Nexans

FLAMEX®
A complete range of cable solutions for rolling stock worldwide

Symbols

Ambient Temperature	
Flexibility	
Resistance to impacts	
Chemical attacks	
Fire performances	
Smoke density	
Gases corrosivity	
Electro Magnetic Interference	
Halogen free	
Weather conditions	
RoHs compliant	

A specialised activity...

Nexans a wide range of cables covering diverse railway standards

The rolling stock industry is now at a crucial point in its development. New challenges must be met due to long-awaited equipment upgrades, booming freight traffic and high-speed train projects, and the growing need for conventional subways, full-automated metros, tramways and light-rail suburban vehicles.

A worldwide supplier of data and energy cables for rolling stock, Nexans is continuing to develop safer and more efficient products that conform to diverse railway standards, and to meet the demand for train interoperability. Innovation, custom engineering and full outsource subsystem responsability are among our service priorities.

Nexans wide product offer includes low voltage control cables, jumper cables, HV roof cables, coaxial cables for HF transmissions, data bus cables for multimedia and digital transmissions, optical fibre cables, low and high temperature power cables.

Our strengths

- **The cable range:**
  - Large range of products, huge diversity (national and international standards)
  - Customization on request,
  - High technology, via R&D partnership with cable assembly manufacturers,
  - ISO 9001 certification.
- **Worldwide presence,** via an integrated network, and two cables factories dedicated to the railway market.
- **The technology**
  - High technology know-how,
  - Customization on request,
  - Knowledge: different materials and processes,
  - Screen knowledge: braid and/or tape, spiral,
  - Largest range of products for multimedia and data transmission cables,
  - Medium/High voltage cable technology for roof cables.

RoHS compliance

All products in this catalogue do not contain any hazardous substance in accordance with the **European Directive n°2002/95/CE** relating to the removal of hazardous substances in the electric and electronic equipements.

... within a leader group

About Nexans:

With energy as the basis of its development, Nexans, the worldwide leader in the cable industry, offers an extensive range of cables and cabling systems. The Group is a global player in the infrastructure, industry, building and Local Area Network markets. Nexans addresses a series of market segments: from energy, transport and telecom networks to shipbuilding, oil and gas, nuclear power, automotives, electronics, aeronautics, material handling and automation.
Nexans is a responsible industrial company that regards sustainable development as integral to its global and operational strategy. Continuous innovation in products, solutions and services, employee development and engagement, and the introduction of safe industrial processes with limited environmental impact are among the key initiatives that place Nexans at the core of a sustainable future.

Global cable expertise for rolling stock

Optical fiber cables

Part 4

Data bus cables for multimedia and digital transmissions

Part 4

power cables

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rubber cables for power needs of locomotives and drives

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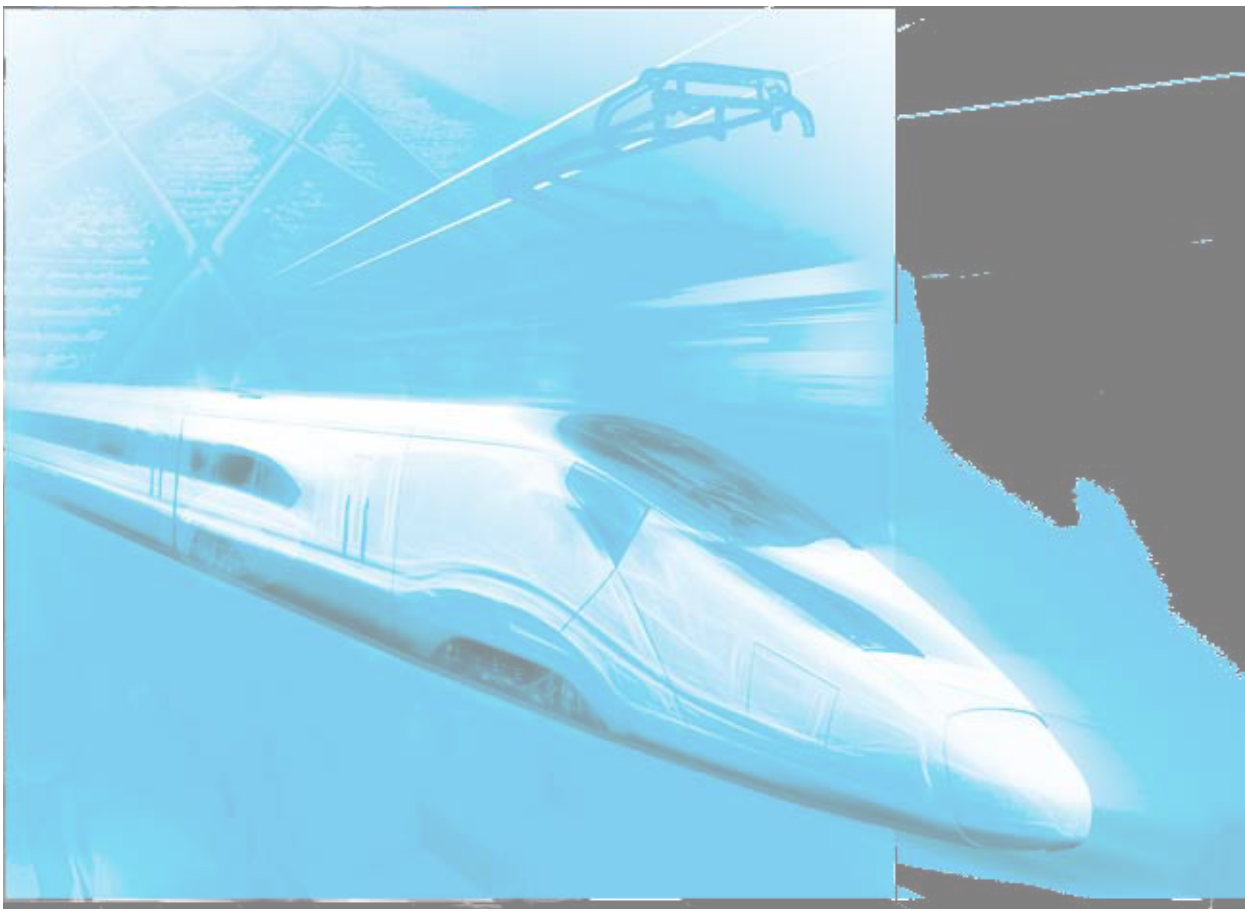
Cables for rolling stock: Guideline

Product family	Standard or reference	Construction	Core insulation	Core insulation thickness			IRM 902, Mineral oil Resistant (Cat 2)	IRM 903 Fuel Resistant (Cat 3)
				Thin	Reduced	Standard		
Low Voltage cables	EN 50 306 Single core EN 50 306 Multicore	FLAMEX® SH20 types 300 V 0.50 to 2.50 mm² FLAMEX® SH20 types 300 V 2, 3, 4, 7, 13, 19, 37 x 0.50 to 2.50 mm²	FLAMEX® SH20 (XL Compound)	●			●	●
	NF F 63 808 Single core	FLAMEX® SH20 types 250 V 0.38 to 4.32 mm²	FLAMEX® SH20 (XL Compound)	●			●	
	NF F 63 808 Multicore	FLAMEX® SH20 types 250 V 2, 3, 4, 7, 13, 19, 37 x 0.38 to 4.32 mm²	FLAMEX® SH20 (XL Compound)	●			●	
Power cables	EN 50 264-3-1 Single core	FLAMEX® Z+ types 0.6/1 kV, 1.8/3 kV	Halogen free		●		●	●
	EN 50 264-3-2 Multicore	FLAMEX® Z+ types 0.6/1 kV	Halogen free		●		●	●
	NF F 63 826 Single core	DC: 0.5 kV (Y500S) 1 kV (Y1000S) 1.5 kV (Y1500S) 3 kV (Y3000S)	Halogen free			●	●	
	NF F 63 826 Multicore	DC: 0.5 kV (NY500SO)	Halogen free			●	●	
	NF F 63 826 Aluminium single core	DC: 1.5 kV (Y1500S)	Halogen free			●	●	
	SNCF 10-5315-848	DC: FLAMEX® Gasoil resistant Single Y1500S Multicore NY500S	Halogen free			●	●	●
	NF F 63 826 SNCF 10-5249-367 SNCF 10-5315-848 Screened single core	DC: FLAMEX® BLG 1.5 kV or 3 kV	Halogen free			●	●	
	EN 50 382-2 Single core	FLAMEX® SI types 1.8/3 kV, 3.6/6 kV 1.5 to 400 mm²	FLAMEX® SI (Silicone base)			●	●	
	NF F 63 827 Single core High temperature	DC: 3 kV (Y3000S) 2.5 to 240 mm²	Silicone rubber			●	●	
Jumpers for power transmission	EN 50 382-2	FLAMEX® SI type FXZ 3.6/6 kV 50 to 185 mm²	Silicone rubber			●	●	
	NF F 63 826 Single core	DC: 1.5 kV (Y1500SS)	Halogen free			●	●	
	NF F 63 827 Reinforced single core High temperature	DC: 3 kV (Z3000SS) 25 to 240 mm²	Silicone rubber			●	●	
	SNCF 10-5315-848 Single core	FLAMEX® GASOIL resistant 1.5 kV	Silicone rubber			●	●	
Jumpers for data and power transmissions	Composite constructions	Variety of constructions according to customer request	Halogen free FLAMEX® or silicone				●	
Coaxial cables	FLAMEX® range, 50 ohms coaxial cables FLAMEX® range, 75 ohms coaxial cables	KX 3B, RG 174, RG 58 (KX15), RG 213, RG 214 KX 6A, RG 59, RG 11, KX8, RG 216	FLAMEX® (Base PE)				●	
Multimedia cables	Databus, twinax, quads	Variety of constructions according to customer request	FLAMEX® (PE base)				●	●
Optical fiber cables	Mono or multi-fibers	1 to 8 optical fibers	FLAMEX®				●	●
FLAMEX® PANTO	Medium/high voltage single core cable		Halogen free				●	

Cables for rolling stock: Guideline

Conductor class Temperature (°C)	Conductor temperature (°C) - 20000 hours (1)	Halogen Free, low smoke	Fire Performance	Application				Page
				Underground	EMU/ Passenger coaches	Diesel locomotive	Electric Locomotive	
105	125	●	EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF C 32 070/C1 & C2 NF F 16 101-A1	●	●	●	●	14
105	125	●	EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF C 32 070/C1 & C2 NF F 16 101-A1	●	●	●	●	28
105	125	●	EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF C 32 070/C1 & C2 NF F 16 101-A1	●	●		●	28
90	120	●	NF C 32 070/C1 & C2, EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●	●	●	40
90	120	●	NF C 32 070/C1 & C2, EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●	●	●	42
90	105	●	NF C 32 070/C1, NF F 16 101-A1	●	●		●	48
90	105	●	NF C 32 070/C1, IEN 60 332-1-2, EN 60 332-3-24/20, EN 50 305-9-1, NF F 16 101-A1	●	●		●	50
90	105	●	NF C 32 070/C1, EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●		●	52
90	105		NF C 32 070/C1, NF F 16 101-A1			●		54
90	105	●	NF C 32 070/C1, EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●		●	58
120 OR 150	140	●	EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●		●	64
120	140	●	NF C 32 070/C1, IEC 60 332-3, EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●		●	70
120 OR 150	140	●	EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●		●	78
90	105	●	NF C 32 070/C1, IEC 60 332-3, EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●		●	80
120	140	●	NF C 32 070/C1, IEC 60 332-3, EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●		●	82
90	105	●	NF C 32 070/C1, IEC 60 332-3, EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1			●		84
70	85	●	IEC 60 332-1/2, IEC 60 782-3-24/25, NF F 16 101-A1	●	●		●	89
70	85	●	IEC 60 332-1, NF F 16 101-A1	●	●		●	94
90	90	●	NF C 32 070/C1 & C2, EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●		●	97
90	105	●	NF C 32 070/C2, EN 60 332-1-2, EN 60 332-3-24/25, EN 50 305-9-1, NF F 16 101-A1	●	●		●	102
90	90	●	EN 60 332-1-2, EN 60 332-3-24/25, NF F 16 101-A1	●	●		●	106

(1) Allowed temperature for a 20.000 hours cumulative working time



PART 1
Low voltage cables

FLAMEX® SH20

Applications

FLAMEX® SH20 cables are particularly recommended for the wiring of electronic equipments in low voltage applications.
Designed to conform to EN 50 306 and NF F 63 808 standards, SH20 insulation is intended for applications where flame and fire retardancy is required, especially for rolling stock applications.

Thin wall halogen free wires & cables for low voltage applications

Advantages

- Developed by the Nexans R&D laboratories, SH20 insulation shows 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, this single-layer insulation is designed to meet the stringent requirements of our customers during cabling operations.
- They allow weight and space saving (thin wall insulation: 0.2 to 0.3 mm insulation thickness).

Main characteristics

- FLAMEX® SH20 cables are available in every type of construction for internal and external uses:
  - single core (unscreened or screened and sheathed),
  - multicore (pair, triple, quad),
  - other constructions on request.
- Operating temperature: from - 40°C up to 105°C,
- Operating voltage: 600 Vac / 1000 Vcc,
- Cross sections:
  - NF F 63 808: from 0.38 mm^2 to 4.32 mm^2 or 22 to 12 AWG (standard versions)
  - EN 50 306: from 0.50 mm^2 to 2.5 mm^2 (standard versions)

Main properties

- Low smoke emission according to IEC 61 034-2,
- Low toxicity and corrosivity of evolved gases after burning:
  - Halogen free content according to IEC 60 754-1
  - pH > 4 according to IEC 60 754-2
  - Conductivity < 100 µS/cm to IEC 60 754-2
- High mechanical resistance (against abrasion, tensile strength and cut through): no additional protection required,
- Excellent chemical resistance (against acids, alkalis, oil, fuel, ...)
- Low smoke index (IF < 5 and NF F 16 101),
- Non toxic cable (ITC < 3 and NF F 16 101),
- Non corrosive cable (IEC 60 754-1/2 and VDE 0472 Teil 813 & 815).

Standards

- FLAMEX® SH20 cables are conform to BS 6853, DIN 5510, EN 45 555, NF F 16 120-A1.

FLAMEX® SH20 properties

According to NF F 63 808 and EN 50 306

Mechanical properties

Test	Standards	FLAMEX® SH20
Tensile strength	NF F 63 808 – 30 N	Passed
Elongation	NF F 63 808	> 100 %
Stripping	NF F 63 808 / EN 50 306	Passed
Abrasion	NF F 63 808 / EN 50 306	Passed
Cut through	NF F 63 808 / EN 50 306 – NF C 93 522	Passed

Electrical properties

Test	Standards	FLAMEX® SH20
Transversal withstand voltage	NF F 63 808 / EN 50 306	Passed No breakdown
Insulation resistance	NF F 63 808 / EN 50 306	$R_{20°}$ > 6000 M Ω km $R_{60°}$ > 3500 M Ω km

Fire properties

Test	Standards	FLAMEX® SH20
Flame and fire propagation	NF F 63 808 – NF C 32 070/C1 and C2 (Class C according to NF F 16 101) IEC 60 332-1 and IEC 60 332-3 cat. C BS 6853 table 13 cat. Ia DIN 5510 EN 50 306-1 VDE 0472 Teil 804	Passed
Smoke density	NF F 63 808 / EN 50 306 BS 6853 IEC 61 034 NF C 20 902/1 – NF C 20 902/2-1 NF F 16 101	Passed
Halogen content	IEC 60 754-1 – EN 50 267 (EN 50 306)	0%
PH (smoke corrosivity)	NF F 63 808 – EN 50 267 (EN 50 306) NF C 20 453 IEC 60 754-2	pH > 5

FLAMEX® SH20 - EN 50 306

Applications

Strictly halogen free, these wires combine the advantages of small size, lightweight, high chemical resistance, high mechanical properties. They are recommended for installation in railway vehicles (locomotives, trains, trolley busses...).
A 125°C conductor temperature is allowed for a 20.000 hours cumulative working time.

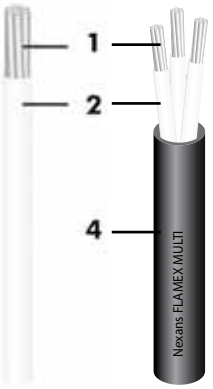
Flexible thin wall insulated wires and cables
Conductor class temperature: +105°C/125°C

FLAMEX® SH20 - 600 vac / 1000 Vcc (300 volts acc. to EN 50 306)

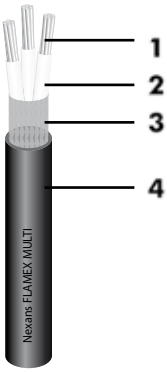
Design

1- Conductor
Stranded tinned copper wires
2- Insulation
THIN WALL Halogen free, FLAMEX® SH20.
3- Screen (for screened versions)
Tinned copper braid with optional polyester tape
4- Outer sheath (for sheath versions)
Halogen free FLAMEX®.

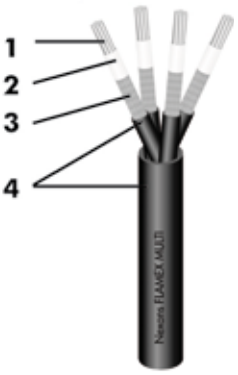
Unscreened wires



Screened multicore/pair cables



Individually screened multicore/pair cables



Marking

According to EN 50 306 (see details hereafter).

Colour codes

Insulation: white, numbered 1 to n
Sheath: black

Bending radius

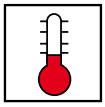
(in accordance with NF F 61 010 standard)
Dynamic use: 10 x outer diameter
Static use: 5 x outer diameter

Standards

According to: NF F 63 808, BS 6853, DIN 5510.

Guide to use

Cabling rules are given in EN 50 343 standard.
Permissible current capacities are given in EN 50 355 and EN 45 545 standards (see page 112).


- 40°C to +105°C


Good chemical resistance (acids, oils, ...) IRM 902, IRM 903


Flame and fire retardant (NF C 32 070/C1 & C2, IEC 60 332- 1/2/3 Cat.C and EN 50 306-1)


Low smoke emission and low opacity (IEC 61 034)


Non corrosive and non toxic (IEC 60 754-2 and EN 50 267)


Flexible

Screened versions

Halogen free (IEC 60 754-1)

EN 50 306 guideline

EN 50 306 Types	Single core cables	Multicore cables	Multipair cables	Multipair with individual		Overall screen (TC)	Outer sheath minimum thickness Type EM 104	Page
				sheath type S2	screen and sheath type S2			
EN 50 306-2 Table 1 Category M Short designation: EN 50 306-2 - 1 x cross section - M	•						-	17
EN 50 306-3 Table 1 Category MM Short designation: EN 50 306-3 Number of cores x cross section - MM - S		•				•	0.20 mm	18
EN 50 306-4 Table 1 Class P Category MM Short designation: EN 50 306-4 1P Number of cores x cross section - MM		•					0.42 mm	19
EN 50 306-4 Table 1 Class E Category MM Short designation: EN 50 306-4 1E Number of cores x cross section - MM		•					1.00 mm	20
EN 50 306-4 Table 3 Class P Category MM Short designation: EN 50 306-4 3P Number of cores x cross section - MM - S		•				•	0.42 mm	21
EN 50 306-4 Table 3 Class E Category MM Short designation: EN 50 306-4 3E Number of cores x cross section - MM - S		•				•	1.00 mm	22
EN 50 306-4 Table 5 Class P Category MMM Short designation: EN 50 306-4 5P Number of pairs x cross section - MMM			•		•		0.56 mm	23
EN 50 306-4 Table 5 Class E Category MMM Short designation: EN 50 306-4 5E Number of pairs x cross section - MMM			•		•		1.00 mm	24
TYPE EN 50 306-4 Class P Category MM Short designation: EN 50 306-4 P Number of pairs x cross section - MM - S			•			•	0.56 mm	25
TYPE EN 50 306-4 Class E Category MM Short designation: EN 50 306-4 E Number of pairs x cross section - MM - S			•			•	1.00 mm	26

Scope

EN 50 306-2

They are for use in railway rolling stock as fixed wiring or wiring where limited flexing in operation is encountered.

EN 50 306-3

They are for use in railway rolling stock as fixed wiring or wiring where limited flexing in operation is encountered.

EN 50 306-4

Cable types are specified for use 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 for use in railway rolling stock as fixed wiring or wiring where limited flexing in operation is encountered.

EN 50 306 fire properties

Parameter	Value	Standard
Flame propagation	-	EN 50 265-2-1
Flame propagation - bunched cables	-	EN 50 306
Evolution of HCL	< 0.5 %	EN 50 267-2-1
PH	>4.3	EN 50 267-2-2
Conductivity	< 10 µS/mm	EN 50 267-2-2
Hazard level	4	EN 45 545-1
Smoke emission	> 70 %	EN 50 268-2
Toxicity index of insulation	< 6	EN 50 305
Toxicity index of sheath (sheathed types)	< 3	EN 50 305

For mechanical, electrical and chemical properties, see pages 12 & 13.

EN 50 306/2 Insulation - Classification

According to the table below, M (single core), MM (multicore) or MMM (multipair) category is the highest operating hazard level for both insulation of the conductor and insulation of the sheath.

