Installation in cable ducts and tubes.
Available on request: HV Loop, completely pre-assembled flexible cables with plugs and sealing ends, electrically tested.

Conductor temperature: -40°C/+90°C/+120°C

DESIGN in line with IEC 60502/EN 50264



BENDING RADIUS

Static use:
5 x outer diameter
For installation and occasional movements:
10 x outer diameter

GUIDE TO USE

Permissible current capacities and cabling rules given in EN 50355 and EN 50343

FIRE SAFETY STANDARDS

FLAMEX® PANTO LEAD-FREE cables comply with the internationally recognised EN 45545-2, which is the leading global standard for the protection of materials used in the manufacture of rolling stock against the effects of fire and smoke.



Operating temp
- 40°C to
+90°C



Good resistance
to UV,
humidity
and ozone



Good chemical
Resistance
(oil, fuel, acid...)



Flame and
Fire
retardant
IEC/EN 60332-1-2
IEC/EN 60332-3 -24



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Low toxicity
EN 50305-9.2



Flexible
Class 5

FLAMEX® PANTO LEAD-FREE 26/45kV

LYNXEO REFERENCE	CROSS-SECTION [mm ²]	SCREEN SECTION [mm ²]	DIAMETER OVER THE INSULATION [mm]	MIN.OUTER DIAMETER [mm]	MAX.OUTER DIAMETER [mm]	APPROX. WEIGHT [kg/km]
79477908	50	16	29.0	34.0	36.5	1,770
79477912	95	16	32.0	40.0	42.0	2,500
79477916	150	16	36.0	41.0	43.0	2,990
79477918	185	25	37.0	44.0	46.0	3,430
79477919	240	25	40.0	45.0	48.0	4,020

Marking

FLAMEX® PANTO LEAD-FREE* 1x section/screen section 26/45kV | LYNXEO | week/year - batch number

* DTREN 150018 - SNCF 10-5299319 for 95 / 16 mm² design

ELECTRICAL PROPERTIES

Nominal voltage	$U_0/U_{(U_{max})} = 26/45 (54) \text{ kV}$	
Max. rated voltage in d.c. installations, one-sided earthed	$U_{0max} = 32 \text{ kV DC}$	
Test voltage	Core/Screen (5 minutes)	$U = 72 \text{ kV}$
	Core/Screen (5 minutes)	$U = 75 \text{ kV} *$
Partial discharge measurement by 52 kV, on pre-assembled flexible cable	$\leq 5 \text{ pC}$	

READY-TO-INSTALL PRE-ASSEMBLED HV CABLES

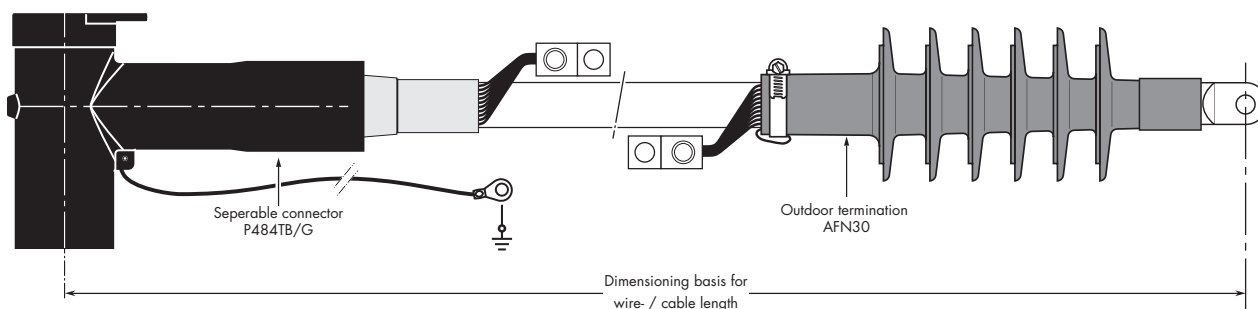
CABLES, CONNECTORS AND TERMINATIONS

APPLICATION

Pre-assembled FLAMEX® PANTO LEAD-FREE cables are equipped with connectors and terminations. They can be used for traction power supply systems. We manufacture the pre-assembled cables specifically customized in terms of cable length and type of accessories. The cables and flexible cables, primarily checked by us, are assembled with different conductor cross-sections and accessories, depending on customer's application.