Hazard level (HL)	1	2 or 3	4
Smoke	-	> 60 %	> 70 %
Toxicity (insulation)	-	< 10	< 6
Toxicity (sheath)	-	< 5	< 3
Low temperature (-25°C) / Normal fuel resistance (IRM 902)	A	B	C
Very low temperature (-40°C) / Normal fuel resistance (IRM 902)	D	E	F
Low temperature (-25°C) / High fuel resistance (IRM 902 + IRM 903)	G	H	J
Very low temperature (-40°C) / High fuel resistance (IRM 902 + IRM 903)	K	L	M Nexans cables

FLAMEX® SH20 - EN 50 306-2 Table 1 Category M
Unscreened and unsheathed single core cables
Thin wall insulation

Designation	Nexans reference	CONDUCTOR			Insulation Ø		Maxi. cond. resistance Ohms/km	Average weight kg/km
		Cross section mm^2	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm		
FLAMEX® 20 EN 50 306-2 1X0.5 -M	2PG198	0.50	19x0.18 TC	0.95	1.15	1.45	40.1	6.0
FLAMEX® 20 EN 50 306-2 1X0.75 -M	2PG199	0.75	19x0.23 TC	1.15	1.35	1.65	26.7	8.5
FLAMEX® 20 EN 50 306-2 1X1.0 -M	2PG200	1.00	19x0.25 TC	1.30	1.45	1.80	20.0	10.5
FLAMEX® 20 EN 50 306-2 1X1.5 -M	2PF779	1.50	37x0.23 TC	1.65	1.95	2.30	13.7	16.0
FLAMEX® 20 EN 50 306-2 1X2.5 -M	2PG201	2.50	37x0.30 TC	2.15	2.50	2.85	8.21	26.5

TC: Tinned copper

Marking
FILOTEX P - EN 50 306-2 - 300 V - 1 x Section - M - ** **
** **: week and year of manufacturing

FLAMEX® SH20 - EN 50 306-3 Table 1 Category MM
Single core and multicore cables (pairs, triples and quads) screened and thin wall sheathed
Thin wall insulation/Thin wall sheath (mini 0.20 mm) type S2

BASE CORE

CONDUCTOR			Insulation Ø		Maxi. cond. resistance Ohms/km
Cross section mm²	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm	
0.50	19x0.18 TC	0.95	1.15	1.45	40.1
0.75	19x0.23 TC	1.15	1.35	1.65	26.7
1.00	19x0.25 TC	1.30	1.45	1.80	20.0
1.50	37x0.23 TC	1.65	1.95	2.30	13.7
2.50	37x0.30 TC	2.15	2.50	2.85	8.21

TC: Tinned copper

PRODUCT REFERENCES

Nb of cores	Designation	Nexans reference	Overall Ø		Average weight kg/km
			mini. mm	maxi. mm	
1	FLAMEX® 20 EN 50 306-3 1 x 0.50 MM - S	2PH184	2.30	2.80	14
2	FLAMEX® 20 EN 50 306-3 2 x 0.50 MM - S	2PG960	3.50	4.30	25
3	FLAMEX® 20 EN 50 306-3 3 x 0.50 MM - S	2PG963	3.70	4.50	33
4	FLAMEX® 20 EN 50 306-3 4 x 0.50 MM - S	2PH189	4.00	5.00	43
1	FLAMEX® 20 EN 50 306-3 1 x 0.75 MM - S	2PH185	2.50	3.00	17
2	FLAMEX® 20 EN 50 306-3 2 x 0.75 MM - S	2PG961	3.90	4.70	31
3	FLAMEX® 20 EN 50 306-3 3 x 0.75 MM - S	2PG964	4.00	5.00	43
4	FLAMEX® 20 EN 50 306-3 4 x 0.75 MM - S	2PH190	4.50	5.50	56
1	FLAMEX® 20 EN 50 306-3 1 x 1.00 MM - S	2PH186	2.70	3.20	20
2	FLAMEX® 20 EN 50 306-3 2 x 1.00 MM - S	2PG962	4.20	5.20	37
3	FLAMEX® 20 EN 50 306-3 3 x 1.00 MM - S	2PG965	4.50	5.50	52
4	FLAMEX® 20 EN 50 306-3 4 x 1.00 MM - S	2PG966	5.00	6.00	65
1	FLAMEX® 20 EN 50 306-3 1 x 1.50 MM - S	2PH187	3.10	3.60	28
2	FLAMEX® 20 EN 50 306-3 2 x 1.50 MM - S	2PF780	5.10	6.10	55
3	FLAMEX® 20 EN 50 306-3 3 x 1.50 MM - S	2PH191	5.40	6.40	75
4	FLAMEX® 20 EN 50 306-3 4 x 1.50 MM - S	2PH192	6.00	7.00	100
1	FLAMEX® 20 EN 50 306-3 1 x 2.50 MM - S	2PH188	3.60	4.40	43
2	FLAMEX® 20 EN 50 306-3 2 x 2.50 MM - S	2PH193	6.40	7.40	87
3	FLAMEX® 20 EN 50 306-3 3 x 2.50 MM - S	2PH194	6.80	7.80	124
4	FLAMEX® 20 EN 50 306-3 4 x 2.50 MM - S	2PH195	7.50	8.50	158

Marking
Cores: by printed numbers
External sheath: FILOTEX P - EN 50 306-3 - 300 V - number of cores x Section - MM - S - 90 - ** ** ** **: week and year of manufacturing

FLAMEX® SH20 - EN 50 306-4 Table 1 Class P Category MM
Unscreened and sheathed multicore cables
Thin wall insulation/Standard wall sheath (mini 0.42 mm) type EM 104

BASE CORE

CONDUCTOR			Insulation Ø		Maxi. cond. resistance Ohms/km
Cross section mm^2	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm	
0.50	19x0.18 TC	0.95	1.15	1.45	40.1
0.75	19x0.23 TC	1.15	1.35	1.65	26.7
1.00	19x0.25 TC	1.30	1.45	1.80	20.0
1.50	37x0.23 TC	1.65	1.95	2.30	13.7
2.50	37x0.30 TC	2.15	2.50	2.85	8.21

TC: Tinned copper

PRODUCT REFERENCES

Nb of cores	Designation	Nexans reference	Overall Ø		Average weight kg/km
			mini. mm	maxi. mm	
2	FLAMEX® 20 EN 50 306-4 1P 2 x 0.50 - MM	2PH304	3.55	4.55	24
3	FLAMEX® 20 EN 50 306-4 1P 3 x 0.50 - MM	2PH305	3.75	4.75	30
4	FLAMEX® 20 EN 50 306-4 1P 4 x 0.50 - MM	2PG693	4.10	5.10	37
7	FLAMEX® 20 EN 50 306-4 1P 7 x 0.50 - MM	2PH306	4.90	5.90	59
13	FLAMEX® 20 EN 50 306-4 1P 13 x 0.50 - MM	2PH307	7.30	8.30	113
19	FLAMEX® 20 EN 50 306-4 1P 19 x 0.50 - MM	2PH308	8.10	9.10	151
37	FLAMEX® 20 EN 50 306-4 1P 37 x 0.50 - MM	2PH309	10.80	12.00	273
2	FLAMEX® 20 EN 50 306-4 1P 2 x 0.75 - MM	2PG694	4.00	5.00	30
3	FLAMEX® 20 EN 50 306-4 1P 3 x 0.75 - MM	2PG695	4.20	5.20	40
4	FLAMEX® 20 EN 50 306-4 1P 4 x 0.75 - MM	2PG696	4.60	5.60	50
7	FLAMEX® 20 EN 50 306-4 1P 7 x 0.75 - MM	2PH310	5.50	6.50	79
13	FLAMEX® 20 EN 50 306-4 1P 13 x 0.75 - MM	2PH311	8.20	9.20	152
19	FLAMEX® 20 EN 50 306-4 1P 19 x 0.75 - MM	2PH312	9.00	10.20	205
37	FLAMEX® 20 EN 50 306-4 1P 37 x 0.75 - MM	2PH313	12.20	13.40	376
48	FLAMEX® 20 EN 50 306-4 1P 48 x 0.75 - MM	2PH314	13.90	15.50	480
2	FLAMEX® 20 EN 50 306-4 1P 2 x 1.00 - MM	2PG697	4.30	5.30	35
3	FLAMEX® 20 EN 50 306-4 1P 3 x 1.00 - MM	2PG698	4.60	5.60	46
4	FLAMEX® 20 EN 50 306-4 1P 4 x 1.00 - MM	2PG699	4.90	5.90	58
7	FLAMEX® 20 EN 50 306-4 1P 7 x 1.00 - MM	2PG700	6.00	7.00	93
13	FLAMEX® 20 EN 50 306-4 1P 13 x 1.00 - MM	2PG701	8.70	9.90	175
19	FLAMEX® 20 EN 50 306-4 1P 19 x 1.00 - MM	2PG702	9.80	11.00	244
37	FLAMEX® 20 EN 50 306-4 1P 37 x 1.00 - MM	2PH315	13.30	14.50	441
2	FLAMEX® 20 EN 50 306-4 1P 2 x 1.50 - MM	2PG703	5.00	6.00	49
3	FLAMEX® 20 EN 50 306-4 1P 3 x 1.50 - MM	2PG704	5.30	6.30	67
4	FLAMEX® 20 EN 50 306-4 1P 4 x 1.50 - MM	2PG705	6.00	7.00	85
7	FLAMEX® 20 EN 50 306-4 1P 7 x 1.50 - MM	2PG706	7.70	8.70	149
13	FLAMEX® 20 EN 50 306-4 1P 13 x 1.50 - MM	2PG707	10.70	11.90	270
19	FLAMEX® 20 EN 50 306-4 1P 19 x 1.50 - MM	2PG708	12.00	13.20	378
37	FLAMEX® 20 EN 50 306-4 1P 37 x 1.50 - MM	2PG709	16.20	17.80	715
2	FLAMEX® 20 EN 50 306-4 1P 2 x 2.50 - MM	2PG710	6.70	7.70	86
3	FLAMEX® 20 EN 50 306-4 1P 3 x 2.50 - MM	2PG711	7.70	8.10	125
4	FLAMEX® 20 EN 50 306-4 1P 4 x 2.50 - MM	2PG712	7.90	8.90	150
7	FLAMEX® 20 EN 50 306-4 1P 7 x 2.50 - MM	2PG713	8.70	9.90	230
13	FLAMEX® 20 EN 50 306-4 1P 13 x 2.50 - MM	2PG714	12.80	14.00	435

Marking
Cores: by printed numbers
External sheath: FILOTEX P - EN 50 306-4 1P - 300 V - number of cores x Section - MM - 90 - ** **
** **: week and year of manufacturing

FLAMEX® SH20 - EN 50 306-4 Table 1 Class E Category MM
Unscreened and sheathed multicore cables
Thin wall insulation/Standard wall sheath (mini 1.00 mm) type EM 104

BASE CORE

CONDUCTOR			Insulation Ø		Maxi. cond. resistance Ohms/km
Cross section mm^2	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm	
0.50	19x0.18 TC	0.95	1.15	1.45	40.1
0.75	19x0.23 TC	1.15	1.35	1.65	26.7
1.00	19x0.25 TC	1.30	1.45	1.80	20.0
1.50	37x0.23 TC	1.65	1.95	2.30	13.7
2.50	37x0.30 TC	2.15	2.50	2.85	8.21

TC: Tinned copper

PRODUCT REFERENCES

Nb of cores	Designation	Nexans reference	Overall Ø		Average weight kg/km
			mini. mm	maxi. mm	
2	FLAMEX® 20 EN 50 306-4 1E 2 x 0.50 - MM	2PH316	4.90	5.90	40
3	FLAMEX® 20 EN 50 306-4 1E 3 x 0.50 - MM	2PH317	5.10	6.10	48
4	FLAMEX® 20 EN 50 306-4 1E 4 x 0.50 - MM	2PH318	5.50	6.50	56
7	FLAMEX® 20 EN 50 306-4 1E 7 x 0.50 - MM	2PH319	6.30	7.30	80
13	FLAMEX® 20 EN 50 306-4 1E 13 x 0.50 - MM	2PH320	8.30	9.30	132
19	FLAMEX® 20 EN 50 306-4 1E 19 x 0.50 - MM	2PH321	9.00	10.20	172
37	FLAMEX® 20 EN 50 306-4 1E 37 x 0.50 - MM	2PH322	12.30	13.50	311
2	FLAMEX® 20 EN 50 306-4 1E 2 x 0.75 - MM	2PH323	5.30	6.30	48
3	FLAMEX® 20 EN 50 306-4 1E 3 x 0.75 - MM	2PH324	5.50	6.50	58
4	FLAMEX® 20 EN 50 306-4 1E 4 x 0.75 - MM	2PH325	6.00	7.00	69
7	FLAMEX® 20 EN 50 306-4 1E 7 x 0.75 - MM	2PH326	6.90	7.90	102
13	FLAMEX® 20 EN 50 306-4 1E 13 x 0.75 - MM	2PH327	9.10	10.30	173
19	FLAMEX® 20 EN 50 306-4 1E 19 x 0.75 - MM	2PH328	10.00	11.20	229
37	FLAMEX® 20 EN 50 306-4 1E 37 x 0.75 - MM	2PH329	13.20	14.40	409
48	FLAMEX® 20 EN 50 306-4 1E 48 x 0.75 - MM	2PH330	14.80	16.40	518
2	FLAMEX® 20 EN 50 306-4 1E 2 x 1.00 - MM	2PH331	5.60	6.60	53
3	FLAMEX® 20 EN 50 306-4 1E 3 x 1.00 - MM	2PH332	5.85	6.85	65
4	FLAMEX® 20 EN 50 306-4 1E 4 x 1.00 - MM	2PG967	6.30	7.30	79
7	FLAMEX® 20 EN 50 306-4 1E 7 x 1.00 - MM	2PG968	7.30	8.30	118
13	FLAMEX® 20 EN 50 306-4 1E 13 x 1.00 - MM	2PG969	9.70	10.90	200
19	FLAMEX® 20 EN 50 306-4 1E 19 x 1.00 - MM	2PG970	10.70	11.90	263
37	FLAMEX® 20 EN 50 306-4 1E 37 x 1.00 - MM	2PH333	14.00	15.60	473
2	FLAMEX® 20 EN 50 306-4 1E 2 x 1.50 - MM	2PH334	6.30	7.30	70
3	FLAMEX® 20 EN 50 306-4 1E 3 x 1.50 - MM	2PH335	6.60	7.60	89
4	FLAMEX® 20 EN 50 306-4 1E 4 x 1.50 - MM	2PG972	7.40	8.40	110
7	FLAMEX® 20 EN 50 306-4 1E 7 x 1.50 - MM	2PG428	8.60	9.80	170
13	FLAMEX® 20 EN 50 306-4 1E 13 x 1.50 - MM	2PG973	11.70	12.90	297
19	FLAMEX® 20 EN 50 306-4 1E 19 x 1.50 - MM	2PG429	13.00	14.20	405
37	FLAMEX® 20 EN 50 306-4 1E 37 x 1.50 - MM	2PG971	17.20	18.80	734
2	FLAMEX® 20 EN 50 306-4 1E 2 x 2.50 - MM	2PH336	7.70	8.70	105
3	FLAMEX® 20 EN 50 306-4 1E 3 x 2.50 - MM	2PH337	8.10	9.10	136
4	FLAMEX® 20 EN 50 306-4 1E 4 x 2.50 - MM	2PG974	8.80	10.00	170
7	FLAMEX® 20 EN 50 306-4 1E 7 x 2.50 - MM	2PH338	9.70	10.90	257
13	FLAMEX® 20 EN 50 306-4 1E 13 x 2.50 - MM	2PH339	13.30	14.50	454

Marking
Cores: by printed numbers
External sheath: FILOTEX P - EN 50 306-4 1E - 300 V number of cores x Section MM - 90 - ** **
** **: week and year of manufacturing

FLAMEX® SH20 - EN 50 306-4 Table 3 Class P Category MM
Screened and sheathed multicore cables
Thin wall insulation/Standard wall sheath (mini 0.42 mm) type EM 104

BASE CORE

CONDUCTOR			Insulation Ø		Maxi. cond. resistance Ohms/km
Cross section mm^2	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm	
0.50	19x0.18 TC	0.95	1.15	1.45	40.1
0.75	19x0.23 TC	1.15	1.35	1.65	26.7
1.00	19x0.25 TC	1.30	1.45	1.80	20.0
1.50	37x0.23 TC	1.65	1.95	2.30	13.7
2.50	37x0.30 TC	2.15	2.50	2.85	8.21

TC: Tinned copper

PRODUCT REFERENCES

Nb of cores	Designation	Nexans reference	Overall Ø		Average weight kg/km
			mini. mm	maxi. mm	
2	FLAMEX® 20 EN 50 306-4 3P 2 x 0.50 MM - S	2PG715	4.10	5.10	32
3	FLAMEX® 20 EN 50 306-4 3P 3 x 0.50 MM - S	2PG716	4.30	5.30	40
4	FLAMEX® 20 EN 50 306-4 3P 4 x 0.50 MM - S	2PG413	4.70	5.70	50
6	FLAMEX® 20 EN 50 306-4 3P 6 x 0.50 MM - S	2PG717	5.50	6.50	70
8	FLAMEX® 20 EN 50 306-4 3P 8 x 0.50 MM - S	2PG718	6.00	7.00	84
2	FLAMEX® 20 EN 50 306-4 3P 2 x 0.75 MM - S	2PG719	4.50	5.50	39
3	FLAMEX® 20 EN 50 306-4 3P 3 x 0.75 MM - S	2PG720	4.70	5.70	49
4	FLAMEX® 20 EN 50 306-4 3P 4 x 0.75 MM - S	2PG721	5.20	6.20	64
6	FLAMEX® 20 EN 50 306-4 3P 6 x 0.75 MM - S	2PG722	6.10	7.10	90
8	FLAMEX® 20 EN 50 306-4 3P 8 x 0.75 MM - S	2PG723	6.60	7.60	112
12	FLAMEX® 20 EN 50 306-4 3P 12 x 0.75 MM - S	2PH024	8.40	9.60	165
2	FLAMEX® 20 EN 50 306-4 3P 2 x 1.00 MM - S	2PG414	4.70	5.70	44
3	FLAMEX® 20 EN 50 306-4 3P 3 x 1.00 MM - S	2PG415	5.10	6.00	59
4	FLAMEX® 20 EN 50 306-4 3P 4 x 1.00 MM - S	2PG724	5.50	6.50	73
6	FLAMEX® 20 EN 50 306-4 3P 6 x 1.00 MM - S	2PG725	6.60	7.60	111
8	FLAMEX® 20 EN 50 306-4 3P 8 x 1.50 MM - S	2PG726	7.70	8.70	139
2	FLAMEX® 20 EN 50 306-4 3P 2 x 1.50 MM - S	2PG727	5.70	6.70	64
3	FLAMEX® 20 EN 50 306-4 3P 3 x 1.50 MM - S	2PG728	6.00	7.00	84
4	FLAMEX® 20 EN 50 306-4 3P 4 x 1.50 MM - S	2PG729	6.60	7.60	108
6	FLAMEX® 20 EN 50 306-4 3P 6 x 1.50 MM - S	2PG730	8.30	9.30	167
8	FLAMEX® 20 EN 50 306-4 3P 8 x 1.50 MM - S	2PG731	8.90	10.10	200
12	FLAMEX® 20 EN 50 306-4 3P 12 x 1.50 MM - S	2PH180	10.60	11.60	280
2	FLAMEX® 20 EN 50 306-4 3P 2 x 2.50 MM - S	2PG732	7.30	8.30	105
3	FLAMEX® 20 EN 50 306-4 3P 3 x 2.50 MM - S	2PG733	7.70	8.70	140
4	FLAMEX® 20 EN 50 306-4 3P 4 x 2.50 MM - S	2PG734	8.40	9.60	180

Marking
Cores: by printed numbers
External sheath: FILOTEX P - EN 50 306-4 3P - 300 V - number of cores x Section - MM - S - 90 - ** **
** **: week and year of manufacturing

FLAMEX® SH20 - EN 50 306-4 Table 3 Class E Category MM
Screened and sheathed multicore cables
Thin wall insulation/Standard wall sheath (mini 1.00 mm) type EM 104

BASE CORE

CONDUCTOR			Insulation Ø		Maxi. cond. resistance Ohms/km
Cross section mm^2	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm	
0.50	19x0.18 TC	0.95	1.15	1.45	40.1
0.75	19x0.23 TC	1.15	1.35	1.65	26.7
1.00	19x0.25 TC	1.30	1.45	1.80	20.0
1.50	37x0.23 TC	1.65	1.95	2.30	13.7
2.50	37x0.30 TC	2.15	2.50	2.85	8.21

TC: Tinned copper

PRODUCT REFERENCES

Nb of cores	Designation	Nexans reference	Overall Ø		Average weight kg/km
			mini. mm	maxi. mm	
2	FLAMEX® 20 EN 50 306-4 3E 2 x 0.50 MM - S	2PG843	5.50	6.50	50
3	FLAMEX® 20 EN 50 306-4 3E 3 x 0.50 MM - S	2PG844	5.70	6.70	59
4	FLAMEX® 20 EN 50 306-4 3E 4 x 0.50 MM - S	2PG845	6.10	7.10	70
6	FLAMEX® 20 EN 50 306-4 3E 6 x 0.50 MM - S	2PG846	6.90	7.90	94
8	FLAMEX® 20 EN 50 306-4 3E 8 x 0.50 MM - S	2PG847	7.50	8.50	110
2	FLAMEX® 20 EN 50 306-4 3E 2 x 0.75 MM - S	2PG848	5.90	6.90	59
3	FLAMEX® 20 EN 50 306-4 3E 3 x 0.75 MM - S	2PG849	6.20	7.20	70
4	FLAMEX® 20 EN 50 306-4 3E 4 x 0.75 MM - S	2PG850	6.50	7.50	86
6	FLAMEX® 20 EN 50 306-4 3E 6 x 0.75 MM - S	2PH340	7.50	8.50	115
8	FLAMEX® 20 EN 50 306-4 3E 8 x 0.75 MM - S	2PG851	8.20	9.20	143
2	FLAMEX® 20 EN 50 306-4 3E 2 x 1.00 MM - S	2PG426	6.20	7.20	65
3	FLAMEX® 20 EN 50 306-4 3E 3 x 1.00 MM - S	2PG852	6.50	7.50	81
4	FLAMEX® 20 EN 50 306-4 3E 4 x 1.00 MM - S	2PG427	6.90	7.90	95
6	FLAMEX® 20 EN 50 306-4 3E 6 x 1.00 MM - S	2PG853	8.00	9.00	140
8	FLAMEX® 20 EN 50 306-4 3E 8 x 1.00 MM - S	2PG854	8.60	9.80	165
2	FLAMEX® 20 EN 50 306-4 3E 2 x 1.50 MM - S	2PG855	7.10	8.10	86
3	FLAMEX® 20 EN 50 306-4 3E 3 x 1.50 MM - S	2PG856	7.40	8.40	107
4	FLAMEX® 20 EN 50 306-4 3E 4 x 1.50 MM - S	2PG857	8.00	9.00	135
6	FLAMEX® 20 EN 50 306-4 3E 6 x 1.50 MM - S	2PG858	9.20	10.40	190
8	FLAMEX® 20 EN 50 306-4 3E 8 x 1.50 MM - S	2PH341	10.20	11.40	226
2	FLAMEX® 20 EN 50 306-4 3E 2 x 2.50 MM - S	2PG859	8.30	9.30	124
3	FLAMEX® 20 EN 50 306-4 3E 3 x 2.50 MM - S	2PH342	8.60	9.80	156
4	FLAMEX® 20 EN 50 306-4 3E 4 x 2.50 MM - S	2PG860	9.40	10.60	198

Marking
Cores: by printed numbers
External sheath: FILOTEX P - EN 50 306-4 3E - 300 V number of cores x Section MM - S - 90 - ** **
** **: week and year of manufacturing

FLAMEX® SH20 - EN 50 306-4 Table 5 Class P Category MMM
Individually screened and sheathed multipair cables
Thin wall insulation/Thin wall internal sheath type S2/Standard wall external sheath (mini 0.56 mm) type EM 104

BASE CORE

CONDUCTOR			Insulation Ø		Maxi. cond. resistance Ohms/km
Cross section mm²	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm	
0.50	19x0.18 TC	0.95	1.15	1.45	40.1
0.75	19x0.23 TC	1.15	1.35	1.65	26.7
1.00	19x0.25 TC	1.30	1.45	1.80	20.0
1.50	37x0.23 TC	1.65	1.95	2.30	13.7
2.50	37x0.30 TC	2.15	2.50	2.85	8.21

TC: Tinned copper

PRODUCT REFERENCES

Nb of cores	Designation	Nexans reference	Overall Ø		Average weight kg/km
			mini. mm	maxi. mm	
2	FLAMEX® 20 EN 50 306-4 5P 2 x 2 x 0.50 MMM	2PH478	9.00	10.20	110
3	FLAMEX® 20 EN 50 306-4 5P 3 x 2 x 0.50 MMM	2PH479	9.60	10.80	137
4	FLAMEX® 20 EN 50 306-4 5P 4 x 2 x 0.50 MMM	2PH480	10.70	11.90	159
7	FLAMEX® 20 EN 50 306-4 5P 7 x 2 x 0.50 MMM	2PH481	13.00	14.20	251
2	FLAMEX® 20 EN 50 306-4 5P 2 x 2 x 0.75 MMM	2PH482	9.80	11.00	132
3	FLAMEX® 20 EN 50 306-4 5P 3 x 2 x 0.75 MMM	2PH483	10.50	11.70	169
4	FLAMEX® 20 EN 50 306-4 5P 4 x 2 x 0.75 MMM	2PH484	11.60	12.80	192
7	FLAMEX® 20 EN 50 306-4 5P 7 x 2 x 0.75 MMM	2PH485	14.00	15.60	303
2	FLAMEX® 20 EN 50 306-4 5P 2 x 2 x 1.00 MMM	2PH486	10.20	11.60	142
3	FLAMEX® 20 EN 50 306-4 5P 3 x 2 x 1.00 MMM	2PH487	10.90	12.10	183
4	FLAMEX® 20 EN 50 306-4 5P 4 x 2 x 1.00 MMM	2PH488	12.10	13.30	211
7	FLAMEX® 20 EN 50 306-4 5P 7 x 2 x 1.00 MMM	2PH489	14.60	16.20	353
2	FLAMEX® 20 EN 50 306-4 5P 2 x 2 x 1.50 MMM	2PH490	12.20	13.40	208
3	FLAMEX® 20 EN 50 306-4 5P 3 x 2 x 1.50 MMM	2PH491	13.10	14.30	268
4	FLAMEX® 20 EN 50 306-4 5P 4 x 2 x 1.50 MMM	2PH492	14.30	15.90	305
7	FLAMEX® 20 EN 50 306-4 5P 7 x 2 x 1.50 MMM	2PH493	17.60	19.20	514

Marking
Cores: by printed numbers
External sheath: FILOTEX P - EN 50 306-4 5P - 300 V - number of pairs x 2 x Section - MMM - 90 - ** **
** **: week and year of manufacturing

FLAMEX® SH20 - EN 50 306-4 Table 5 Class E Category MMM
Individually screened and sheathed multipair cables
Thin wall insulation/Thin wall internal sheath type S2/
Standard wall external sheath (mini 1.00 mm) type EM 104

BASE CORE

CONDUCTOR			Insulation Ø		Maxi. cond. resistance Ohms/km
Cross section mm²	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm	
0.50	19x0.18 TC	0.95	1.15	1.45	40.1
0.75	19x0.23 TC	1.15	1.35	1.65	26.7
1.00	19x0.25 TC	1.30	1.45	1.80	20.0
1.50	37x0.23 TC	1.65	1.95	2.30	13.7
2.50	37x0.30 TC	2.15	2.50	2.85	8.21

TC: Tinned copper

PRODUCT REFERENCES

Nb of cores	Designation	Nexans reference	Overall Ø		Average weight kg/km
			mini. mm	maxi. mm	
2	FLAMEX® 20 EN 50 306-4 5E 2 x 2 x 0.50 MMM	2PH343	10.10	11.30	138
3	FLAMEX® 20 EN 50 306-4 5E 3 x 2 x 0.50 MMM	2PH344	10.80	12.00	170
4	FLAMEX® 20 EN 50 306-4 5E 4 x 2 x 0.50 MMM	2PH345	11.80	13.00	192
7	FLAMEX® 20 EN 50 306-4 5E 7 x 2 x 0.50 MMM	2PH346	13.90	15.50	284
2	FLAMEX® 20 EN 50 306-4 5E 2 x 2 x 0.75 MMM	2PH347	10.90	12.10	162
3	FLAMEX® 20 EN 50 306-4 5E 3 x 2 x 0.75 MMM	2PH348	11.60	12.80	201
4	FLAMEX® 20 EN 50 306-4 5E 4 x 2 x 0.75 MMM	2PH349	12.80	14.00	231
7	FLAMEX® 20 EN 50 306-4 5E 7 x 2 x 0.75 MMM	2PH350	15.10	16.70	346
2	FLAMEX® 20 EN 50 306-4 5E 2 x 2 x 1.00 MMM	2PH351	11.30	12.50	174
3	FLAMEX® 20 EN 50 306-4 5E 3 x 2 x 1.00 MMM	2PH352	12.00	13.20	215
4	FLAMEX® 20 EN 50 306-4 5E 4 x 2 x 1.00 MMM	2PH353	13.20	14.40	245
7	FLAMEX® 20 EN 50 306-4 5E 7 x 2 x 1.00 MMM	2PH354	15.70	17.30	374
2	FLAMEX® 20 EN 50 306-4 5E 2 x 2 x 1.50 MMM	2PH355	13.30	14.50	246
3	FLAMEX® 20 EN 50 306-4 5E 3 x 2 x 1.50 MMM	2PF781	14.00	15.60	300
4	FLAMEX® 20 EN 50 306-4 5E 4 x 2 x 1.50 MMM	2PH356	15.50	17.10	349
7	FLAMEX® 20 EN 50 306-4 5E 7 x 2 x 1.50 MMM	2PG975	18.70	20.30	550

Marking
Cores: by printed numbers
External sheath: FILOTEX P - EN 50 306-4 5E - 300 V - number of pairs x 2 x Section - MMM - 90 - ** **
** **: week and year of manufacturing

FLAMEX® SH20 - TYPE EN 50 306-4 Class P Category MM
Screened and sheathed multipair cables (overall screen)
Thin wall insulation/Standard wall sheath (mini 0.56 mm) type EM 104

BASE CORE

CONDUCTOR			Insulation Ø		Maxi. cond. resistance Ohms/km
Cross section mm^2	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm	
0.50	19x0.18 TC	0.95	1.15	1.45	40.1
0.75	19x0.23 TC	1.15	1.35	1.65	26.7
1.00	19x0.25 TC	1.30	1.45	1.80	20.0
1.50	37x0.23 TC	1.65	1.95	2.30	13.7
2.50	37x0.30 TC	2.15	2.50	2.85	8.21

TC: Tinned copper

PRODUCT REFERENCES

Nb of cores	Designation	Nexans reference	Overall Ø		Average weight kg/km
			mini. mm	maxi. mm	
2	FLAMEX® 20 EN 50 306-4 P 2 x 2 x 0.50 MM - S	2PG735	6.20	7.40	66
3	FLAMEX® 20 EN 50 306-4 P 3 x 2 x 0.50 MM - S	2PG736	6.50	7.70	79
4	FLAMEX® 20 EN 50 306-4 P 4 x 2 x 0.50 MM - S	2PG737	7.40	8.60	103
7	FLAMEX® 20 EN 50 306-4 P 7 x 2 x 0.50 MM - S	2PG738	8.80	10.00	152
2	FLAMEX® 20 EN 50 306-4 P 2 x 2 x 0.75 MM - S	2PG739	7.00	8.20	86
3	FLAMEX® 20 EN 50 306-4 P 3 x 2 x 0.75 MM - S	2PG740	7.30	8.50	105
4	FLAMEX® 20 EN 50 306-4 P 4 x 2 x 0.75 MM - S	2PG741	8.20	9.40	130
7	FLAMEX® 20 EN 50 306-4 P 7 x 2 x 0.75 MM - S	2PG742	9.90	11.10	202
2	FLAMEX® 20 EN 50 306-4 P 2 x 2 x 1.00 MM - S	2PG743	7.60	8.80	99
3	FLAMEX® 20 EN 50 306-4 P 3 x 2 x 1.00 MM - S	2PG744	7.90	9.10	121
4	FLAMEX® 20 EN 50 306-4 P 4 x 2 x 1.00 MM - S	2PG745	8.80	10.00	150
7	FLAMEX® 20 EN 50 306-4 P 7 x 2 x 1.00 MM - S	2PG746	10.80	12.00	237
2	FLAMEX® 20 EN 50 306-4 P 2 x 2 x 1.50 MM - S	2PG747	8.70	9.90	133
3	FLAMEX® 20 EN 50 306-4 P 3 x 2 x 1.50 MM - S	2PG748	9.20	10.40	170
4	FLAMEX® 20 EN 50 306-4 P 4 x 2 x 1.50 MM - S	2PG749	10.40	11.60	218
7	FLAMEX® 20 EN 50 306-4 P 7 x 2 x 1.50 MM - S	2PG750	13.10	14.30	365

Marking
Pairs: by printed numbers
External sheath: FILOTEX P - TYPE EN 50 306-4 P - 300 V - number of pairs x 2 x Section - MM - S - 90 - ** **
** **: week and year of manufacturing

FLAMEX® SH20 - TYPE EN 50 306-4 Class E Category MM
Screened and sheathed multipair cables (overall screen)
Thin wall insulation/Standard wall sheath (mini 1.00 mm) type EM 104

BASE CORE

CONDUCTOR			Insulation Ø		Maxi. cond. resistance Ohms/km
Cross section mm²	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm	
0.50	19x0.18 TC	0.95	1.15	1.45	40.1
0.75	19x0.23 TC	1.15	1.35	1.65	26.7
1.00	19x0.25 TC	1.30	1.45	1.80	20.0
1.50	37x0.23 TC	1.65	1.95	2.30	13.7
2.50	37x0.30 TC	2.15	2.50	2.85	8.21

TC: Tinned copper

PRODUCT REFERENCES

Nb of cores	Designation	Nexans reference	Overall Ø		Average weight kg/km
			mini. mm	maxi. mm	
2	FLAMEX® 20 EN 50 306-4 E 2 x 2 x 0.50 MM - S	2PG861	7.20	8.40	85
3	FLAMEX® 20 EN 50 306-4 E 3 x 2 x 0.50 MM - S	2PG862	7.50	8.70	100
4	FLAMEX® 20 EN 50 306-4 E 4 x 2 x 0.50 MM - S	2PG863	8.40	9.60	125
7	FLAMEX® 20 EN 50 306-4 E 7 x 2 x 0.50 MM - S	2PH357	9.75	10.95	177
2	FLAMEX® 20 EN 50 306-4 E 2 x 2 x 0.75 MM - S	2PG864	8.00	9.20	110
3	FLAMEX® 20 EN 50 306-4 E 3 x 2 x 0.75 MM - S	2PH358	8.35	9.55	128
4	FLAMEX® 20 EN 50 306-4 E 4 x 2 x 0.75 MM - S	2PH359	9.15	10.35	155
7	FLAMEX® 20 EN 50 306-4 E 7 x 2 x 0.75 MM - S	2PH360	10.75	11.95	226
2	FLAMEX® 20 EN 50 306-4 E 2 x 2 x 1.00 MM - S	2PG865	8.60	9.80	125
3	FLAMEX® 20 EN 50 306-4 E 3 x 2 x 1.00 MM - S	2PG866	8.90	10.10	150
4	FLAMEX® 20 EN 50 306-4 E 4 x 2 x 1.00 MM - S	2PH361	9.80	11.00	176
7	FLAMEX® 20 EN 50 306-4 E 7 x 2 x 1.00 MM - S	2PH362	11.55	12.75	260
2	FLAMEX® 20 EN 50 306-4 E 2 x 2 x 1.50 MM - S	2PH363	9.70	10.90	159
3	FLAMEX® 20 EN 50 306-4 E 3 x 2 x 1.50 MM - S	2PH364	10.10	11.30	196
4	FLAMEX® 20 EN 50 306-4 E 4 x 2 x 1.50 MM - S	2PH365	11.20	12.40	242
7	FLAMEX® 20 EN 50 306-4 E 7 x 2 x 1.50 MM - S	2PH366	13.50	14.70	382

Marking
Pairs: by printed numbers
External sheath: FILOTEX P - TYPE EN 50 306-4 E - 300 V - number of pairs x 2 x Section - MM - S - 90 - ** **
** **: week and year of manufacturing

FLAMEX® SH20 - NF F 63 808

Applications

Strictly halogen free, these wires combine the advantages of small size, lightweight, high chemical resistance, high mechanical properties. They are recommended for installation in railway vehicles (locomotives, trains, trolley busses...).
A 125°C conductor temperature is allowed for a 20.000 hours cumulative working time.

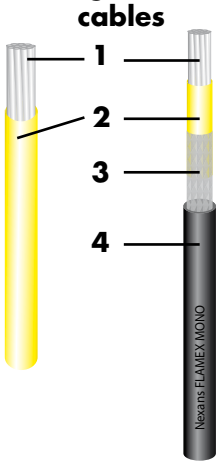
Flexible thin wall insulated wires and cables
FLAMEX® SH20 types
Conductor class temperature: +105°C

FLAMEX® SH20 - 600 vac / 1000 Vcc (250 volts acc. to NF F 63808)

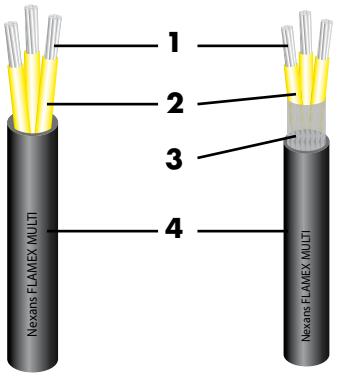
Design

1- Conductor
Stranded tinned copper wires
2- Insulation
THIN WALL Halogen free, FLAMEX® SH20
3- Screen (for screened versions)
Tinned copper braid with optional polyester tape
4- Outer sheath (for sheath versions)
Halogen free FLAMEX®

Single core cables



Multicore cables



Marking

According to NF F 63 808 (see details hereafter).

Colour codes

0.60 (AWG20)	0.93 (AWG18)	1.34 (AWG16)	1.82 (AWG14)	2.61 (AWG14)	4.32 (AWG12)
Yellow	White	Green	Yellow	White	Green

Bending radius

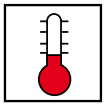
Dynamic use: 10 x outer diameter
Static use: 5 x outer diameter

Standards

According to: NF F 63 808, NF F 16 101, BS 6853, DIN 5510.

Guide to use

Cabling rules are given in NF F 61 010 standard.
Permissible current capacities are given in NF F 61 012 standard
(see page 110).


- 40°C to +105°C


Good chemical resistance (acids, oils, ...)


Flame and fire retardant (NF C 32 070/ C1 & C2 and IEC 60 332-1/2/3 Cat.C.)


Low smoke emission and low opacity (IEC 61 034)


Non corrosive and non toxic (IEC 60 754-2)


Flexible

Screened versions

Halogen free (IEC 60 754-1)

FLAMEX® SH20 - NF F 63 808
Unscreened and unsheathed single core cables

Designation	Nexans reference	AME				Overall Ø		Average weight kg/km
		Gauge AWG	Cross section mm²	Construction n x Ø mm	Ø maxi. mm	mini. mm	maxi. mm	
FLAMEX® 20 0.38	2PF501	22	0.38	19 x 0.16 TC	0.85	1.15	1.35	4.70
FLAMEX® 20 0.60	2PF503	20	0.60	19 x 0.20 TC	1.05	1.30	1.50	6.60
FLAMEX® 20 0.93	2PF272	18	0.93	19 x 0.25 TC	1.30	1.55	1.75	10.00
FLAMEX® 20 1.34	2PF505	16	1.34	19 x 0.30 TC	1.55	1.80	2.00	14.00
FLAMEX® 20 1.82	2PF507	14	1.82	37 x 0.25 TC	1.82	2.10	2.40	19.20
FLAMEX® 20 2.61	2PF508	14	2.61	37 x 0.30 TC	2.28	2.50	2.80	27.80
FLAMEX® 20 4.32	2PF509	12	4.32	61 x 0.30 TC	2.90	3.00	3.30	44.20

TC: Tinned copper

Marking
For NF F 63 808 cables:
Core: E section - NF F 63 808-239 - FILOTEX P3 -** **
** **: week and year of manufacturing
For other cables: Marking according to customer request

FLAMEX® SH20 - NF F 63 808
Screened and sheathed single core cables (thin wall sheath)

Designation	Nexans reference	CONDUCTOR				Overall diameters		Average weight kg/km
		Gauge AWG	Cross section mm²	Construction n x Ø mm	Maxi. Ø mm	Insulation Nominal Ø mm	Cable Nominal Ø mm	
FLAMEX® 20 0.38 BLG	2PF512	22	0.38	19 x 0.16 TC	0.85	1.25 ± 0.10	2.30 ± 0.25	11.50
FLAMEX® 20 0.60 BLG	2PF514	20	0.60	19 x 0.20 TC	1.05	1.40 ± 0.10	2.55 ± 0.25	15.00
FLAMEX® 20 0.93 BLG	2PF407	18	0.93	19 x 0.25 TC	1.30	1.65 ± 0.10	2.75 ± 0.25	19.00
FLAMEX® 20 1.34 BLG	2PF516	16	1.34	19 x 0.30 TC	1.55	1.90 ± 0.10	2.95 ± 0.25	24.00
FLAMEX® 20 1.82 BLG	2PF518	14	1.82	37 x 0.25 TC	1.82	2.25 ± 0.15	3.50 ± 0.25	32.00
FLAMEX® 20 2.61 BLG	2PF519	14	2.61	37 x 0.30 TC	2.28	2.65 ± 0.15	3.90 ± 0.30	43.00
FLAMEX® 20 4.32 BLG	2PF520	12	4.32	61 x 0.30 TC	2.90	3.15 ± 0.15	4.45 ± 0.30	63.00

TC: Tinned copper

Marking
For NF F 63 808 cables:
Core: E section - NF F 63 808-239 - FILOTEX P3 -** **
External sheath: E - BLG section - NF F 63 808-239 - FILOTEX P3 -** **
** **: week and year of manufacturing
For other cables: Marking according to customer request

FLAMEX® SH20 - NF F 63 808 (insulation and sheath)
Screened and sheathed multicore cables (thin wall sheath)

Base core according to NF F 63 808.
Insulation material according to NF F 63 808.
External sheath according to NF F 63 808.

BASE CORE

Designation	CONDUCTOR				Overall Ø	
	Gauge AWG	Cross section mm²	Construction n x Ø mm	Maxi. Ø mm	mini. mm	maxi. mm
FLAMEX® 20 0.38	22	0.38	19 x 0.16 TC	0.85	1.15	1.35
FLAMEX® 20 0.60	20	0.60	19 x 0.20 TC	1.05	1.30	1.50
FLAMEX® 20 0.93	18	0.93	19 x 0.25 TC	1.30	1.55	1.75
FLAMEX® 20 1.34	16	1.34	19 x 0.30 TC	1.55	1.80	2.00
FLAMEX® 20 1.82	14	1.82	37 x 0.25 TC	1.82	2.10	2.40
FLAMEX® 20 2.61	14	2.61	37 x 0.30 TC	2.28	2.50	2.80
FLAMEX® 20 4.32	12	4.32	61x0.30 TC	2.90	3.00	3.30

TC: Tinned copper

Nb of cores	Designation	Nexans reference	Overall diameters		Average weight kg/km
			Insulation Nominal Ø mm	Cable Nominal Ø mm	
2	FLAMEX® 20 2 x 0.38 BLG	2PF523	1.25 ± 0.10	3.60 ± 0.40	20.00
2	FLAMEX® 20 2 x 0.60 BLG	2PF525	1.40 ± 0.10	4.10 ± 0.40	30.00
2	FLAMEX® 20 2 x 0.93 BLG	2PF273	1.65 ± 0.10	4.65 ± 0.40	39.00
2	FLAMEX® 20 2 x 1.34 BLG	2PF527	1.90 ± 0.10	5.20 ± 0.40	52.00
2	FLAMEX® 20 2 x 1.82 BLG	2PF529	2.25 ± 0.15	5.95 ± 0.40	67.00
2	FLAMEX® 20 2 x 2.61 BLG	2PF530	2.65 ± 0.15	6.75 ± 0.40	87.00
2	FLAMEX® 20 2 x 4.32 BLG	2PF531	3.15 ± 0.15	7.90 ± 0.40	128.00
3	FLAMEX® 20 3 x 0.38 BLG	2PF533	1.25 ± 0.10	3.95 ± 0.40	30.00
3	FLAMEX® 20 3 x 0.60 BLG	2PF535	1.40 ± 0.10	4.40 ± 0.40	39.00
3	FLAMEX® 20 3 x 0.93 BLG	2PF537	1.65 ± 0.10	4.90 ± 0.40	52.00
3	FLAMEX® 20 3 x 1.34 BLG	2PF538	1.90 ± 0.10	5.50 ± 0.40	66.00
3	FLAMEX® 20 3 x 1.82 BLG	2PF540	2.25 ± 0.15	6.20 ± 0.40	84.00
3	FLAMEX® 20 3 x 2.61 BLG	2PF541	2.65 ± 0.15	7.20 ± 0.40	117.00
3	FLAMEX® 20 3 x 4.32 BLG	2PF542	3.15 ± 0.15	8.50 ± 0.40	182.00
4	FLAMEX® 20 4 x 0.38 BLG	2PF544	1.25 ± 0.10	4.45 ± 0.40	39.00
4	FLAMEX® 20 4 x 0.60 BLG	2PF546	1.40 ± 0.10	4.90 ± 0.40	51.00
4	FLAMEX® 20 4 x 0.93 BLG	2PF548	1.65 ± 0.10	5.40 ± 0.40	70.00
4	FLAMEX® 20 4 x 1.34 BLG	2PF549	1.90 ± 0.10	6.10 ± 0.40	89.00
4	FLAMEX® 20 4 x 1.82 BLG	2PF551	2.25 ± 0.15	6.85 ± 0.40	109.00
4	FLAMEX® 20 4 x 2.61 BLG	2PF552	2.65 ± 0.15	8.05 ± 0.40	157.00
4	FLAMEX® 20 4 x 4.32 BLG	2PF553	3.15 ± 0.15	9.45 ± 0.40	237.00

Marking

For NF F 63 808 cables:
First core: E section -NF F 63 808-239 - FILOTEX P3 -** **
Other cores: by printed numbers
External sheath: E - BLG number of cores x section - NF F 63 808-239 - FILOTEX P3 -** **
** **: week and year of manufacturing
For other cables: Marking according to customer request

FLAMEX® SH20 - NF F 63 808 (insulation), NF F 63 826 (sheath)
Unscreened/Screened and sheathed multicore cables
Thick wall sheath for external use

Base core according to NF F 63 808.
Insulation material according to NF F 63 808.
External sheath according to NF F 63 826 (Thickness = 1.20 mm).