Accessory A
See table for accessory selection

Accessory B
See table for accessory selection



TECHNICAL CHARACTERISTICS

- Type-tested:
All accessories meet the CENELEC HD 629.1 requirements.
- Routine-tested:
Depending on customer needs, each pre-assembled cable loop can be tested for AC withstands and partial discharge prior leaving the factory.

FIRE SAFETY STANDARDS

The pre-assemblies conform to the requirements from EN 45545-2.

READY-TO-INSTALL PRE-ASSEMBLED CABLES

CONNECTORS AND TERMINATIONS

EXAMPLE REQUEST:

Please fill in the applicable information.

CHARACTERISTICS	15 kV Traction power supply system	25 kV Traction power supply system
Cable type		
Cable length		
Accessory A		
Length of shield wire		
Accessory B		
Length of shield wire		
Partial discharge sample test	yes / no	yes / no
AC withstand test	yes / no	yes / no

If you do not indicate the length of the shield wire, we will assume a length of 500 mm for accessory «A» and «B».

EXAMPLE FOR ACCESSORIES SELECTION:

System requirements:

- Traction power supply system according to EN 50163: 25 kV
- Requirement of the creepage distance according to IEC 50124: PD4
- Bushing interface of traction transformer: Interface C

The applicable types of accessories for FLAMEX® PANTO LEAD-FREE 26/45 kV cable can be:

CROSS-SECTION OF CONDUCTOR / SCREEN	DIAMETER OVER CORE INSULATION* [mm]	ACCESSORY A: SEPARABLE CONNECTOR	ACCESSORY B: TERMINATION
50/16	29	P480TB/G-25	AFN30-3
95/16	32	P480TB/G-25	AFN30-3
150/16	36	P480TB/G-30	AFN36-4
185/25	37	P480TB/G-30	AFN36-4
240/25	40	P480TB/G-30	AFN36-4
400/35	46.5	P484TB/G-37	AFN36-5

The proper accessories type is up to the dia. over core insulation. To choose the right accessories, please double-check the diameter over core insulation in the respective cable date sheet. If they are not equal, the cable date sheet shall prevail.

Detailed information can be found in the respective accessories data sheet.

When dimensioning the preassembled cable length, we take the center points of both cable accessories as the basis. When indicating the length of the shield wire, please also specify whether the shield wire should be lead out on one or both sides.