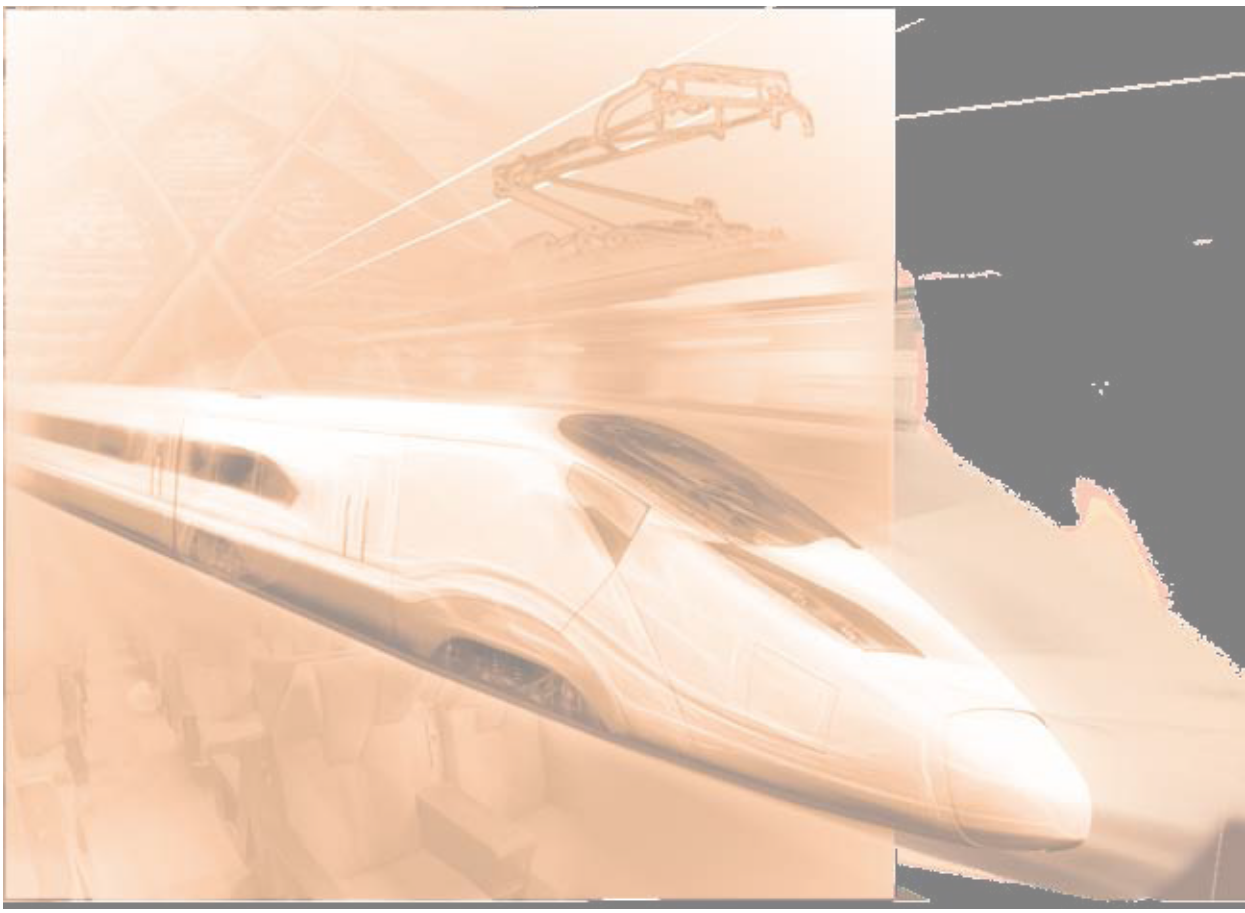
BASE CORE

Designation	CONDUCTOR				Overall Ø	
	Gauge AWG	Cross section mm²	Construction n x Ø mm	Maxi. Ø mm	mini. mm	maxi. mm
FLAMEX® 20 0.93	18	0.93	19 x 0.25 TC	1.30	1.55	1.75
FLAMEX® 20 1.34	16	1.34	19 x 0.30 TC	1.55	1.80	2.00
FLAMEX® 20 1.82	14	1.82	37 x 0.25 TC	1.82	2.10	2.40

TC: Tinned copper

Nb of cores	Nexans designation	Section mm²	Nexans reference	Overall Ø	
				mini. mm	maxi. mm
WITHOUT OVERALL SCREEN					
2	FLAMEX® 20 2 x 0.93 63808/826	0.93	2PF659	5.50	6.50
3	FLAMEX® 20 3 x 0.93 63808/826		296584	5.75	6.75
4	FLAMEX® 20 4 x 0.93 63808/826		2PF554	6.50	7.30
7	FLAMEX® 20 7 x 0.93 63808/826		2PF408	7.20	8.20
13	FLAMEX® 20 13 x 0.93 63808/826		2PF555	9.50	10.80
19	FLAMEX® 20 19 x 0.93 63808/826		2PF556	10.40	11.70
37	FLAMEX® 20 37 x 0.93 63808/826		2PF660	14.10	16.20
2	FLAMEX® 20 2 x 1.34 63808/826	1.34	2PF557	6.00	7.00
4	FLAMEX® 20 4 x 1.34 63808/826		296585	6.80	7.80
7	FLAMEX® 20 7 x 1.34 63808/826		2PG411	7.70	9.00
13	FLAMEX® 20 13 x 1.34 63808/826		2PF604	10.20	12.00
19	FLAMEX® 20 19 x 1.34 63808/826		2PG412	13.00	14.90
37	FLAMEX® 20 37 x 1.34 63808/826		2PF558	15.60	17.70
3 x 2	FLAMEX® 20 3 x (BLG 2 x 1.34) 63808/826		2PF561	13.20	14.80
7 x 2	FLAMEX® 20 7 x (BLG 2 x 1.34) 63808/826		2PF562	16.80	18.60
19	FLAMEX® 20 19 x 1.82 63808/826	1.82	2PG400	13.00	14.20
37	FLAMEX® 20 37 x 1.82 63808/826		2PF559	16.70	19.30
61	FLAMEX® 20 61 x 1.82 63808/826		2PF560	21.30	23.70
WITH OVERALL SCREEN					
2	FLAMEX® 20 2 x 0.93 BLG 63808/826	0.93	2PF409	6.00	6.80
3	FLAMEX® 20 3 x 0.93 BLG 63808/826	0.93	2PF563	6.00	7.00
4	FLAMEX® 20 4 x 0.93 BLG 63808/826	0.93	2PF564	6.90	7.60
2	FLAMEX® 20 2 x 1.34 BLG 63808/826	1.34	2PF565	6.50	7.30

Marking
Marking according to customer request.



PART 2
Power cables

Classification

The UIC 895 OR is the only international standard for rolling stock power cables. This document classifies cables according to the following performances:

- Voltage ratings: 750V - 1500V - 3000V,
- Oil and fuel resistance,
- Working conductor temperature range,
- Fire performance.

According to this classification, Nexans provides 6 families of power cables for rolling stock

Characteristics	Standard	UIC 985 OR classification			
		Category Oil and fuel resistance	Index Working temperature range	Type Fire performance	Page
FLAMEX® Z+	EN 50 264-3-1 & 3-2	Category III Resistance to IRM 902 mineral oil and fuel IRM 903	Index B 100°C	Fire retardant Type 2	39
Standard wall power cables	NF F 63 826	Category II Resistance to IRM 902 mineral oil only	Index B 100°C	Fire retardant Type 2	45
High temperature power cables	EN 50 382-2	Category II Resistance to IRM 902 mineral oil only	Not defined	Fire retardant Type 2	63
	NF F 63 827	Category II Resistance to IRM 902 mineral oil only	Not defined	Fire retardant Type 2	70

Classification: example for the NF F standard (pages 47 & 69)

To reduce risks and damage due to fire, several railway companies and rolling stock manufacturers have established specifications which prescribe the choice of materials in different uses.

For example, the French NF F 16-101 standard classifies rolling stocks in

- 3 categories depending on risks for passengers (fire and smoke).

Category	Type of risks
Category A1	Subway or underground lines, frequent uses in tunnel
Category A2	City and suburban lines, few uses in tunnel
Category NC	Inter-city lines, rare uses in tunnel

- 5 classes about the fire performance, electric cables must be flame retardant (NF C 32 070 n°1 test or IEC 60 332-1) and then they are classified according to the NF C 32 070 n°2 test) for fire performances.

Class	Burnt length
Class A	If burnt length is 0 mm
Class B	If burnt length is lower than 50 mm
Class C	If burnt length is lower than 300 mm
Class D	If burnt length is lower than 800 mm
Class NC	If burnt length is higher than 800 mm

- 2 parameters concerning smokes - opacity and toxicity - are important and are used to calculate a global index: IF = Dm/100 +VOF4/30 + ITC/2
  with Dm (Density of smoke), VOF4 (Time for density), ITC (Toxicity index on cable)

Compounds are classified as:

Type	Global index
F0	If lower than 5
F1	If lower than 20
F2	If lower than 40
F3	If lower than 80
F4	If lower than 120
F5	If higher than 120

FLAMEX® Z+ properties

Mechanical properties

Test	Standards	FLAMEX® Z+
Tensile strength	EN 50 264	Passed
Elongation	EN 50 264	> 150 % (insulation) > 125 % (sheath)
Ageing	EN 50 264	135°C (insulation) 120°C (sheath)
Oil, acid, alkali behaviours	EN 50 264	Passed
Ozone	EN 50 264	Passed
Diesel oil and fuel resistance)	EN 50 264	Pass for Flamex® Z category M
Cold behaviour	EN 50 264 / EN 60 811-1-4	-40°C category M

Electrical properties

Test	Standards	FLAMEX® Z+
Voltage test	EN 50 264 / EN 50 305	Passed No breakdown
Insulation resistance	EN 50 264	Passed at 20°C Passed at 90°C

Fire properties

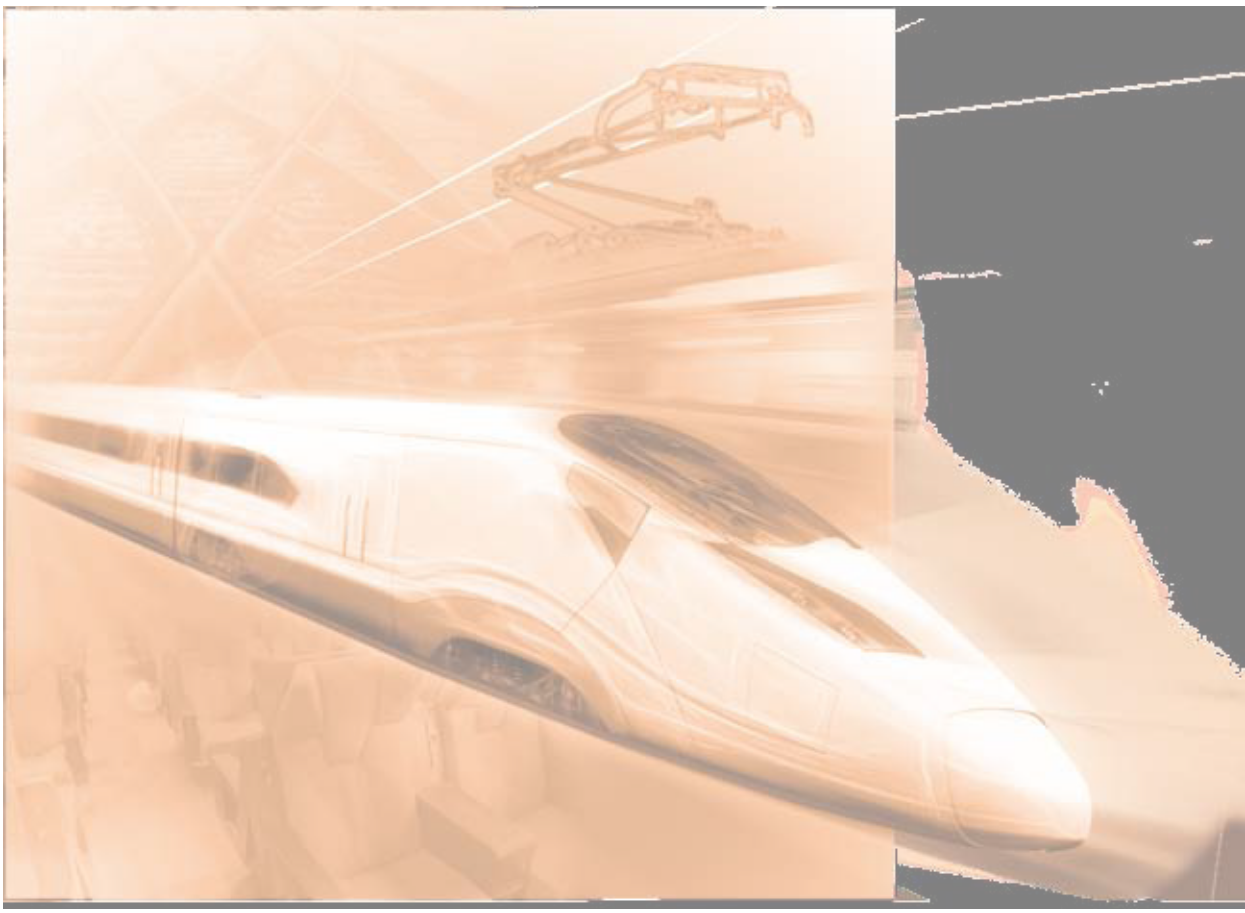
Test	Standards	FLAMEX® Z+
Flame and fire propagation	EN 60 332-1-2 (flame)	Passed
	EN 60 332-3-24 (bundle)	Passed category C for overall diameter ≥ 12 mm
	EN 60 332-3-25 (bundle)	< 12 mm and > 6 mm
	EN 50 305 (fire)	≤ 6 mm
	Equivalent to: BS 6853 table 13 cat Ia NFC 32070 C2 and C1 (class C according to NF F 16 101)	
Smoke density	EN 61 034-2 Equivalent to: BS 6853, NF C 32 073-2	Passed
Halogen content	EN 50 267-2-1, EN 50 264-1, EN 60 684-2 Equivalent to: IEC 60 754-1, NF C 20 454…	0%
PH (smoke corrosivity)	EN 50 267-1, EN 50 267-2-2/2-3 NF C 20 453, IEC 60 754-2, NF C 32 074-1	pH >4,3 Conductivity ≤10 µS/mm

EN 50 264-3 guideline

EN 50 264-3 Types	Single core cables	Multicore cables	Multipair cables	Insulation	Screened	Sheathed	Page
EN 50 264-3-1 0.6/1kV - Category M	•			EN 50 264-1 EI 109		EN 50 264-1 EM 104	38
EN 50 264-3-1 1.8/3kV - Category M	•						38
EN 50 264-3-2 0.6/1kV - Category MM		•				•	42

EN 50 264-3 fire properties

Parameter	Value	Standard
Flame propagation	-	EN 60 332-1-2
Flame propagation – bunched cables	-	EN 60 332-3-24/25 or EN 50 305 depending on diameter
Evolution of HCL	< 0.5 %	EN 50 267-2-1
PH	>4.3	EN 50 267-2-2
Conductivity	< 10 µS/mm	EN 50 267-2-2
Hazard level	3	EN 45 545-1
Smoke emission	> 70 %	EN 61 034-2
Toxicity index	< 3	EN 50 305



Part 2-1
FLAMEX® Z+
Flexible HFFR power cables with reduced insulation thickness

FLAMEX® Z+
Single core

EN 50 264-3-1
0.6/1kV
1.8/3 kV

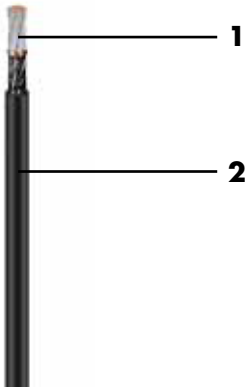
Applications

For protected installation in railway vehicles (locomotives, trains, trolley-busses etc.), switching station and control panels.
Installation in cable ducts, pipes and tubes.
Current carrying capacity according to EN 50 343.
Serves request acc. to EN 45 545-1.
A 120°C conductor temperature is allowed for a 20.000 hours cumulative working time.

Conductor temperature: +90°C/120°C

Design

1- Conductor
Flexible stranded tinned copper
class 5 according to IEC 60 228
optional separator tape
2- Insulation
Cross linked compound type EI 109
acc. to EN 50 264-1.
Oil, diesel-oil, ozone and UV resistant.



Marking

Example: FLAMEX® Z+ NF F 16 101 / EN 50 264-3-1 600V 10 M |Nexans| 26/2008 Fa-Nr.

Colour codes

Black

Bending radius

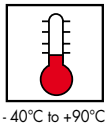
Dynamic use: 5 x outer diameter
Static use: 3 x outer diameter

Standards

EN 50 264-3-1, EN 45 545,
NF F 16 101, BS 6853 (on request), DIN 5510.

Guide to use

Cabling rules are given in EN 50 343 standard.
Permissible current capacities are given in EN 50 355 and EN 45 545 standards (see page 112).


- 40°C to +90°C


Good resistance to UV and humidity


Good chemical resistance (acids, oils, ...) IRM 902, IRM 903


Flame and fire retardant (EN 60 332-1-2 EN 60 332-3-24 EN 60 332-3-25)


Low smoke emission and low opacity (EN/IEC 61 034-2)


Gas toxicity innocuous EN 50 305-9.2


Flexible (Class 5 IEC 60 228)

Halogen free (IEC 60 754-1)

FLAMEX® Z+ - 0.6/1kV - Cat. M
Unsheathed single core cables

Designation	CONDUCTOR	Overall Ø mm		Approx. Weight kg/km
	Cross section mm²	mini. mm	maxi. mm	
FLAMEX® Z+	1	2.4	2.8	17
FLAMEX® Z+	1.5	2.8	3.3	23
FLAMEX® Z+	2.5	3.2	3.8	32
FLAMEX® Z+	4	3.8	4.4	47
FLAMEX® Z+	6	4.2	5.0	64
FLAMEX® Z+	10	5.1	5.9	104
FLAMEX® Z+	16	6.1	7.2	158
FLAMEX® Z+	25	7.8	9.1	243
FLAMEX® Z+	35	9.0	10.6	335
FLAMEX® Z+	50	10.6	12.4	466
FLAMEX® Z+	70	12.5	14.6	665
FLAMEX® Z+	95	13.9	16.3	865
FLAMEX® Z+	120	15.7	18.4	1105
FLAMEX® Z+	150	17.6	20.6	1366
FLAMEX® Z+	185	19.6	22.9	1704
FLAMEX® Z+	240	22.2	26.0	2191
FLAMEX® Z+	300	24.6	28.8	2771
FLAMEX® Z+	400	28.1	32.9	2788

FLAMEX® Z+ 1.8/3kV - Cat. M
Unsheathed single core cables

Designation	CONDUCTOR	Overall Ø mm		Approx. Weight kg/km
	Cross section mm²	mini. mm	maxi. mm	
FLAMEX® Z+	1.5	5.3	6.2	51
FLAMEX® Z+	2.5	5.7	6.7	63
FLAMEX® Z+	4	6.2	7.3	82
FLAMEX® Z+	6	6.7	7.8	102
FLAMEX® Z+	10	7.5	8.8	147
FLAMEX® Z+	16	8.6	10.0	208
FLAMEX® Z+	25	9.9	11.6	293
FLAMEX® Z+	35	11.1	13.0	392
FLAMEX® Z+	50	12.5	14.6	524
FLAMEX® Z+	70	14.2	16.6	724
FLAMEX® Z+	95	16.0	18.7	949
FLAMEX® Z+	120	17.6	20.6	1187
FLAMEX® Z+	150	19.1	22.3	1437
FLAMEX® Z+	185	20.9	24.4	1782
FLAMEX® Z+	240	23.7	27.5	2266
FLAMEX® Z+	300	25.6	30.1	2839
FLAMEX® Z+	400	29.2	34.2	3864

FLAMEX® Z+ Multicore

EN 50 264-3-2
0.6/1kV

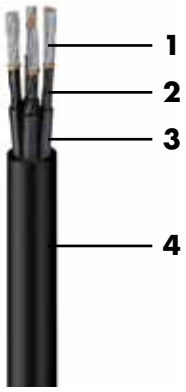
Applications

For use in railway vehicles (locomotives, trains, trolley busses, etc.), switching station and control panels.
Installation in cable ducts, tubes and outside.
Current carrying capacity, acc. to EN 50 343.
Werves requested according to EN 45 545-1.
A 120°C conductor temperature is allowed for a 20.000 hours cumulative working time.

Conductor temperature: +90°C/120°C

Design

1- Conductor
Flexible stranded tinned copper
class 5 according to IEC 60 228
optional separator tape
2- Insulation
Cross linked compound EI 109
according to EN 50 264-1,
oil and diesel-oil resistant.
3- Outer Sheath
Special cross linked EVA,
rubber type EM 104 according to EN 50 264-1,
oil, diesel oil, ozone and UV resistant.



Marking

Example: FLAMEX® Z+ EN 50 264-3-2
600V 2x1,5 MM |Nexans| 10/2008 Fa-Nr. 0148...

Colour codes

Insulation: black, core identification by printed numbers in white.
Sheath: black

Bending radius

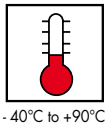
Dynamic use: 5 x outer diameter
Static use: 3 x outer diameter

Standards

EN 50 264-3-2, EN 45 455, NF F 16 101, BS 6853 (on request), DIN 5510.

Guide to use

Cabling rules are given in EN 50 343 standard.
Permissible current capacities are given in EN 50 355 and EN 45 545 standards (see page 112).


- 40°C to +90°C


Good resistance to UV and humidity


Good chemical resistance (acids, oils, ...) IRM 902, IRM 903


Flame and fire retardant (EN 60 332-1-2 EN 60 332-3-24 EN 60 332-3-25)


Low smoke emission and low opacity (EN/IEC 61 034-2)

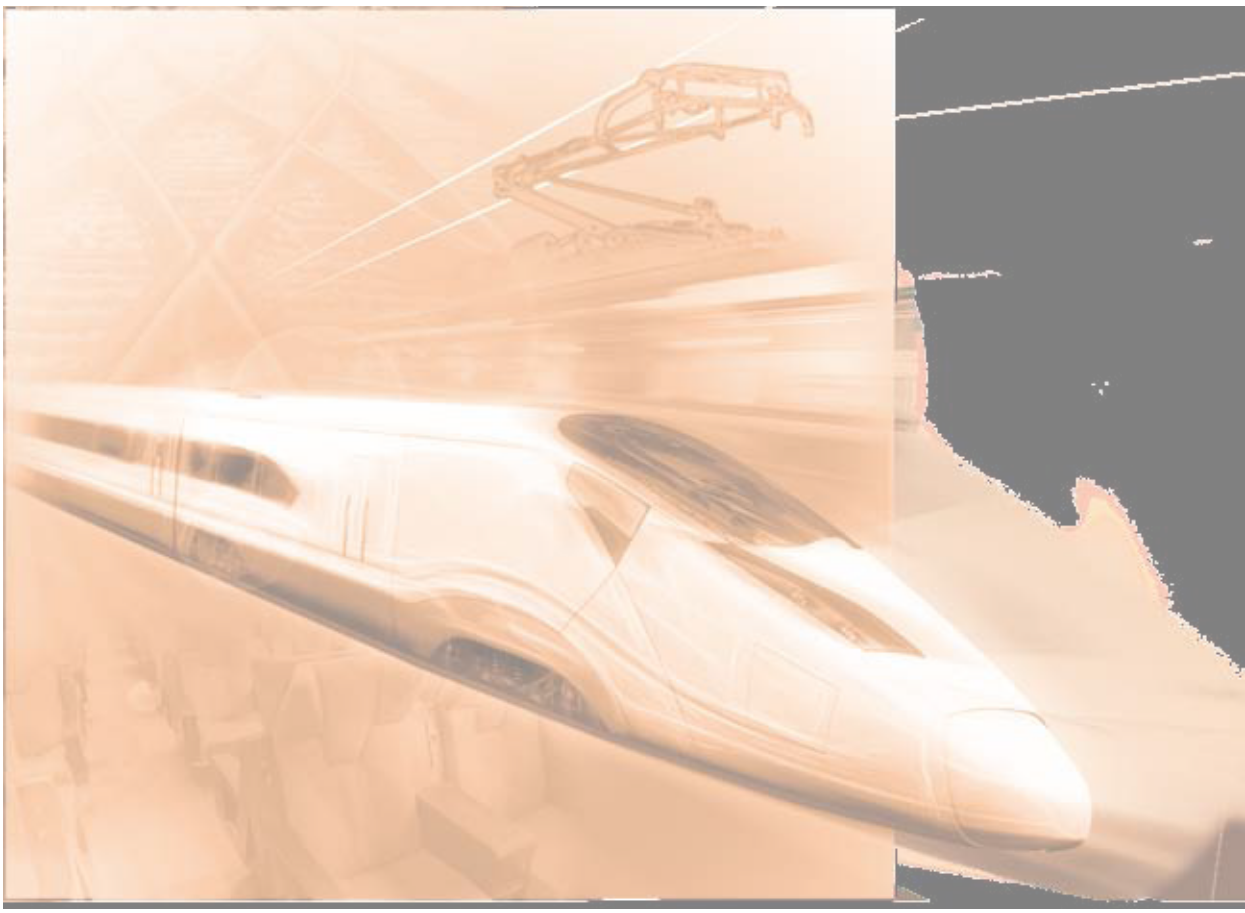

Gas toxicity innocuous EN 50 305-9.2


Flexible (Class 5 IEC 60 228)

Halogen free (IEC 60 754-1)

FLAMEX® Z+ 0.6/1kV - Cat. MM
Multicore cables

Designation	CONDUCTOR	Number of cores	Overall Ø mm		Approx. weight kg/km
	Cross section mm²		mini. mm	maxi. mm	
FLAMEX® Z +	1.5	2	7.2	9.0	110
FLAMEX® Z +	1.5	3	7.7	9.5	125
FLAMEX® Z +	1.5	4	8.5	10.5	150
FLAMEX® Z +	2.5	2	8.0	10.0	140
FLAMEX® Z +	2.5	3	8.5	10.5	165
FLAMEX® Z +	2.5	4	9.4	11.6	200
FLAMEX® Z +	4	3	9.7	12.0	225
FLAMEX® Z +	6	3	10.7	13.2	295
FLAMEX® Z +	10	4	14.7	18.2	570



Part 2-2
French Standards
Standard wall power cables

NF F 63 826 properties

Mechanical properties

Test	Standards	NF F 63 826
Tensile strength	NF F 63 826	Passed
Elongation	NF F 63 826	> 100%
Ageing	NF F 63 826	Passed
Oil, acid, alkali behaviours	NF F 63 826	Passed
Ozone	NF F 63 826	Passed

Electrical properties

Test	Standards	NF F 63 826
Transversal withstand voltage	NF F 63 826	Passed No breakdown
Insulation resistance	NF F 63 826	$R_{20°}$ > 500 M Ω km $R_{60°}$ > 50 M Ω km

Fire properties

Test	Standards	NF F 63 826
Flame and fire propagation	NF F 63 826 - NFC 32-070/C1 et C2 (class C according to NF F 16 101) IEC 60 332-1-2 and IEC 60 332-3-24 BS 6853 table 13 cat. Ia EN 50 265	Passed
Smoke density	NF F 63 826 BS 6853 IEC 61 034-2 NF F 16 101	Passed
Halogen content	IEC 60 754-1 NF C 20 454, EN 50 267-2-1	0%
PH (smoke corrosivity)	NF F 63 826, EN 50 267-1, EN 50 267-2-2/2-3 NF C 20 453 IEC 60 754-2 NF C 32 074-1	pH > 5

NF F 63 826
Single core

500 to 3.000 V(Vo)

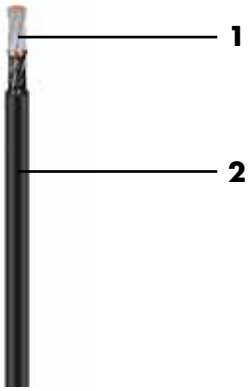
Applications

For use in railway vehicles (locomotives, trains, trolley busses, etc.), switching stations and controll panels. Installation in cable ducts, tubes and outside (protected). Strictly halogen free, these cables are also fire retardant, low smoke fume and are recommanded for rolling stock.
A 105°C conductor temperature is allowed for 20.000 hours cumulative working temperature.

Conductor temperature: +90°C/+105°C

Design

1- Conductor
Flexible tinned copper- class 5
IEC 60 228,
conductor wrapping optional
2- Insulation
Halogen free compound, type EI 104
colour: black



Marking

Example: Y-1000-S / 35 MM2 NF F 63 826 |Nexans|08/2008 Fa-Nr. 0148...

Bending radius

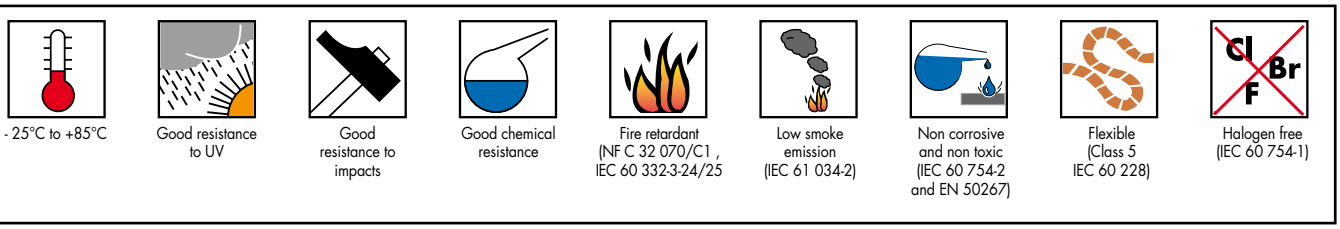
Dynamic use: 5 x outer diameter
Static use: 3 x outer diameter

Standards

According to: NF F 63 826, NF F 16 101, BS 6853 (on request).

Guide to use

Permissible current capacities are given in NF F 61 012 standard (see page 110).



NF F 63 826 - Single core cables

Cross Section (mm^2)	Y 500 S		Y 1000 S		Y 1500 S		Y 3000 S	
	Ø Max. (mm)	Approx. Weight (kg/km)	Ø Max. (mm)	Approx. Weight (kg/km)	Ø Max. (mm)	Approx. Weight (kg/km)	Ø Max. (mm)	Approx. Weight (kg/km)
1	4.5	26	-	-	-	-	-	-
1.5	4.8	33	5.2	42	6.8	59	-	-
2.5	5.2	43	5.6	55	7.2	73	8.8	94
4	5.8	59	6.2	72	7.8	91	9.5	124
6	6.5	82	6.9	96	8.3	120	9.9	135
10	8.1	135	8.3	154	9.7	160	11.3	200
16	9.2	210	9.4	218	10.8	235	12.4	265
25	-	-	11.0	316	12.2	330	13.8	375
35	-	-	12.5	440	13.7	480	15.3	290
50	-	-	14.3	580	15.5	610	17.2	680
70	-	-	16.3	830	17.7	860	19.1	930
95	-	-	18.4	1040	19.8	1070	21.4	1066
120	-	-	20.5	1310	21.9	1340	23.5	1530
150	-	-	-	-	23.8	1620	25.5	1740
185	-	-	-	-	25.9	1940	27.6	2100
240	-	-	-	-	29.1	2550	31.7	2460
300	-	-	-	-	31.9	2950	35	3050

NF F 63 826
Multicore

500 V(Vo)

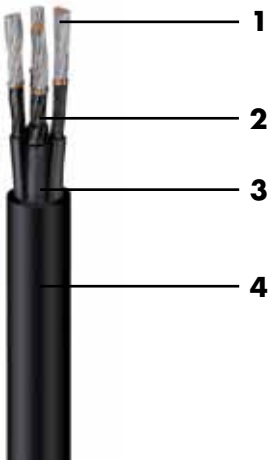
Applications

For use in railway vehicles (locomotives, trains, trolley busses, etc.), switching stations and control panels. Installation in cable ducts, tubes and outside (protected). Strictly halogen free, these cables are also fire retardant, low smoke fume and are recommanded for rolling stock.
A 105°C conductor temperature is allowed for a 20.000 hours cumulative working temperature.

Conductor temperature: +90°C/+105°C

Design

1- Conductor
Flexible tinned copper- class 5
IEC 60 228
optional conductor wrapping
2- Insulation
Halogen free compound, type EI 104
colour: black
3- Separating tape
Polyester tape
4- Outer sheath
Halogen free compound, type EM 104
colour: black



Marking

Example: NY-500-SO 2x1,5 MM2 NF F 63 826 |Nexans| 10/2008 Fa-Nr. 0148...

Bending radius

Dynamic use: 5-8 x outer diameter
Static use: 4 x outer diameter

Standards

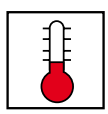
According to: NF F 63 826, NF F 16 101, BS 6853 (on request).

Guide to use

Cabling rules are given in NF F 61 012 standard.
(see page 110)

Core Identification

By printed numbers


- 25°C to +85°C


Good resistance to UV


Good resistance to impacts


Good chemical resistance


Fire retardant (NF C 32 070/C1, IEC 60 332-3, EN 50 266


Low smoke emission (IEC 61 034-2)


Non corrosive and non toxic (IEC 60 754-2 and EN 50 267)


Flexible (Class 5 IEC 60 228)

Halogen free (IEC 60 754-1)

NF F 63 826 - Multicore cables - NY 500 SO type

Cross Section (mm^2)	Maximum Ø (mm)	Approx. Weight (kg/km)
2 x 1.5	9.9	115
4 x 1.5	11.4	160
7 x 1.5	13.3	245
13 x 1.5	18.0	425
19 x 1.5	19.9	675
37 x 1.5	27.1	1170
2 x 2.5	11.3	185
4 x 2.5	13.1	275
13 x 2.5	21.1	750
19 x 2.5	23.4	980

NF F 63 826
Single Core

ALUMINIUM CONDUCTOR
1.500 V(Vo)

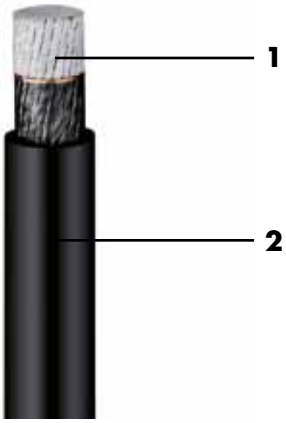
Applications

For use in railway vehicles (locomotives, trains, trolley busses, etc.), switching stations and controll panels. Installation in cable ducts, tubes and outside (protected). Strictly halogen free, these cables are also fire retardant, low smoke fume and are recommanded for weight saving in rolling stock applications.
A 105°C conductor temperature is allowed for a 20.000 hours cumulative working temperature.

Conductor temperature: +90°C/+105°C

Design

1- Conductor
Flexible stranded aluminium, class 5, conductor wrapping optional
2- Insulation
Special halogen free compound, type EI 104
colour: black



Marking

Example: Y-1500-S 50 MM2 ALU NF F 63 826 |Nexans| 10/2008 Fa-Nr. 0148...

Bending radius

Dynamic use: 5 x outer diameter
Static use: 3 x outer diameter

Standards

NF F 63 826, NF F 16 101, BS 6853 (on request).

Guide to use

Cabling rules are given in NF F 61 012 standard.
(see page 110)

Core Identification

Black

- 25°C to +85°C
Good resistance to UV
Good resistance to impacts
Good chemical resistance (acids, oils, ...)
Fire retardant (NF C 32 070/C1, IEC 60 332-3
Low smoke emission (IEC 61 034-2)
Non corrosive and non toxic (IEC 60 754-2 and EN 50 267)
Flexible (Class 5 IEC 60 228)
Cl Br F
Halogen free (IEC 60 754-1)

NF F 63 826 - Single core cable aluminium - Y 1500 S type

Cross Section (mm^2)	Overall Ø		Approx. Weight (kg/km)	Permissible current rating (A)
	Mini. (mm)	Maxi (mm)		
50	14.2	15.5	297	189
70	16.1	17.7	413	237
95	18.0	19.8	491	281
120	20.0	21.9	593	324
150	21.8	23.8	697	371
185	23.7	25.9	850	433
240	26.6	29.1	1059	523
300	29.5	32	1280	603

Copper and aluminium types: comparative table

Cross Section (mm^2)	Maxi. allowed current (A)		Approx. cable weight (kg/km)	
	Copper (base NF F 63 826)	Aluminium (base NF F 63 826)	Copper	Aluminium
150	482	371	1620	697
185	563	433	1940	850
240	680	523	2550	1059
300	784	603	2950	1280

FLAMEX® GASOIL resistant
Single core

SNCF 10-5315-848
1.500 V(Vo)

Applications

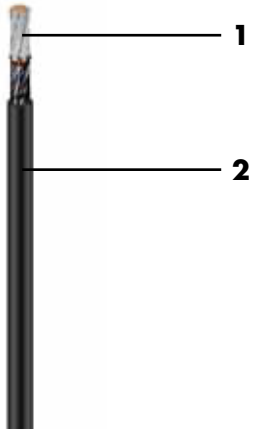
For protected installation in railway, vehicles (locomotives, trains, trolley busses), switching stations and control panels. Installation in cable ducts, pipes and tubes.
This cable is special gasoil resistant, flame retardant, strictly halogen free and shows low smoke opacity.

Substitute the cable family acc. to NF F 63 296

Conductor temperature: +90°C/+105°C

Design

1- Conductor
Flexible stranded tinned copper, class 5 acc. to DIN VDE 0295 / IEC 60 228 / HD 383,
conductor wrapping optional
2- Insulation
Cross linked compound type EI 104 acc. to EN 50 264-1,
oil, diesel oil, ozone and UV resistant



Marking

Y-1500-S 1x185 MM2 FLAMEX GASOIL resistant 10-5315-8481
|Nexans| 40/2010 Fa-Nr. ...

Bending radius

Dynamic use: 4 x outer diameter
Static use: 5 x outer diameter

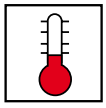
Standards

SNCF 10-5315-848, EN 50 264-2-1, NF F 16 101

Core Identification

Black

Halogen free
EN 50 264-1 A/B


Operating temp range
- 40°C to +90°C


Gases corrosivity
No acc to
EN 50 267-2-2


Gas toxicity innocuous
EN 50 305-9.2


Flame retardant
EN 60 332-3-24/25;
EN 60 332-1-2;
EN 50 305-9.1;
NF F 16 101


Smoke density
EN 50 268-2;
NF F 16 101

FLAMEX® GASOIL resistant - single core

Cross Section (mm^2)	Ø Max. (mm)	Approx. Weight (kg/km)
1.5	6.8	59
2.5	7.2	73
4	7.8	91
6	8.3	120
10	9.7	160
16	10.8	235
25	12.2	330
35	13.7	480
50	15.5	610
70	17.7	860
95	19.8	1070
120	21.9	1340
150	23.8	1620
185	25.9	1940
240	29.1	2550

FLAMEX® GASOIL resistant Multicore

SNCF 10-5315-848
500 V(Vo)

Applications

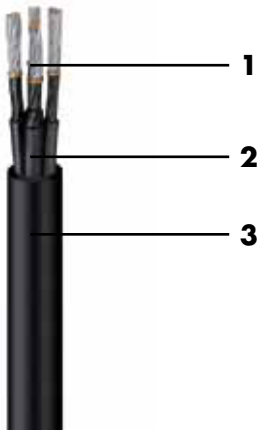
For use in railway vehicles (locomotives, trains, trolley busses etc.), switching stations and control panels.
Installation in cable ducts, tubes.
This cable is special gasoil resistant, flame retardant, strictly halogen free shows low smoke opacity.

Substitute the cable family acc. to NF F 63 296

Conductor temperature: +90°C/+105°C

Design

1- Conductor
Flexible stranded tinned copper, class 5 acc. to DIN VDE 0295 / IEC 60 228 HD 383;
conductor wrapping optional.
2- Insulation
Cross linked compound type EI 104 acc. to EN 50 264-1, oil, gasoil, ozone and UV resistant
3- Outer sheath
Cross linked compound type EM 104 acc. to EN 50 264-1, oil, gasoil, ozone and UV resistant
Colour: black



Marking

Ink marking white:
NY-500-SO 4x2,5 MM2 FLAMEX GASOIL resistant 10-5315-848 |Nexans| 40/2010 Fa-Nr. ...

Bending radius

Dynamic use: 4 x outer diameter
Static use: 5 x outer diameter

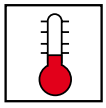
Standards

SNCF 10-5315-848, EN 50 264-2-2, NF F 16 101

Core Identification

Black

Halogen free
EN 50 264-1 A/B


Operating temp range
- 40°C to +95°C


Gases corrosivity
No acc to
EN 50 267-2-2


Gas toxicity innocuous
EN 50 305-9.2


Flame retardant
EN 60 332-3-24/25;
EN 60 332-1-2


Smoke density
EN 50 268-2;
NF F 16 101

FLAMEX® GASOIL resistant multicore cable

Number of core	Cross Section (mm^2)	Maximum Ø (mm)	Approx. Weight (kg/km)
2	1.5	9.9	115
4	1.5	11.4	160
7	1.5	13.3	245
13	1.5	18.0	450
19	1.5	19.9	615
37	1.5	27.1	1050
2	2.5	11.3	170
4	2.5	13.1	235
13	2.5	21.1	700
19	2.5	23.4	925

FLAMEX® BLG
Screened single core cable

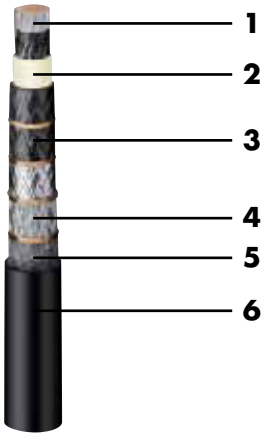
1.500 or 3.000 V (Vo)

Applications

For protected installation in railway vehicles (locomotives, trains, trolley-busses etc.), switching station and control panels. Installation in cable ducts, pipes and tubes. Specially for mobile links between cars or car bogies.
This cable will be specially design in line to SNCF 10-5249-367 resp, SNCF 10-5315-848 resp, NF F 63 826 according to the customers demand.

Design

1- Conductor
Flexible or extra flexible stranded tinned copper
Class 5 resp.6 according to DIN VDE 0295 / IEC 60228 / HD 383
2- Insulation + optional tape
Cross Linked compounds
type EI104 (Rubber) or type EI112 (Silicone)
3- Screen
Tape or foil
4- Sheath
Tinned copper wire braid or textile braid
5- Separator
Tape or foil
6. Outer sheath
Cross linked compound type EM 104 black
on request: Anti gasoil outer sheath compound



Bending radius

Dynamic use: 10 x outer diameter
Static use: 5 x outer diameter

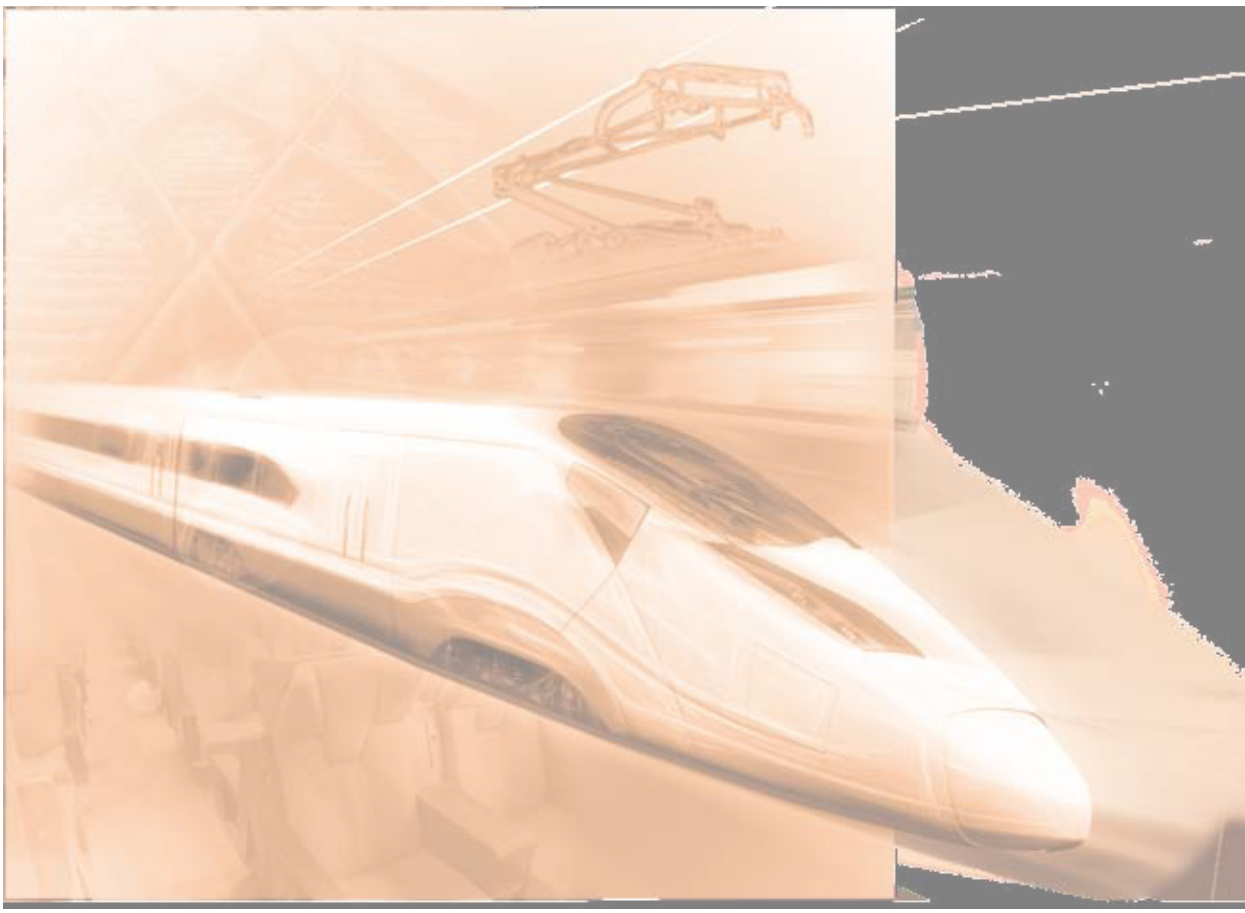
Standards

According to: EN 50 264, EN 50 382-2, NF F 16-101, SNCF 10-5249-367, SNCF 10-5315-848

Guide to use

Permissible current capacities are given in NF F 61 012 standard (see page 110).

Halogen free EN 50 264-1 A/B	Operating temp range - 40°C to +90°C	Gases corrosivity No acc. to EN 50 267-2-2	Gas toxicity innocuous EN 50 305-9.2	Flame retardant EN 60 332-1-2; EN 60 332-3-24; EN 60 332-3-25	Smoke density EN 50 268-2; NF F 16 101



Part 2-3
High temperature power cables

FLAMEX® SI

Applications

European standard EN 50 382 is about railway rolling stock high temperature power cables having special fire performance: halogen free, low smoke and fumes, low toxicity and low corrosiveness and high fire retardant.

This standard is splitted in two parts:
Part 1: general requirements: voltage , compounds requirements , fire performance and tests
Part 2: it is dedicated to cable designs: compound thickness , cable diameter and to tests on complete cables

This standard allows a large choice of cables depending on:

- Class of temperature: 120°C (tinned copper) or 150°C (plain copper)
- Voltage rate: 1.6/3 kV or 3.6/6 kV
- Silicon rubber compound performance: mechanical and thermal properties, resistance to IRM902 oil, acid and alkaline, cold behavior
- Cable designs: with insulation only, or with insulation and sheath, or class 6 conductors for mobile applications.

Silicon rubber compounds are referenced as

- Insulation compounds:
  - Type EI 112: low mechanical properties and no oil resistance. This compound must be used in combination with a sheathing compound
  - Type EI 111: this compound can be used for unsheathed cables thanks to its high mechanical properties, cold behavior, and chemical (oils, acid and alkaline) resistance
- Sheathing compounds:
  - Type EM 105: uses for -25°C up to 120°C
  - Type EM 106: uses for -40°C up to 120°C
  - Type EM 107: uses for -40°C up to 150°C

EN 50 382-2 standard also defines cable designations for various cable constructions with combination of silicon rubber compounds:

F	120°C and F 150°C	with EI 111 insulation compound
OC	120°C	with EI 112 insulation compound + EM 105 sheathing compound
FC	120°C	with EI 111 insulation compound + EM 105 sheathing compound
OF	120°C	with EI 112 insulation compound + EM 106 sheathing compound
FF	120°C	with EI 111 insulation compound + EM 106 sheathing compound
OF	150°C	with EI 112 insulation compound + EM 107 sheathing compound
FF	150°C	with EI 111 insulation compound + EM 107 sheathing compound

Nexans proposes to rolling stock manufacturers 3 cable series of FLAMEX® SI grouping the major applications

1-Type F: with only insulation

This type could be manufactured with tinned or plain copper conductor.
The tinned version of this type is an alternative to French standard type named NF F 63 827 Y 3000 S.
Silicon rubber made in Nexans plant overlaps requirements of EN 50 382-1 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 Nexans is the highest performance solution made off the highest grade of insulation and sheathing compounds.
This type could be used instead of OC, FC or OF versions in all fixed links indoor or outdoor.

3-Type FXZ: for mobile uses

This type with extra flexible conductor and with mechanical reinforced insulation is dedicated to be used as jumper cables between cars or between cars and bogies.
This type is an alternative version to the French NF F 63 827 Z3000 SS cable.