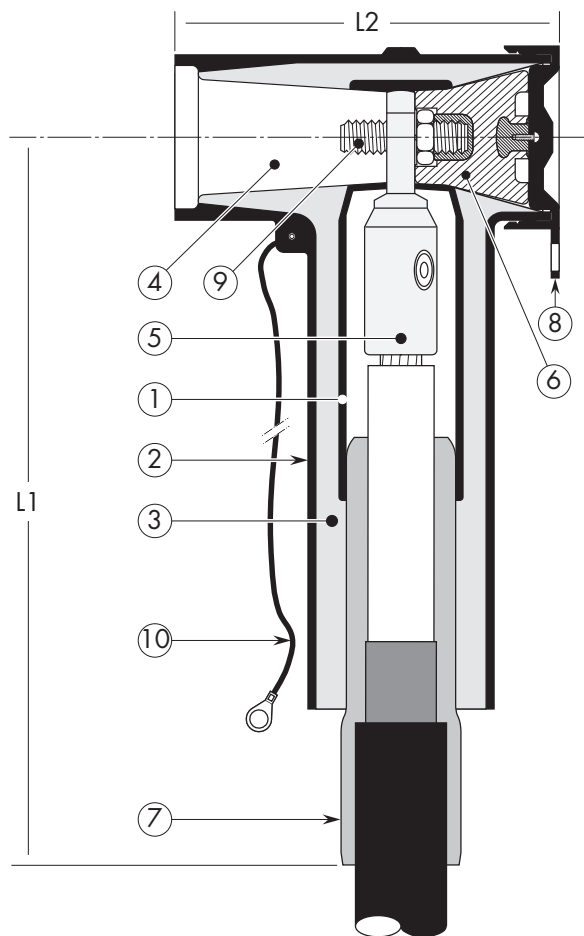
SEPARABLE HV CONNECTORS

INTERFACE C, E AND F

APPLICATION

Separable connectors are suitable for installation on flexible cable FLAMEX® PANTO LEAD-FREE.

They can be used to connect the cable to other full screened equipment (e.g. traction transformer) in traction power supply systems.



DESIGN

- | | |
|--|--|
| 1 Conductive EPDM insert | 7 Cable reducer |
| 2 Conductive EPDM jacket | 8 Conductive rubber cap |
| 3 Insulating EPDM layer moulded between the insert and the jacket | 9 Clamping screw |
| 4 Type C, E or F - interface as described by EN 50180 and EN 50181 | 10 Earth lead
The screen break design enables cable outer sheath testing without removing or dismantling the connector (except 750LR) |
| 5 Bolted or crimp conductor contact | |
| 6 Basic insulating plug | |

TECHNICAL CHARACTERISTICS

Separable connectors meet the CENELEC HD 629.1 requirements.

- The thick conductive EPDM jacket provides a total safe to touch screen to ensure safety.
- Thanks to new materials the separable connectors are non-size sensitive.
- Each separable connector is tested for AC withstand and partial discharge prior leaving the factory.

FIRE SAFETY STANDARDS

The separable HV connectors conform to EN 45545-2.

SEPARABLE HV CONNECTORS

SEPARABLE CONNECTOR TYPE	L1 [mm]	L2 [mm]	INTERFACE TYPE	DIAMETER OVER CORE INSULATION*	
				Minimum [mm]	Maximum [mm]
(M)430TB/G	290	185	C	13.0	37.6
(M)(P)480TB/G	290	185	C	13.0	37.6
(M)(P)484TB/G	360	185	C	17.0	50.0
(M)(P)400TB/G	350	255	C	13.0	37.6
(M)(P)440TB/G	355	255	C	17.0	50.0
(M)(P)784TB/G	360	205	E	16.0	56.0
Q909TB/G	445	250	F	27.0	68.0

*Information can be found in the respective cable data sheet.

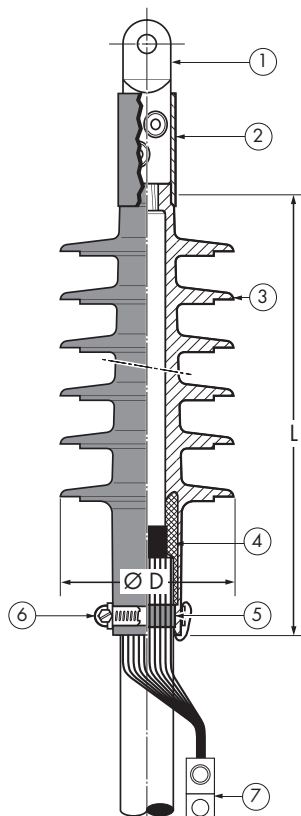
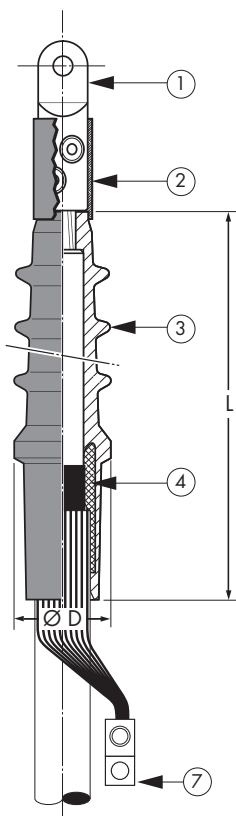
HV TERMINATIONS

AIN & AFN FOR INDOOR AND OUTDOOR

APPLICATION

The AIN/AFN termination is suitable for indoor/outdoor installation on flexible cable FLAMEX® PANTO LEAD-FREE.