EN-50382-2 guideline

EN 50 382-2 Types	Class of temperature		Conductor type		Conductor class	Insulation	Reinforced	Sheathed
	120°C	150°C	Tinned copper	Plain copper				
EN 50 382-2 1.8/3kV - Type F	•		•		5	EI 111		
EN 50 382-2 1.8/3kV - Type F		•		•	5	EI 111		
EN 50 382-2 3.6/6kV - Type F	•		•		5	EI 111		
EN 50 382-2 3.6/6kV - Type F		•		•	5	EI 111		
EN 50 382-2 1.8/3kV - Type FF	•		•		5	EI 111		EM 107
EN 50 382-2 1.8/3kV - Type FF		•		•	5	EI 111		EM 107
EN 50 382-2 3.6/6kV - Type FF	•		•		5	EI 111		EM 107
EN 50 382-2 3.6/6kV - Type FF		•		•	5	EI 111		EM 107
EN 50 382-2 3.6/6kV - Type FXZ	•		•		6	EI 111	•	
EN 50 382-2 3.6/6kV - Type FXZ		•		•	6	EI 111	•	

FLAMEX® SI - type F
EN 50 382-2

Applications

These cables are designed and dedicated to be used on rolling stock equipment where high temperature is required to save cable weight.
Thanks to its high flexibility , these cables are frequently installed on locomotive equipment with low bending radius.

Conductor class temperature: 120°C or 150°C

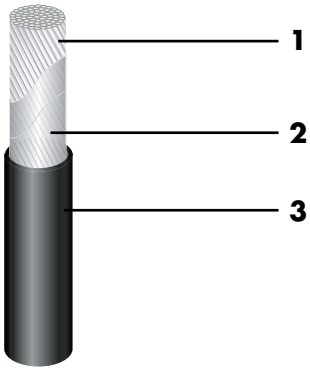
Uo/U (Um): 1.8/3(3.6)kV or 3.6/6(7.2)kV
Vo: 2700 V or 5400 V

Design

1- Conductor
Flexible class 5 copper according to IEC 60 228
* tinned copper for 120°C class
* plain copper for 150°C class

2- Separator
Unweaved tape

3- Insulation
Twin layer of silicon rubber compound type EI 111 according to EN 50 382-1
colour: black outer layer



Marking

FLAMEX® SI EN 50 382-2 Voltage rate (1800 V or 3600 V)- conductor size - designation type (F) - temperature class (120°C or 150°C)
Nexans factory number (205) batch number/year

Standards

Construction EN 50 382-2 (categorie C/F1)
Fire & Smoke performance NF F 16 101 (EN/TS 45 545-2(HL3))

Guide to use

Cabling rules are given in EN 50 343
Min. bending radius (static) 4 x outer cable diameter (EN 30 355)
Min. bending radius (dynamic) 6 x outer cable diameter
Pulling tensile force (dynamic) during installation 50 N/mm² of copper size
Mechanical static tensile force 15N/mm² of copper size
Permissible current corrying capacities: value and calculation method are given in EN 50 355 (see page 112)

- 40°C to + 115°C or -40°C to +145°C	Good chemical resistance (acids, oils, ...) IRM 902	Flame retardant EN 60 332-1-2	Fire retardant (EN 50 266-2-4) (or 2-5 for cable diameter < 12mm)	Smoke emission EN 61 034-2 (light transmission > = 70%)	Toxicity index EN 50 305 (ITC < 3)	Halogen free EN 50 267-2-1 (less than 0.5%) EN 60 884-2 (less than 0.1%) EN 50 267-2-2 (more than 4.3) EN 50 267-2-2 (less than 10 µS/mm)

FLAMEX® SI - EN 50 382-2 1.8/3kV Type F Class 120°C or 150°C Unsheathed flexible single core cables

Ref table 1 EN 50 382-2

Designation	CONDUCTOR		Thickness of insulation mm	Overall Ø mm		Average weight kg/km
	Cross section mm²	Ø mm		mini. mm	maxi. mm	
FLAMEX® SI EN 50 382.2 1800V 1.5 F 120°C or 150°C	1.5	1.5	2.5	6.3	7.3	64
FLAMEX® SI EN 50 382.2 1800V 2.5 F 120°C or 150°C	25	1.95	2.5	6.7	7.8	77
FLAMEX® SI EN 50 382.2 1800V 4 F 120°C or 150°C	4	2.5	2.5	7.2	8.4	96
FLAMEX® SI EN 50 382.2 1800V 6 F 120°C or 150°C	6	3.0	2.5	7.7	9.0	117
FLAMEX® SI EN 50 382.2 1800V 10 F 120°C or 150°C	10	3.9	2.5	8.5	10.0	162
FLAMEX® SI EN 50 382.2 1800V 16 F 120°C or 150°C	16	5.0	2.5	9.6	11.2	225
FLAMEX® SI EN 50 382.2 1800V 25 F 120°C or 150°C	25	6.4	2.5	10.9	12.7	311
FLAMEX® SI EN 50 382.2 1800V 35 F 120°C or 150°C	35	7.7	2.5	12.1	14.1	411
FLAMEX® SI EN 50 382.2 1800V 50 F 120°C or 150°C	50	9.2	2.5	13.5	15.8	545
FLAMEX® SI EN 50 382.2 1800V 70 F 120°C or 150°C	70	11.0	2.7	15.0	17.8	747
FLAMEX® SI EN 50 382.2 1800V 95 F 120°C or 150°C	95	12.5	2.7	17.0	19.9	973
FLAMEX® SI EN 50 382.2 1800V 120 F 120°C or 150°C	120	14.2	2.7	18.6	21.7	1212
FLAMEX® SI EN 50 382.2 1800V 150 F 120°C or 150°C	150	15.8	2.7	20.1	23.5	1463
FLAMEX® SI EN 50 382.2 1800V 185 F 120°C or 150°C	185	17.5	2.7	21.7	25.4	1787
FLAMEX® SI EN 50 382.2 1800V 240 F 120°C or 150°C	240	20.1	2.7	24.1	28.2	2270
FLAMEX® SI EN 50 382.2 1800V 300 F 120°C or 150°C	300	22.5	2.7	26.4	30.9	2715
FLAMEX® SI EN 50 382.2 1800V 400 F 120°C or 150°C	400	25.8	2.9	29.9	34.9	3561

FLAMEX® SI - EN 50 382-2 3.6/6kV Type F Class 120°C or 150°C Unsheathed flexible single core cables

Ref table 3 EN 503-82-2

Designation	CONDUCTOR		Thickness of insulation mm	Overall Ø mm		Average weight kg/km
	Cross section mm²	Ø mm		mini. mm	maxi. mm	
FLAMEX® SI EN 50 382.2 3600V 2.5 F 120°C or 150° C	2.5	1.95	3.0	7.6	8.9	94
FLAMEX® SI EN 50 382.2 3600V 4 F 120°C or 150° C	4	2.5	3.0	8.1	9.5	114
FLAMEX® SI EN 50 382.2 3600V 6 F 120°C or 150° C	6	3.0	3.0	9.0	10.6	136
FLAMEX® SI EN 50 382.2 3600V 10 F 120°C or 150° C	10	3.9	3.0	9.5	11.1	183
FLAMEX® SI EN 50 382.2 3600 V 16 F 120°C or 150° C	16	5.0	3.0	10.5	12.3	249
FLAMEX® SI EN 50 382.2 3600V 25 F 120°C or 150° C	25	6.4	3.0	11.8	13.8	338
FLAMEX® SI EN 50 382.2 3600V 35 F 120°C or 150° C	35	7.7	3.0	13.0	15.2	441
FLAMEX® SI EN 50 382.2 3600V 50 F 120°C or 150° C	50	9.2	3.0	14.4	16.9	578
FLAMEX® SI EN 50 382.2 3600V 70 F 120°C or 150° C	70	11.0	3.0	16.1	18.9	784
FLAMEX® SI EN 50 382.2 3600V 95 F 120°C or 150° C	95	12.5	3.0	17.5	20.5	998
FLAMEX® SI EN 50 382.2 3600V 120 F 120°C or 150° C	120	14.2	3.1	19.3	22.6	1247
FLAMEX® SI EN 50 382.2 3600V 150 F 120°C or 150° C	150	15.8	3.1	20.8	24.4	1502
FLAMEX® SI EN 50 382.2 3600V 185 F 120°C or 150° C	185	17.5	3.2	22.6	26.5	1839
FLAMEX® SI EN 50 382.2 3600V 240 F 120°C or 150° C	240	20.1	3.4	25.4	29.8	2353
FLAMEX® SI EN 50 382.2 3600V 300 F 120°C or 150° C	300	22.5	3.4	27.7	32.4	2800
FLAMEX® SI EN 50 382.2 3600V 400 F 120°C or 150° C	400	25.8	3.4	30.8	36.0	3634

FLAMEX® SI - type FF
EN 50 382-2

Applications

These cables are designed and dedicated to be used on rolling stock equipment where high temperature is required to save cable weight
Thanks to its high flexibility, these cables are frequently installed on locomotive equipment with low bending radius.

Conductor class temperature: 120°C or 150°C

Uo/U (Um): 1.8/3(3.6)kV or 3.6/6(7.2)kV
Vo: 2700 V or 5400 V

Design

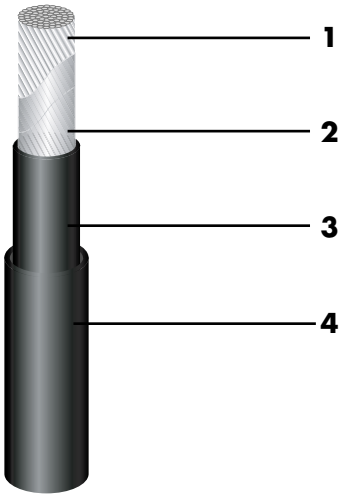
1- Conductor
Flexible class 5 copper according to IEC 60 228
* tinned copper for 120°C class
* plain copper for 150°C class

2- Separator
Unweaved tape

3- Insulation
Silicon rubber
Compound type EI 111 according to EN 50 382-1

(Optionnal) - Separator
Unweaved tape

4- Outer sheath
Silicon rubber
compound type EM 107
according to EN 50 382-1
colour: black outer layer



Marking

FLAMEX® SI EN 50 382-2 Voltage rate (1800 V or 3600 V)- conductor size - designation type (FF) - temperature class (120°C or 150°C)
Nexans factory number (205) batch number/year

Standards

Construction EN 50 382-2
Fire & Smoke performance NF F 16 101

Guide to use

Cabling rules are given in EN 50 343
Min. bending radius (static) 4 x outer cable diameter (EN 30 355)
Min. bending radius (dynamic) 6 x outer cable diameter
Pulling tensile force (dynamic) during installation
50 N/mm² of copper size
Mechanical static tensile force 15N/mm² of copper size
Permissible current corrying capacities: value and calculation method are given in EN 50 355 (see page 112)

- 40°C to + 115°C or -40°C to +145°C	Good chemical resistance (acids, oils, ...) IRM 902	Flame retardant EN 60 332-1-2	Fire retardant (EN 50266-2-4) (or 2-5 for cable diameter < 12mm)	Smoke emission EN 61 034-2 (light transmission > = 70%)	Toxicity index EN 50 305 (ITC < 3)	Halogen free EN 50 267-2-1 (less than 0.5%) EN 60 884-2 (less than 0.1%) EN 50 267-2-2 (more than 4.3) EN 50 267-2-2 (less than 10 µS/mm)

FLAMEX® SI - EN 50 382-2 1.8/3kV Type FF Class 120°C or 150°C
Insulated and sheathed flexible single core cables

Ref table 1 EN 50 382-2

Designation	CONDUCTOR		Insulation/Sheath		Overall Ø mm		Average weight kg/km
	Cross section mm²	Ø mm	Insulation nominal thickness mm	Sheath Thickness mm	mini. mm	maxi. mm	
FLAMEX® SI EN 50 382.2 1800V 1.5 FF 120°C or 150°C	1.5	1.5	1.3	1.4	6.8	7.9	83
FLAMEX® SI EN 50 382.2 1800V 2.5 FF 120°C or 150°C	2.5	1.95	1.3	1.4	7.2	8.4	97
FLAMEX® SI EN 50 382.2 1800V 4 FF 120°C or 150°C	4	2.5	1.3	1.4	7.7	9.0	117
FLAMEX® SI EN 50 382.2 1800V 6 FF 120°C or 150°C	6	3.0	1.3	1.4	8.2	9.6	139
FLAMEX® SI EN 50 382.2 1800V 10 FF 120°C or 150°C	10	3.9	1.5	1.4	9.4	11.0	196
FLAMEX® SI EN 50 382.2 1800V 16 FF 120°C or 150°C	16	5.0	1.5	1.4	10.5	12.2	264
FLAMEX® SI EN 50 382.2 1800V 25 FF 120°C or 150°C	25	6.4	1.8	1.4	12.3	14.4	373
FLAMEX® SI EN 50 382.2 1800V 35 FF 120°C or 150°C	35	7.7	1.8	1.4	13.6	15.9	479
FLAMEX® SI EN 50 382.2 1800V 50 FF 120°C or 150°C	50	9.2	1.8	1.4	15.0	17.5	620
FLAMEX® SI EN 50 382.2 1800V 70 FF 120°C or 150°C	70	11.0	1.8	1.5	16.8	19.7	840
FLAMEX® SI EN 50 382.2 1800V 95 FF 120°C or 150°C	95	12.5	2.2	1.5	19.0	22.2	1097
FLAMEX® SI EN 50 382.2 1800V 120 FF 120°C or 150°C	120	14.2	2.2	1.6	20.8	24.3	1355
FLAMEX® SI EN 50 382.2 1800V 150 FF 120°C or 150°C	150	15.8	2.2	1.6	22.3	26.1	1620
FLAMEX® SI EN 50 382.2 1800V 185 FF 120°C or 150°C	185	17.5	2.4	1.7	24.5	28.6	1993
FLAMEX® SI EN 50 382.2 1800V 240 FF 120°C or 150°C	240	20.1	2.4	1.8	27.1	31.7	2514
FLAMEX® SI EN 50 382.2 1800V 300 FF 120°C or 150°C	300	22.5	2.4	1.9	29.5	34.6	2816
FLAMEX® SI EN 50 382.2 1800V 400 FF 120°C or 150°C	400	25.8	2.6	2.0	33.2	38.9	3692

FLAMEX® SI - EN 50 382-2 3.6/6kV Type FF Class 120°C or 150°C
Insulated and sheathed (T) flexible single core cables - Tinned copper conductor

Ref table 5 EN 50 382-2

Designation	CONDUCTOR		Insulation/Sheath		Overall Ø mm		Average weight kg/km
	Cross section mm²	Ø mm	Insulation nominal thickness mm	Sheath thickness mm	mini. mm	maxi. mm	
TINNED COPPER CONDUCTOR - CLASS 5							
FLAMEX® SI EN 50 382.2 3600V 2.5 FF 120°C or 150° C	2.5	1.95	2.6	1.4	9.9	11.6	153
FLAMEX® SI EN 50 382.2 3600V 4 FF 120°C or 150° C	4	2.5	2.6	1.4	10.4	12.2	177
FLAMEX® SI EN 50 382.2 3600V 6 FF 120°C or 150° C	6	3.0	2.6	1.4	10.9	12.8	202
FLAMEX® SI EN 50 382.2 3600V 10 FF 120°C or 150° C	10	3.9	2.6	1.4	11.8	13.8	254
FLAMEX® SI EN 50 382.2 3600V 16 FF 120°C or 150° C	16	5.0	2.6	1.4	12.8	15.0	328
FLAMEX® SI EN 50 382.2 3600V 25 FF 120°C or 150° C	25	6.4	2.9	1.4	14.7	17.2	445
FLAMEX® SI EN 50 382.2 3600V 35 FF 120°C or 150° C	35	7.7	2.9	1.4	15.9	18.6	558
FLAMEX® SI EN 50 382.2 3600V 50 FF 120°C or 150° C	50	9.2	2.9	1.5	17.5	20.55	715
FLAMEX® SI EN 50 382.2 3600V 70 FF 120°C or 150° C	70	11.0	2.9	1.5	19.2	22.4	936
FLAMEX® SI EN 50 382.2 3600V 95 FF 120°C or 150° C	95	12.5	2.9	1.6	20.8	24.3	1176
FLAMEX® SI EN 50 382.2 3600V 120 FF 120°C or 150° C	120	14.2	2.9	1.6	22.4	26.2	1428
FLAMEX® SI EN 50 382.2 3600V 150 FF 120°C or 150° C	150	15.8	2.9	1.7	24.1	28.2	1712
FLAMEX® SI EN 50 382.2 3600V 185 FF 120°C or 150° C	185	17.5	3.2	1.8	26.4	30.9	2106
FLAMEX® SI EN 50 382.2 3600V 240 FF 120°C or 150° C	240	20.1	3.4	1.9	29.4	34.4	2667
FLAMEX® SI EN 50 382.2 3600V 300 FF 120°C or 150° C	300	22.5	3.4	1.9	31.7	37.1	3129
FLAMEX® SI EN 50 382.2 3600V 400 FF 120°C or 150° C	400	25.8	3.4	2.0	35.0	40.9	4033

NF F 63 827 properties

Mechanical properties

Test	Standards	NF F 63 827
Tensile strength	NF F 63 827	Passed
Elongation	NF F 63 827	> 100%
Ageing	NF F 63 827	Passed
Oil, acid, alkali behaviours	NF F 63 827	Passed
Ozone	NF F 63 827	Passed

Electrical properties

Test	Standards	NF F 63 827
Transversal withstand voltage	NF F 63 827	Passed No breakdown
Insulation resistance	NF F 63 827	$R_{20°}$ > 200 M Ω km $R_{60°}$ > 20 M Ω km

Fire properties

Test	Standards	NF F 63 827
Flame and fire propagation	NF F 63 827 – NF C 32 070/C1 et C2 (class C according to NF F 16 101) IEC 60 332-1 et IEC 60 332-3 cat. C BS 6853 table 13 cat. Ia EN 50 265	Passed
Smoke density	NF F 63 827 BS 6853 IEC 61 034-2 NF F 16 101	Passed
Halogen content	IEC 60 754-1 NF C 20 454, EN 50 267-2-1	0%
PH (smoke corrosivity)	NF F 63 827, EN 50 267-1, EN 50 267-2-2/2-3 NF C 20 453 IEC 60 754-2 NF C 32 074-1	pH > 5

NF F 63 827

Applications

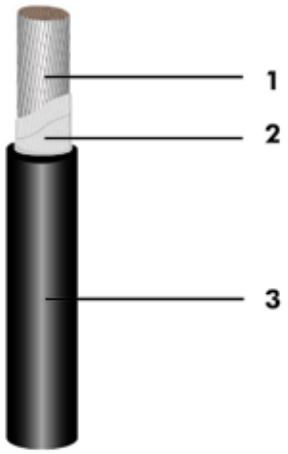
Strictly halogen free, these cables are also fire retardant, low smoke fume and are recommended for high temperature applications in railway vehicles (locomotives, trains, trolley busses...).
A 140°C conductor temperature is allowed for a 20000 hours cumulative working time.

HIGH TEMPERATURE
Flexible single core cables
Y 3000 S type
Conductor class temperature:
+120°C/+140°C

Vo : 3000 V

Design

1- Conductor
Flexible tinned copper- class 5
IEC 60 2288
2- Separating tape
Polyester tape
3- Insulation
Silicone halogen free rubber
Colour: black



Marking

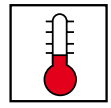
Y-3000-S - section - NF F 63 827 |Nexans| factory code - week/year

Construction

NF F 63 827

Test performance

NF F 16 101


- 40°C to +135°C


Good resistance to UV and humidity


Good resistance to impacts


Good chemical resistance (acids, oils, ...)


Fire retardant (NF C 32 070/C1, IEC 60 332-3, EN 50 266)


Low smoke emission (IEC 61 034-2)


Non corrosive and non toxic (IEC 60 754-2 and EN 50 267)


Flexible (Class 5 IEC 60 228)

Halogen free

Y 3000 S NF F 63 827

Cables (mm²)	Conductor Approx. Ø (mm)	Max. resistance of core at 20°C (ohms/km)	Y 3000 S			
			Overall Ø minimum (mm)	Overall Ø Maximum (mm)	Permissible current rating (A)	Approx. Weight (kg/km)
2.5	1.95	8.21	6.4	7.2	46	65
4	2.5	5.09	7.0	7.8	60	85
10	3.9	1.95	8.4	9.5	105	160
16	5.0	1.24	9.8	11.0	136	230
25	6.4	0.795	11.0	12.2	176	310
35	7.7	0.565	12.2	13.5	220	420
50	9.2	0.393	14.2	15.5	268	580
70	11.0	0.277	16.1	17.7	335	790
95	12.5	0.210	18.0	19.8	400	1030
120	14.2	0.164	20.0	21.9	460	1250
150	15.8	0.132	21.8	23.8	525	1560
185	17.5	0.108	23.7	25.9	615	1880
240	20.1	0.0817	26.6	29.1	750	2420

• Electrical test:

10 000 V - 50 Hz - 5 mn

Current carrying capacity
Current data are indicated for continuous duty operation and apply to maximum conductor
- temperature: 120°C
- ambient temperature:
from 25 °C up to 40°C without correction factor

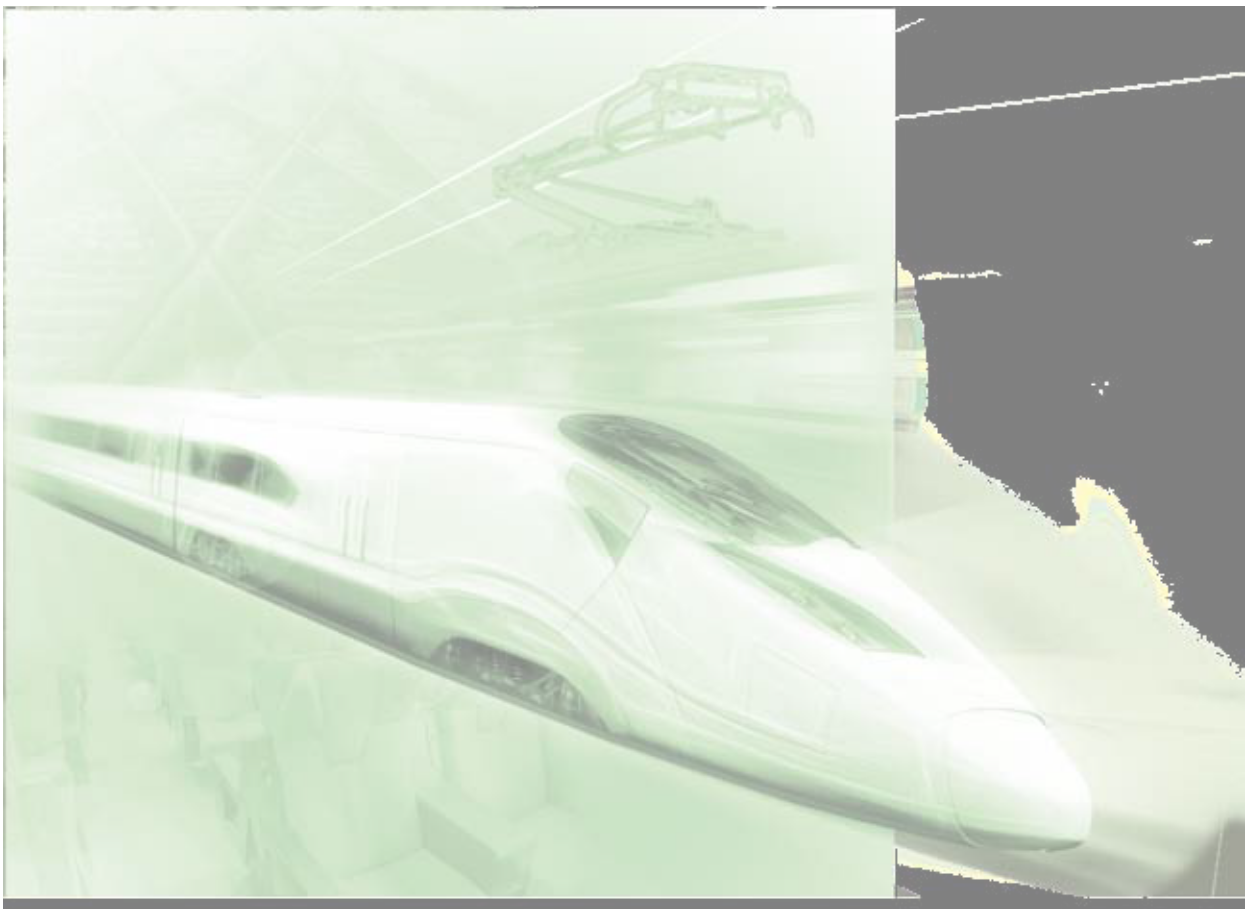
To meet hard conditions in rolling stock application; materials must have good mechanical properties, good resistance to ozone, IRM 902 mineral oil, acids and alkalis

In NF F 16 101 standards, these rolling stock cables are classified:

* Fire Performance : class C

The burnt lenght must be lower than 300 mm after NFC C 32-070 n°2 test

* Smoke emission: class F0 means IF<5



PART 3
Jumper cables

Standard and customized jumper cables

Extra-flexible cables

Applications

Nexans produces a complete range of standard or customized jumper cables for power and data transmission outside trains and inside subways and tramways.
Nexans manufacture 2 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.
Nexans jumper cables show an excellent mechanical resistance to abrasion, tensile strength and cut through, but also a very good resistance to chemical agents.

Main characteristics

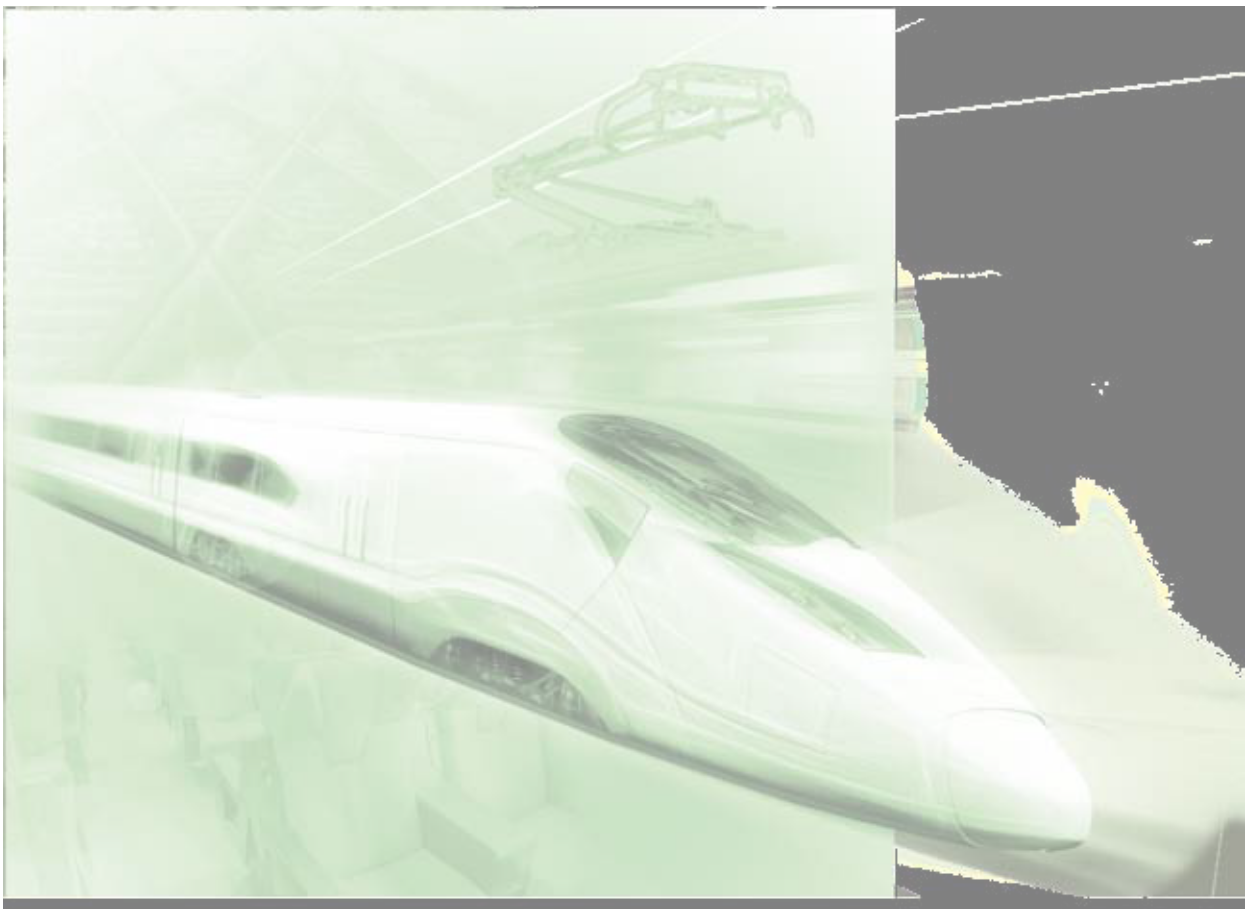
- Jumper cables are available in every type of construction according to customer specifications:
  - with single and multicore (unscreened and unsheathed and/or screened and sheathed),
  - with coaxial or data bus cables,
  - with optical elements.
- Very high flexibility level (class 6 stranded conductor)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

Standards and specifications

Jumper cables strictly conform to the following standards:
IEC 60 332-3 Cat. C, NFC 32-070 C1/C2, BS 6853 table 13 Cat Ia, EN 50 306-1, VDE 0472 Teil 804 (fire performance).
All internal insulation of low voltage wires meet NF F 63 808, EN 50 306, NF C 20 902/1 & 2/2-1, NF F 16 101Class F0 C, IEC 60 754/2 – EN 50 267 (EN 50 306), NF C 20 453.
They also strictly conform to requirements linked to external sheath: NF F 63 295 (low smoke emission & fire performance) or NF F 63 826.

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.



Part 3-1
Extra-flexible standard jumper cables

FLAMEX® SI - type FXZ
EN 50 382-2

Applications

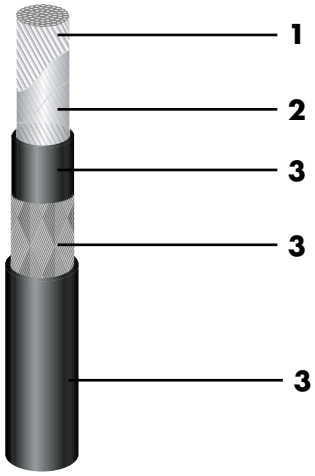
This specific extra flexible and reinforced type is designed to be used as jumper cables

Conductor class temperature: 120°C or 150°C

Uo/U (Um): 3.6/6(7.2)kV
Vo: 5400 V

Design

1- Conductor
Extra Flexible class 6 copper according to IEC 60 228
*tinned copper for 120°C Class
*plain copper for 150°C Class
2- Separator
Unweaved tape
3- Insulation
Twin layer of silicon rubber with included polyester reinforcemement braid compound type EI 111 according to EN 50 382-1.
Colour: black



Marking

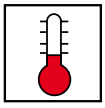
FLAMEX® SI EN 50 382-2 3600 V- conductor size - designation type (FXZ) - temperature class (120°C or 150°C)
Nexans factory number (205) batch number/year

Standards

Construction EN 50 382-2
Fire & Smoke performance NF F 16 101

Guide to use

Cabling rules are given in EN 50 343
Min. bending radius (static) 4 x outer cable diameter (EN 30 355)
Min. bending radius (dynamic) 6 x outer cable diameter
Pulling tensile force (dynamic) during installation
50 N/mm² of copper size
Mechanical static tensile force 15N/mm² of copper size
Permissible current corrying capacities: value and calculation method are given in EN 50 355 (see page 112)


- 40°C to + 115°C
or
-40°C to +145°C


Good chemical resistance
(acids, oils, ...)
IRM 902


Flame retardant
EN 60 332-1-2


Fire retardant
(EN 50 266-2-4)
(or 2-5 for cable diameter < 12mm)


Smoke emission
EN 61 034-2
(light transmission > = 70%)


Toxicity index
EN 50 305
(ITC < 3)

Halogen free
EN 50 267-2-1 (less than 0.5%)
EN 60 884-2 (less than 0.1%)
EN 50 267-2-2 (more than 4.3)
EN 50 267-2-2 (less than 10 µS/mm)

FLAMEX® SI - EN 50 382-2 3.6/6kV Type FXZ Class 120°C or 150°C
Extra flexible single core cables

Ref table 4 EN 50 382-2

Designation	CONDUCTOR		Insulation/Sheath		Overall Ø mm		Average weight kg/km
	Cross section mm^2	Ø mm	Insulation nominal thickness mm	Reinforced braid for insulation Approx. Thickness mm	mini. mm	maxi. mm	
FLAMEX® SI EN 50 382.2 3600V 50 FXZ 120°C or 150°C	50	9.2	3.0	0.8	15.2	17.8	680
FLAMEX® SI EN 50 382.2 3600V 70 FXZ 120°C or 150°C	70	11.0	3.0	0.8	16.9	19.8	935
FLAMEX® SI EN 50 382.2 3600V 95 FXZ 120°C or 150°C	95	12.5	3.0	0.8	18.3	21.4	1150
FLAMEX® SI EN 50 382.2 3600V 120 FXZ 120°C or 150°C	120	14.2	3.1	0.8	20.1	23.5	1480
FLAMEX® SI EN 50 382.2 3600V 150 FXZ 120°C or 150°C	150	15.8	3.1	0.8	21.6	25.3	1800
FLAMEX® SI EN 50 382.2 3600V 185 FXZ 120°C or 150°C	185	17.5	3.2	0.8	23.4	27.4	2240

NF F 63 826
JUMPER / Single core

extra flexible (SS)
1.500 V(Vo)

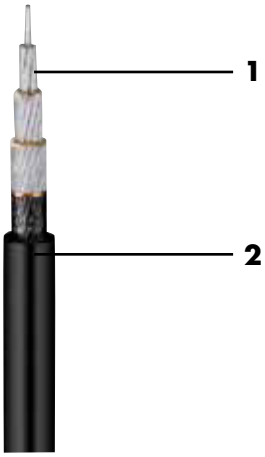
Applications

For use in railway vehicles (locomotives, trains, trolley busses etc.), switching stations and control panels. Especially for mobile links between cars or car bogies. Installation in cable ducts, tubes or outside (protected). Strictly halogen free, these cables are also resistant, low smoke fume.
A 105°C conductor temperature is allowed for a 20.000 hours cumulative working time.

Conductor temperature: +90°C/+105°C

Design

1- Conductor
Extra-flexible tinned copper class 6 acc. to IEC 60 228, conductor wrapping optionnal
2- Insulation
Special halogen free compound, type EI 104
colour: black



Marking

Example: Y-1500-SS 120 MM2
NF F 63 826 |Nexans| 04/2010 Fa-Nr

Bending radius

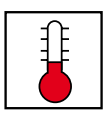
(in accordance with NF F 16 010 standard)
Dynamic use: 4 to 8 x outer diameter
Static use: 3 x outer diameter

Standards

According to: NF F 63 826, NF F 16 101, BS 6853 (on request).

Guide to use

Cabling rules are given in NF F 61 010 standard.
Permissible current capacities are given in NF F 61 012 standard (see page 110).


- 25°C to +85°C


Good resistance to UV and humidity


Good resistance to impacts


Good chemical resistance (acids, oils, ...)


Fire retardant (NF C 32 070/C1, EN 60 332-24/25, EN 60 332-1-2)


Low smoke emission (IEC 61 034-2)


Non corrosive and non toxic (IEC 60 754-2 and EN 50 267)


Extraflexible (Class 6 IEC 60 228)

Halogen free IEC 60 754-1

NF F 63 826 - JUMPER Single cores

Cross Section (mm^2)	Maxi Overall diameter (mm)	Approx. Weight (kg/km)
10	9.5	187
16	10.8	266
25	12.2	354
35	13.7	440
50	15.5	613
70	17.7	875
95	19.8	1045
120	21.9	1350
150	23.8	1650
185	25.9	2130

NF F 63 827

Applications

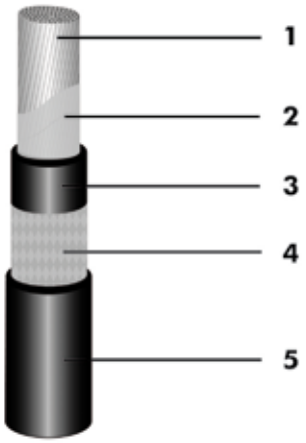
Strictly halogen free, these cables are also fire retardant, low smoke fume and are recommended for mobile links between car or car-bogies (jumpers).
A 140°C conductor temperature is allowed for a 20000 hours cumulative working time.
They can also be used for general power applications.

EXTRA-FLEXIBLE, HIGH TEMPERATURE REINFORCED single core cables
Standard wall insulation
Z 3000 SS type
Conductor class temperature: +120°C/+140°C

Vo : 3000 V

Design

1- Conductor
Extra-flexible tinned copper - class 6 IEC 60 228
2- Optional separator tape
Polyester tape
3- Insulation
Silicone halogen free rubber
4- Mechanical reinforcement
Textile Braid
5- Sheath
Silicone halogen free rubber
Colour: Black



Marking

Example: NF F 63 827 Z3000 SS - section |Nexans| factory code - batch number/year

Bending radius

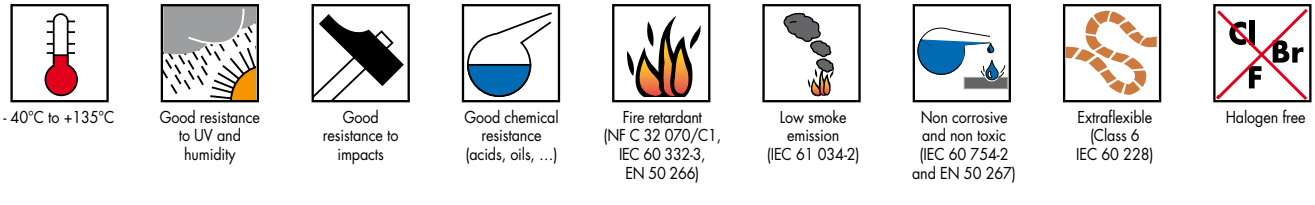
Dynamic use: 4 to 8 x outer diameter
Static use: 3 x outer diameter

Standards

According to: NF F 63 827, NF F 16 101.

Guide to use

Cabling rules are given in NF F 61 010 standard.
Permissible current capacities are given in NF F 61 012 standard (see page 110).



Characteristics

Cables (mm^2)	Conductor Approx. Ø (mm)	Max. resistance of core at 20°C (ohms/km)	Z 3000 SS			
			Overall Ø minimum (mm)	Overall Ø maximum (mm)	Permissible current rating (A)	Approx. Weight (kg/km)
25	6.4	0.795	12.0	13.2	176	390
35	7.7	0.565	13.2	14.7	221	500
50	9.2	0.393	15.2	16.7	268	680
70	11.0	0.277	17.1	18.8	335	930
95	12.5	0.210	19.0	21.0	338	1150
120	14.2	0.164	21.0	23.1	458	1470
150	15.8	0.132	22.8	25.0	525	1800
185	17.5	0.108	24.7	27.1	613	2240
240	20.1	0.0817	27.6	31.2	740	2820

- Electrical test:

10000 V - 50 Hz - 5 mn

Current data are indicated for continuous duty operation and apply to maximum conductor
- temperature: 140°C
- ambient temperature: 30°C

To meet hard conditions in rolling stock application; materials must have good mechanical properties, good resistance to ozone, IRM 902 mineral oil, acids and alkalis.

In NF F 16 101 standard, these rolling stock cables are classified:

- Fire performance: class C

The burnt length must be lower than 300 mm after NF C 32 070 n°2 test

- Smoke emission: class F0 means IF<5.

FLAMEX® GASOIL resistant
JUMPER / Single core

SNCF 10-5315-848
1.500 V (Vo)

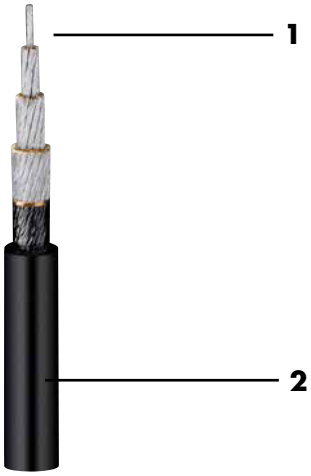
Applications

For protected installation in railway vehicles (locomotives, trains, trolley-busses etc.), switching station and control panels. Installation in cable ducts, pipes and tubes. Specially for mobile links between cars on bogies.
This cable is a special gasoil resistant, flame retardant, strictly halogen free and shows low smoke opacity.
Substitute the cable family according to NF F 63 296.

Conductor class temperature: 90°C/105°C

Design

1- Conductor
Extra flexible stranded tinned copper
Class 6 according to DIN VDE 0295 / IEC 60228 / HD 383
Conductor wrapping optional
2- Insulation
Cross linked compound type EI 104
according to EN 50 264-1,
oil, gasoil, ozone and UV resistant



Marking

e.g : Y-1500-SS 1x185mm2 FLAMEX GASOIL resistant 10-5315-848 I Nexans I 40/2010 Fa-Nr. ...

Colour Codes

Black

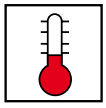
Bending radius

Dynamic use: 10 x outer diameter
Static use: 5 x outer diameter

Standards

SNCF 10-5315-848, EN 50 264-2-1, NF F 16 101

Halogen free
EN 50 264-1 A/B


Operating temp range
- 40°C to +90°C


Gases corrosivity
No acc. to
EN 50 267-2-2

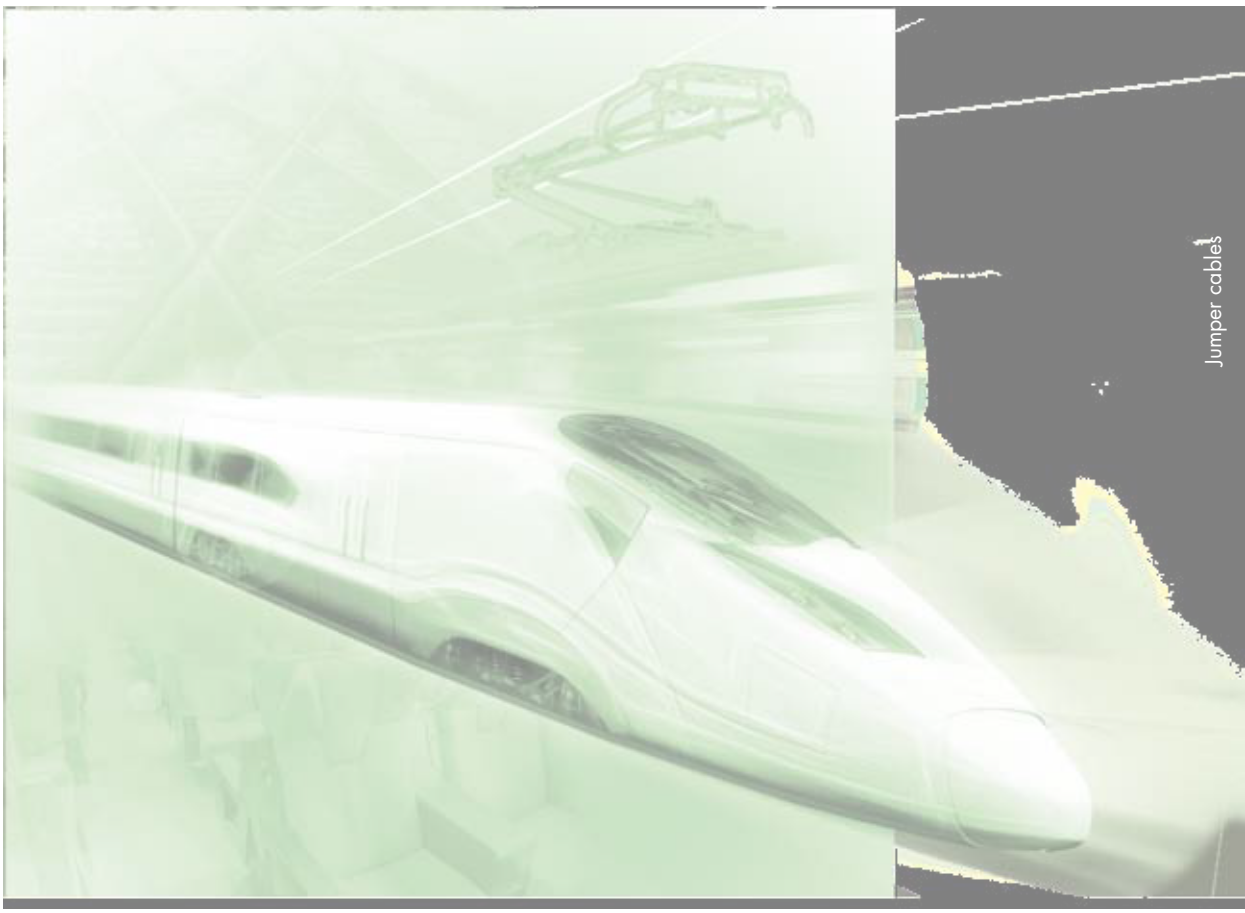

Gas toxicity innocuous
EN 50 305-9.2


Flame retardant
EN 60 332-1-2;
EN 60 332-3-24;
EN 60 332-3-25


Smoke density
EN 50 268-2;
NF F 16 101

FLAMEX® GASOIL resistant - JUMPER Single cores

Cross Section (mm²)	Maxi outer diameter (mm)	Approx. Weight (kg/km)
1x25	12.2	330
1x35	13.7	480
1x50	15.5	610
1x70	17.7	860
1x95	19.8	1070
1x120	21.9	1340
1x150	23.8	1620
1x185	25.9	1940
1x240	29.1	2550



Part 3-2
Customized jumper cables

COMPOSITE & MULTICORE JUMPER CABLES

Extra-flexible cables

Applications

Nexans produces a complete range of customized jumper cables for power and data transmission.

Power and data applications

Main characteristics

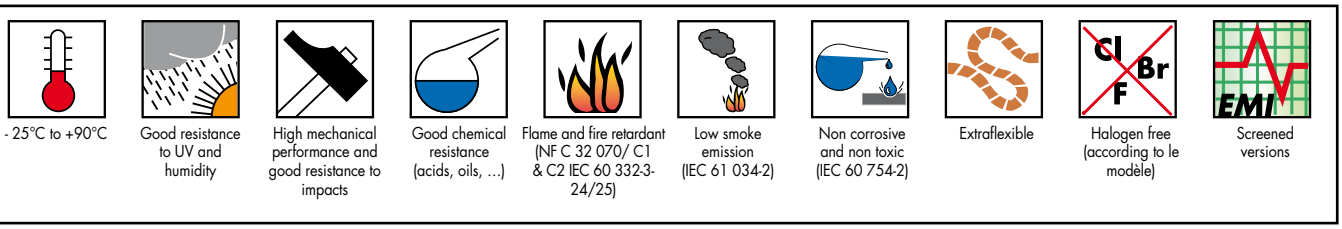
- Jumper cables are available in every type of construction according to customer specifications:
  - with single and multicore (unscreened and unsheathed and/or screened and sheathed),
  - with coaxial or data bus cables,
  - with optical elements.
- Very high flexibility level (class 6 stranded conductor)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

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.