They can be used to connect the cable to other equipment and bus bars in traction power supply systems.



DESIGN

1 Conductor

Longitudinally sealed mechanical or compression cable lug (alternative pin-type)

2 Inner conductive layer

Silicone tube or cap as additional sealing at the transition of the cable lug to the termination housing

3 Insulation

High flexibility silicone rubber housing

4 Inner conductive layer

Integrated conductive rubber insert

5 Screen

Water sealing mastic

6 Outer sheath

Earthing clamp

7 Outer sheath

Earth cable lug

SPECIFICATIONS AND STANDARDS

Indoor and outdoor terminations meet the CENELEC HD 629.1 requirements.

FIRE SAFETY STANDARDS

The HV terminations conform to EN 45545-2.

HV TERMINATIONS

TERMINATION TYPE	CREEPAGE DISTANCE [mm]	L [mm]	Ø D [mm]	DIAMETER OVER CORE INSULATION*	
				Minimum [mm]	Maximum [mm]
AIN 30-1	414	300	74	23.8	28.4
AIN 30-2	412	300	74	27.1	37.6
AIN 30-3	393	300	81	31.5	42.8
AIN 36-4	506	405	98	31.5	41.0
AIN 36-5	502	405	98	39.0	50.0
AIN 36-6	499	405	98	46.0	58.0
AFN 30-1	695	300	115	23.8	28.4
AFN 30-2	694	300	115	27.1	37.6
AFN 30-3	718	300	127	31.5	42.8
AFN 36-3	755	405	127	28.0	32.0
AFN 36-4	755	405	127	31.5	41.0
AFN 36-5	755	405	127	39.0	50.0
AFN 36-6	755	405	127	46.0	58.0
AFNP 52-3-C	1,079	535	127	28.0	32.0
AFNP 52-4-C	1,079	535	127	31.5	41.0
AFNP 52-5-C	1,079	535	127	39.0	50.0
AFNP 52-6-C	1,079	535	127	46.0	58.0

*Information can be found in the respective cable data sheet.



SPECIALTIES

FLAMEX® HYBRIDS & JUMPERS.....	96
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FLAMEX® HYBRIDS & JUMPERS

APPLICATIONS

Lynxéo produces a complete range of standard or customized jumper cables for power and data transmission outside : trains, subways and tramways.

There are two main jumper cable types:

- to supply power in each coach,
- to transmit information between coaches and between chassis and bogie inside a coach.

ADVANTAGES

Designed to conform to the railway standards, these halogen-free cables are intended for applications where an extra-flexibility combined with flame and fire retardancy is required. jumper cables show an excellent mechanical resistance to abrasion, tensile strength and cut through, but also a very good resistance to chemical agents.

STANDARDS AND SPECIFICATIONS

Jumper cables conform to the international standard EN 45545-2 and to customer specifications that are strongly linked the working conditions of the trains.

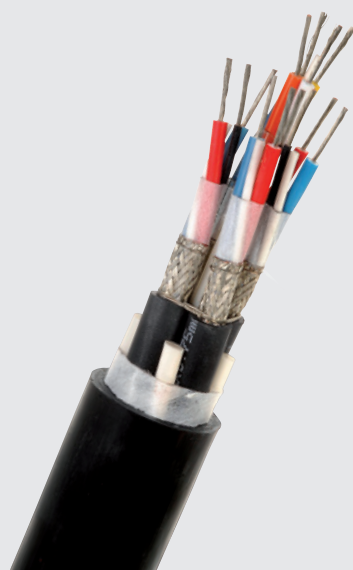
MAIN CHARACTERISTICS

- Jumper cables are available in every type of construction according to customer specifications:
 - with single and multicore (unscreened and unsheathed and/or screened and sheathed) ;
 - with coaxial or data bus cables ;
 - with optical elements.
- Very high flexibility level (class 6 stranded conductor)
- High reliability: flex life guarantee > 1 million cycles
- Excellent mechanical and chemical resistance
- Rated voltage: from 250 V to 3000 V

FLEX LIFE GUARANTEE

In order to guarantee more than 1 million flex cycles, we have developed our own test equipment. Each jumper cable is tested to simulate all specific movements endured during operation.

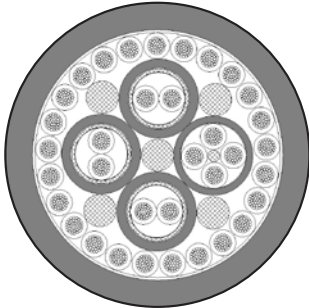
The complex movements are controlled on two horizontal and perpendicular axes and can be customized according to specific client needs.



Typical constructions designed for more than 1 million cycles

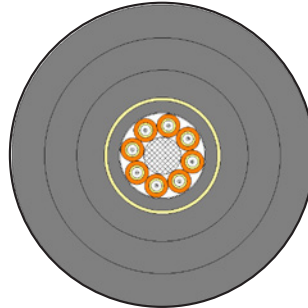
JUMPER CONTROL

2PN164: [3(2x2,50mm² MCS)
+ (4x2,50mm² MC)+25x2.50mm²]C



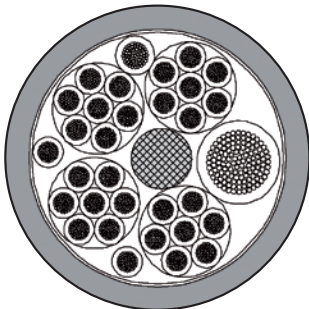
JUMPER OPTICAL FIBER

2PM792: OM3 – 8FO 50/125



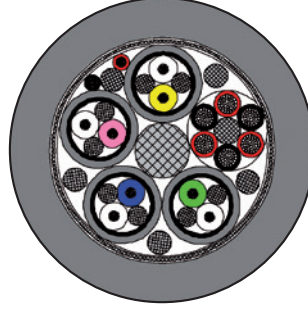
CONTROL AND POWER

2PK464: 30 x 2.5 mm² +
1 x 4 mm² + 1 x 16 mm²



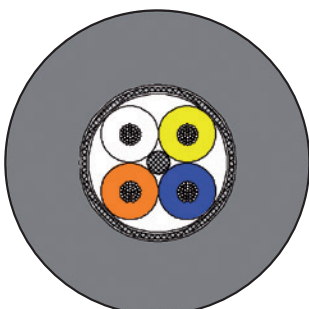
DATA BUS AND CONTROL

2PJ151: 4 x (2 x 0.5 mm² MVB 120 Ω) +
6 x 1.5 mm² + 2 x 0.5 mm² control



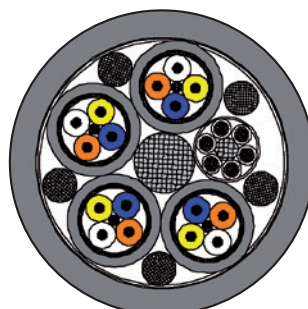
ETHERNET

2PJ528: 4 x 0,75 mm² 100 Ω



DATA BUS AND CONTROL

2PJ809: 4 x (4 x 0.75 mm² 100 Ω) + 6 x 1.5 mm²
Ethernet 100 Ω, MVB 120 Ω



Operating temp
-40°C or -25°C to
+85°C up to +105°C



Good chemical
Resistance
(oil, fuel,
acid...)



Flame and
Fire retardant
IEC/EN 60332-1-2
IEC/EN 60332-3
EN 50305-9.1



Low smoke
emission
IEC/EN 61034-2



Low corrosivity
of combustion
gases
IEC/EN 60754-2



Low toxicity
EN 50305-9.2



Halogen-free
IEC/EN 60754-1
IEC 60684-2



Flexible
Class 5/6



EMI



CURRENT RATING

CURRENT RATING OF WIRES IN ACCORDANCE WITH EN 50343

CURRENT RATING OF COPPER WIRES IN FREE AIR FOR SINGLE CORE CABLES

TEMPERATURE CLASS Standards	CURRENT RATING [A]			
	90°C (45°C) EN 50264 EN 50306	105°C EN 50306	120°C EN 50382	150°C EN 50382
Nominal cross-section [mm ²]				
0.5	14	12	-	-
0.75	16	15	-	-
1	20	23	25	29
1.5	25	29	32	37
2.5	33	38	42	48
4	46	52	58	67
6	60	68	76	88
10	85	97	107	124
16	110	125	139	161
25	150	171	189	219
35	190	217	239	277
50	240	274	302	350
70	300	342	378	438
95	360	410	454	526
120	425	485	536	621
150	490	559	617	715
185	560	638	706	818
240	675	770	851	986
300	775	884	977	1,132
400	950	1,083	1,197	1,387
K	1.0	1.14	1.26	1.46

Ambient temperature: 45°C

DERATING COEFFICIENT K1 FOR DIFFERENT WORKING TEMPERATURES ACCORDING TO EN 50343

TEMPERATURE CLASS	DERATING COEFFICIENT (K1)			
	90°C	105°C	120°C	150°C
35°C	1,11	1,08	1,06	1,05
45°C	1	1	1	1
55°C	0.88	0.91	0.93	0.95
65°C	0.75	0.82	0.86	0.90
75°C	0.58	0.71	0.77	0.85
85°C	0.33	0.58	0.68	0.79
95°C	-	0.41	0.58	0.72
105°C	-	-	0.45	0.65
115°C	-	-	0.26	0.58
125°C	-	-	-	0.49
135°C	-	-	-	0.38
145°C	-	-	-	0.22

DERATING COEFFICIENT K2 (EN 50343) FOR CABLES IN ACCORDANCE WITH INSTALLATION RULES

NUMBER OF CABLES LOADED	"CABLES ON TRAYS, IN ONE LAYER TYPE B)"	CABLES ON TRAYS, IN TWO LAYERS	"CABLES ON TRAYS, IN SEVERAL LAYERS TYPE C)"	"CABLES ON THE FLOOR OR ON A WALL TYPE D)"	"CABLES ON A CEILING OR UNDER FLOOR TYPE E)"	"CABLES IN A CLOSED TUBE, CONDUIT OR TRAY TYPE F)"	"CABLES IN A CLOSED TUBE OR CONDUIT, THERMALLY INSULATED TYPE G)"
single cable	1.0	1.0	1.0	1.0	0.95	0.95	0.76
2 cables	0.87	0.87	0.87	0.85	0.81	0.80	0.61
3 cables	0.83	0.83	0.78	0.79	0.72	0.70	0.53
4 cables	0.78	0.71	0.71	0.75	0.68	0.65	0.49
8 cables	0.74	0.59	0.52	0.75	0.62	0.52	0.40
12 cables	0.73	0.54	0.45	0.75	0.61	0.45	0.34
16 cables	0.72	0.51	0.41	0.75	0.61	0.41	0.31
20 cables and more	0.71	0.47	0.38	0.75	0.61	0.38	0.29

Calculation I cable: $> I_{load} / k1 \times k2 \times k3 \times k4 \times k5$ see EN guide to use

Symbols

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OPERATING TEMPERATURE



WEATHER CONDITIONS



FLEXIBILITY



CHEMICAL RESISTANCE



FIRE PERFORMANCES



LOW SMOKE DENSITY



LOW TOXICITY



HALOGEN-FREE



LOW GASES CORROSIVITY



ELECTRO MAGNETIC INTERFERENCE



RoHS COMPLIANT



REACH COMPLIANT



Wired to electrify industry

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