Standards and specifications

Jumper cables strictly conform to the following standards: IEC 60 332-3-24/25, NFC 32-070 C1/C2, BS 6853 table 13 Cat Ia, EN 50 306-1, VDE 0472 Teil 804 (fire performance).
All internal insulation of low voltage wires meet NF F 63 808, EN 50 306, NF C 20 902/1 & 2/2-1, NF F 16 101Class F0 C, IEC 60 754/2 – EN 50 267 (EN 50 306), NF C 20 453.
They also strictly conform to requirements linked to external sheath: NF F 63 295 (low smoke emission & fire performance) or NF F 63 826.

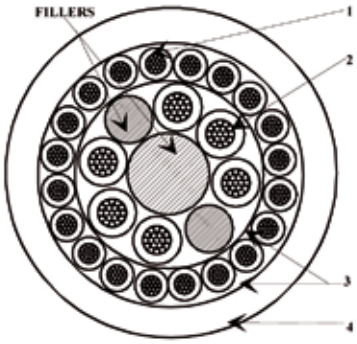


- 25°C to +90°C
- Good resistance to UV and humidity
- High mechanical performance and good resistance to impacts
- Good chemical resistance (acids, oils, ...)
- Flame and fire retardant (NF C 32 070/ C1 & C2 IEC 60 332-3-24/25)
- Low smoke emission (IEC 61 034-2)
- Non corrosive and non toxic (IEC 60 754-2)
- Extraflexible
- Halogen free (according to le modèle)
- Screened versions

Typical constructions

Unscreened wires

ET 2PE920: 6 wires (6.0 mm²) + 20 wires (2.61 mm²)
Overall diameter: 27 mm



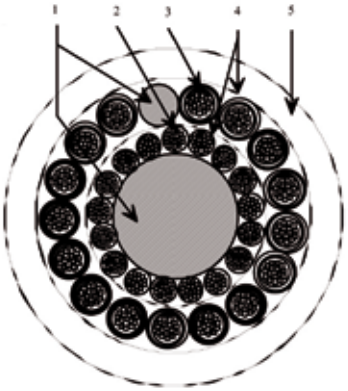
1. 20 wires
2. 6 wires
3. Tapes
4. LSZH sheath

ET 2PE384: 61 wires (1.82 mm²)
Overall diameter: 28 mm

1. Filler
2. 61 wires
3. Tapes
4. LSZH sheath

Screened and unscreened wires

ET 2PB503: 17 unscreened wires (1.34 mm²)
+ 16 screened wires (1.34 mm²)
Overall diameter: 28 mm



1. Fillers
2. 17 wires
3. 16 wires
4. Tapes
5. Rubber sheath

Screened multipair cable

ET 2PC842: 11 screened pairs (1.50 mm²)
+ 1 screened triple (1.50 mm²)
Overall diameter: 35 mm

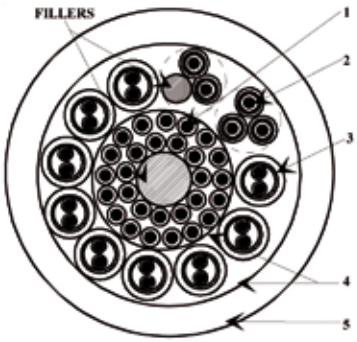
1. Fillers
2. 11 pairs
3. 1 triple
4. Tapes
5. LSZH sheath

ET 2PC211: 3 screened pairs (0.93 mm²)
Overall diameter: 15 mm

1. Fillers
2. 3 pairs
3. Tapes
4. Rubber sheath

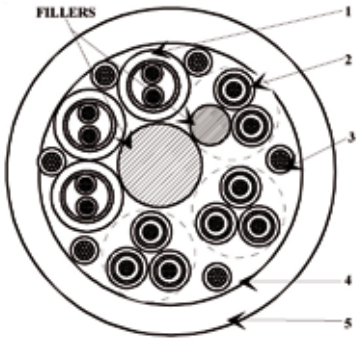
Composite cable

ET 2PE925: 28 wires (0.93 mm²) + 5 screened and sheathed wires (0.93 mm²) + 9 screened pairs (0.93 mm²)
Overall diameter: 28 mm



1. 28 wires
2. 5 wires
3. 9 pairs
4. Tapes
5. LSZH sheath

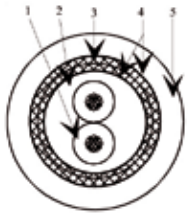
ET 2PE923: 6 unscreened wires (0.93 mm²) + 8 screened and sheathed wires (0.93 mm²) + 3 screened pairs (0.93 mm²)
Overall diameter: 28 mm



1. 3 pairs
2. 8 wires
3. 6 wires
4. Tapes
5. LSZH sheath

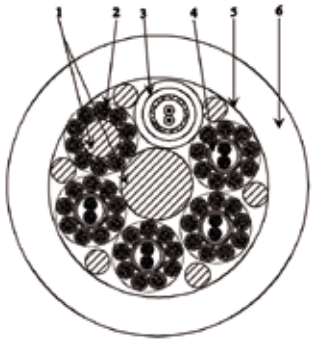
Data bus cable

ET 2PA721: Data bus 120 Ω – 1 screened pair
Overall diameter: 13 mm



1. 2 wires
2. Polyolefin sheath
3. Tinned copper braids
4. Tapes
5. LSZH sheath

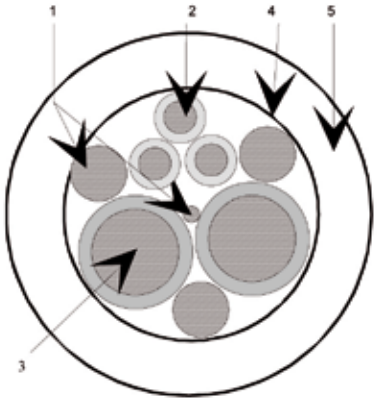
ET 2PE485: 46 wires (1.82 mm²) + 4 screened and sheathed pairs (0.93 mm²) + 1 twinax 105 Ω (0.60 mm²).
Overall diameter: 38 mm



1. Fillers
2. 46 wires
3. 1 twinax
4. 4 pairs
5. Tapes
6. LSZH sheath

Power cable

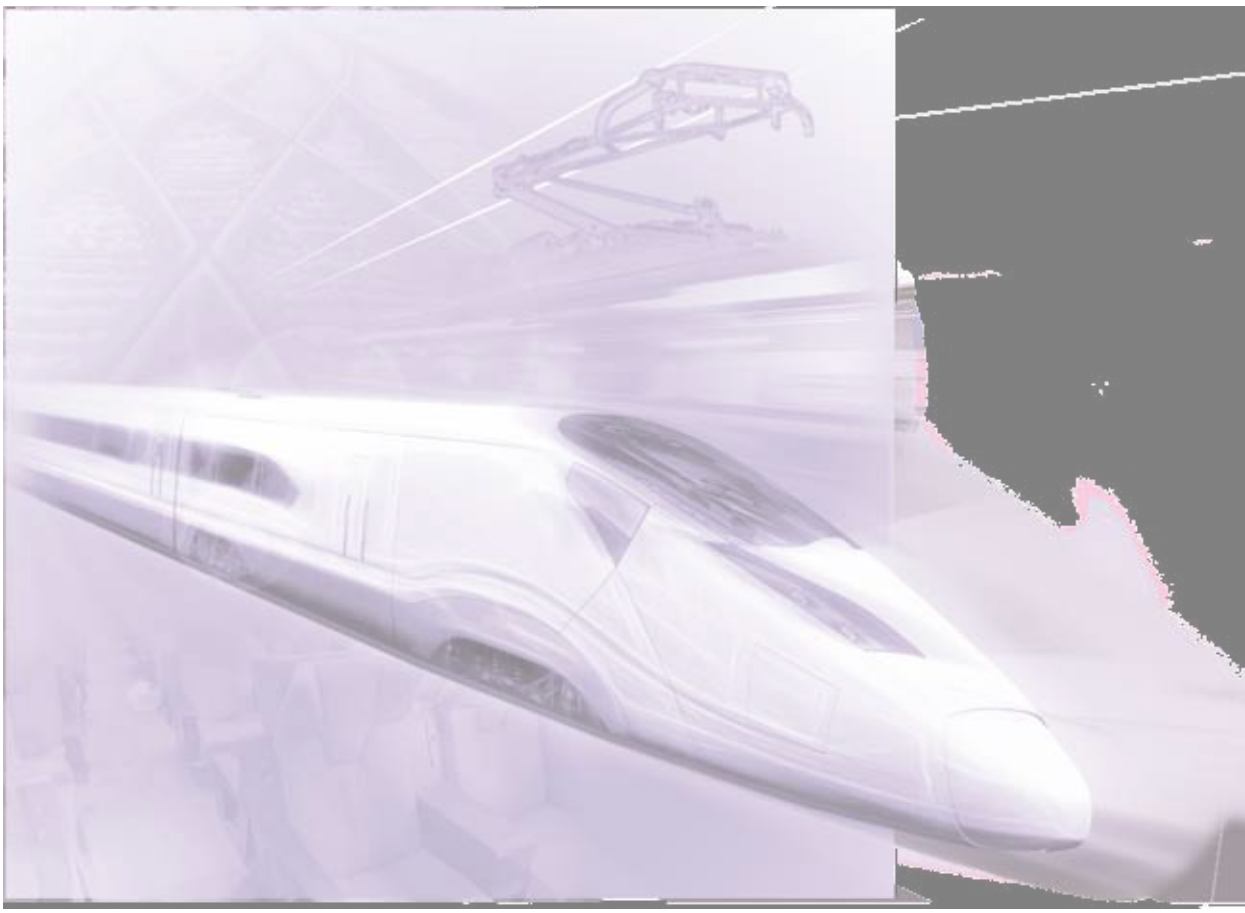
- Power jumper cable: 2 x 50 mm² + 3 x 6 mm² Highly flexible, silicone insulation and halogen free sheath
  Overall diameter: 36 mm
- RY 1500 SS 4 x 95 mm² + 2 x 10 mm²
  Highly flexible, silicone insulation and halogen free sheath
  Overall diameter: 53 mm
- RY 1500 SSO 4 x 70 mm² + 2 x 10 mm²
  Highly flexible, halogen free materials
  Overall diameter: 46 mm



1. Fillers
2. 3 wires
3. 2 wires
4. Tapes
5. LSZH sheath

Other constructions

These examples represent an overview of our expertise. Indeed, composite cables with fibre optical cables are also available on request.
Our development and design engineers are at your disposal to provide their experience in customising any of our products to meet your specific requirements.



PART 4
Multimedia & data transmission cables

COAXIAL CABLES

Applications

Nexans produces a range of coaxial cables for data transmission and video signal in onboard equipments.

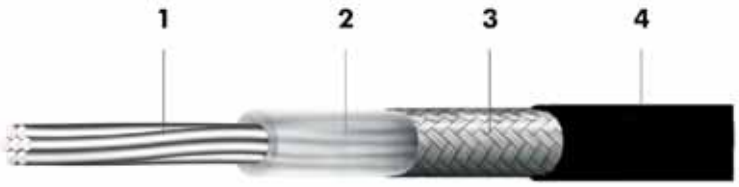
FLAMEX® KX/RG

Coaxial cables 50 Ω and 75 Ω

Design

1- Conductor
Stranded bare, tinned or silvered copper
2- Dielectric
PE.
3- Screen
Single or double braid in bare, tinned or silvered copper
4- Sheath
Halogen free
Colour: black

Lay up with fire barrier tapes (in option).



Marking

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

Bending radius

Static use: 5 x outer diameter

Standards

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

Connectors

Compatible with standard connectors: SMA, SMB, TNC, BNC, N...

- 30°C to +80°C
- Good chemical resistance (acids, oils, ...)
- Flame and fire retardant (IEC 60 332-1/2/3 cat. C)
- Low smoke emission and low opacity (IEC 61 034).
- Non corrosif et non toxique (IEC 60 754-2)
- Flexible
- Halogen free (IEC 60 754-1)
- Screened versions

Coaxial cables 50 Ω

Designation	Nexans reference	Conductor		Dielectric	Braid		Cable		Operating voltage (V ac)
		Stranding	Ø (mm)	Ø (mm)	1 (mm)	2 (mm)	Ext. Ø (mm)	Weight (kg/km)	
FLAMEX® KX 3B	ET 299946	7 x 0.16 CCS	0.48	1.50 ± 0.10	0.10 TPC	-	2.54 ± 0.13	10	1100
FLAMEX® RG 174	ET 299956	7 x 0.16 CCS	0.48	1.52 ± 0.08	0.10 TPC	-	2.79 ± 0.13	12.5	1100
FLAMEX® RG 58	ET 299954	19 x 0.18 TPCt	0.90	2.95 ± 0.10	0.13 TPC	-	4.95 ± 0.10	41	1400
FLAMEX® RG 213	ET 299957	7 x 0.75 BC	2.25	7.24 ± 0.18	0.18 BC	-	10.30 ± 0.18	165	3700
FLAMEX® RG 214	ET 299958	7 x 0.75 SPC	2.25	7.24 ± 0.18	0.16 SPC	0.16 SPC	10.80 ± 0.18	198	3700

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

Coaxial cables 75 Ω

Designation	Nexans reference	Conductor		Dielectric	Braid		Cable		Operating voltage (V ac)
		Stranding	Ø (mm)	Ø (mm)	1 (mm)	2 (mm)	Ext. Ø (mm)	Weight (kg/km)	
FLAMEX® KX 6A	ET 299952	7 x 0.20 BC	0.60	3.70 ± 0.12	0.16 BC	-	6.10 ± 0.15	57	1700
FLAMEX® RG 59	ET 299955	1 x 0.57 CCS	0.57	3.71 ± 0.10	0.16 BC	-	6.15 ± 0.10	58	1700
FLAMEX® RG 11	ET 299953	7 x 0.40 TPS	1.20	7.24 ± 0.18	0.18 BC	-	10.30 ± 0.18	146	3700
FLAMEX® KX 8	ET 299951	7 x 0.40 BC	1.20	7.25 ± 0.15	0.18 BC	-	10.30 ± 0.20	145	3700
FLAMEX® RG 216	ET 299965	7 x 0.40 TPC	1.20	7.24 ± 0.18	0.16 BC	0.16 BC	10.80 ± 0.18	185	3700

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

SPC: Silver plated copper, SPCCS: silver plated copper clad steel, TPC: tin plated copper, BC: bare copper, CCS: copper clad steel

Attenuation values

	Designation	Nexans reference	Attenuation at x MHz in db/100m (nominal values)						
			50	100	200	400	1000	3000	11000
50 Ω	FLAMEX® KX 3B	ET 299946			45				
	FLAMEX® RG174	ET 299956	21.32	32.8		82.02	147.63		
	FLAMEX® RG58	ET 299954	13.12	21.32		55.77	91.86		
	FLAMEX® RG213	ET 299957	3.93	7.54		15.74	29.52		
	FLAMEX® RG214	ET 299958	5.57			22.3		91.86	196.85
75 Ω	FLAMEX® KX6A	ET 299952			20				
	FLAMEX® RG59	ET 299955				29.52	52.48		
	FLAMEX® RG 11	ET 299953				17.06	30.84		
	FLAMEX® KX8	ET 299951			12				
	FLAMEX® RG 216	ET 299965				21.32	75.45		

MULTIMEDIA & DATA TRANSMISSION CABLES

For on-board equipments in rolling stock applications

Applications

Nexans produces a range of Multimedia & Data Transmission cables for on-board railway equipments.
Using the FLAMEX® technology, these halogen free cables are intended for applications where flame retardancy is required. They are particularly recommended for the cabling of rolling stock applications.

Customized products - 100 to 150 Ω

Advantages

This range of products meets the current needs of the market especially regarding the interoperability of trains and railway equipments throughout Europe (ERTMS).
These cables are adapted for data transmission up to 100 MHz, with performance close to that of 'CAT5' cables.
Nexans experience in the design of shielding technology enables us to propose all constructions with high EMC protection.

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 cars (TGV).
  MVB & WTB are a part of the TCN protocol defined in the IEC 61 375.
- PROFIBUS, video on request, audio...
- ETHERNET 100 base T

Standards and specifications

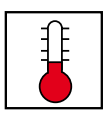
External Jacket EN 50 264 or NF F 63 826 according to the version

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.


From - 25°C to +90°C according to the version


Good chemical resistance (acids, oils, ...)


Flame retardant (NF C 32 070 C2 and IEC 60 332- 1)


Low smoke emission and low opacity (IEC 61 034).


Non corrosive and non toxic (IEC 60 754-2 and EN 50 267)


Flexible

Halogen free (IEC 60 754-1)

Screened versions

Multimedia cable range according to main fire European requirements

Type	Nexans ref.	Cable type	Construction	Dedicated Network	Impedance 100 Ω	Impedance 120 Ω	Impedance 150 Ω	Cross section mm²	Screen	Jacket material	Nominal Overal diameter	Average weight kg/km	fire performances
DATA BUS CABLES	2PF146	quad	4 cores	ETHERNET MVB	•			0,6	Alu tape TC braid	NF F 63 826 EN 50 264	7,80	86	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PE993	quad	4 cores	MVB		•		0,5	Alu tape TC braid	NF F 63 826 EN 50 264	8,00	86	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PF580	pair	2 cores	MVB		•		0,5	Alu tape TC braid	NF F 63 826 EN 50 264	8,00	84	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PF578	pair	2 cores	WTB		•		0,75	Alu tape TC braid	NF F 63 826 EN 50 264	8,20	87	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PF164	pair	2 cores	PROFIBUS			•	0,34	Alu tape TC braid	NF F 63 826 EN 50 264	8,00	82	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PF860	pair	Pair + 1 core	CAN OPEN CAN BUS		•		0,5	Alu tape TC braid	NF F 63 826 EN 50 264	6,80	62	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PF861	quad	Quad + 4 cores	MVB		•		0,50 0,25	Alu tape TC braid	NF F 63 826 EN 50 264	8,00	90	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
DATA BUS ETHERNET CABLES	2PC854	pair	8 cores	ETHERNET CAT 6	•			0,13	Alu tape TC braid	NF F 63 826 EN 50 264	7,50	65	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PC912	pair	4 cores	ETHERNET CAT 5	•			0,25	Alu tape TC braid	NF F 63 826 EN 50 264	6,50	55	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PJ286	quad	4 cores	ETHERNET CAT 5	•			0,25	Alu tape TC braid	NF F 63 826 EN 50 264	6,10	55	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PF953	pair	8 cores	ETHERNET CAT 5	•			0,25	Alu tape TC braid	NF F 63 826 EN 50 264	9,00	100	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PJ818	pair	8 cores	ETHERNET CAT 6	•			0,25	Alu tape TC braid	NF F 63 826 EN 50 264	11,50	130	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PH934	pair	4 cores	ETHERNET CAT 5	•			0,5	Alu tape TC braid	NF F 63 826 EN 50 264	9,80	118	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PJ285	quad	4 cores	ETHERNET CAT 5	•			0,5	Alu tape TC braid	NF F 63 826 EN 50 265	8,50	96	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PF737	pair	8 cores	ETHERNET CAT 5	•			0,5	Alu tape TC braid	NF F 63 826 EN 50 264	9,70	118	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PF146	quad	4 cores	ETHERNET CAT 5	•			0,6	Alu tape TC braid	NF F 63 826 EN 50 264	7,80	86	EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A

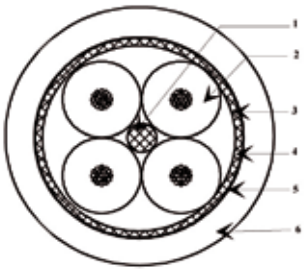
Multimedia cable range according to NF F 16 101 cat A1 and main fire European requirements

Type	Nexans ref.	Cable type	Construction	Dedicated Network	Impedance 100 Ω	Impedance 120 Ω	Impedance 150 Ω	Cross section mm²	Screen	Jacket material	Nominal Overal diameter	Average weight kg/km	Fire performances
DATA BUS CABLES	2PK476*	quad	4 cores	MVB		•		0,5	Alu tape TC braid	NF F 63 826 EN 50 264	8,50	95	NF F 16 101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PJ842	pair	2 cores	MVB		•		0,5	Alu tape TC braid	NF F 63 826 EN 50 264	8,50	86	NF F 16 101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PJ841	pair	2 cores	WTB		•		0,75	Alu tape TC braid	NF F 63 826 EN 50 264	8,50	92	NF F 16 101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PK477*	pair	2 cores	PROFIBUS			•	0,34	Alu tape TC braid	NF F 63 826 EN 50 264	8,50	90	NF F 16 101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PK478*	pair	Pair + 1 core»	CAN OPEN CAN BUS		•		0,5	Alu tape TC braid	NF F 63 826 EN 50 264	8,50	70	NF F 16 101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PK479*	quad	Quad + 4 cores»	MVB		•		0,50 0,25	Alu tape TC braid	NF F 63 826 EN 50 264	9,00	100	NF F 16 101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
DATA BUS ETHERNET CABLES	2PK480*	pair	8 cores	ETHERNET CAT 6	•			0,13	Alu tape TC braid	NF F 63-826 EN 50 264	8,50	75	NF F 16-101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PC912	pair	4 cores	ETHERNET CAT 5	•			0,25	Alu tape TC braid	NF F 63-826 EN 50 264	6,50	55	NF F 16-101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PK319	quad	4 cores	ETHERNET CAT 5	•			0,25	Alu tape TC braid	NF F 63-826 EN 50 264	6,70	65	NF F 16-101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PK480*	pair	8 cores	ETHERNET CAT 5	•			0,25	Alu tape TC braid	NF F 63-826 EN 50 264	9,50	110	NF F 16-101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PK481*	pair	4 cores	ETHERNET CAT 5	•			0,5	Alu tape TC braid	NF F 63-826 EN 50 264	10,50	125	NF F 16-101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PK211	quad	4 cores	ETHERNET CAT 5	•			0,5	Alu tape TC braid	NF F 63-826 EN 50 265	8,50	96	NF F 16-101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A
	2PK482*	pair	8 cores	ETHERNET CAT 5	•			0,5	Alu tape TC braid	NF F 63-826 EN 50 264	10,50	125	NF F 16-101 cat A1 EN 50 306 DIN 5510-2 CEI 11170-3 BS 6853 cat 1A

* Under development

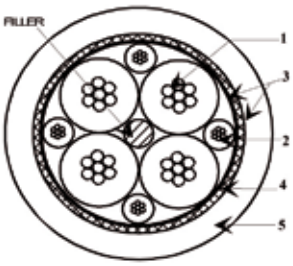
Typical constructions

Shielded quad 2PF146/2PE993



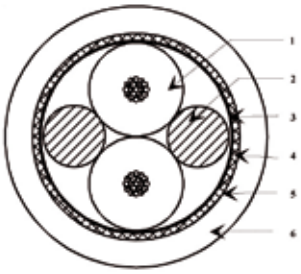
1. 1 filler
2. 4 conductors
3. Tapes
4. Braid
5. Tape
6. Sheath

Shielded quad 2PF861



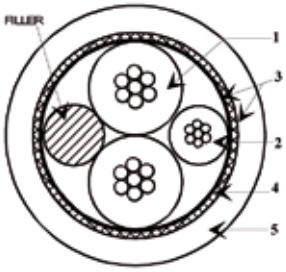
1. 4 conductors (quad)
2. 4 conductors
3. Tapes
4. Braid
5. Sheath

Twinax/Bus 289779/2PF580/ 2PF578/2PE424



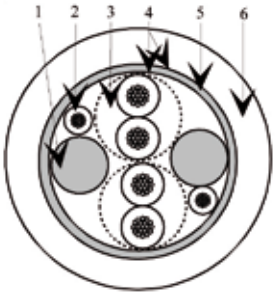
1. 2 conductors
2. 2 fillers
3. Tapes
4. Braid
5. Tape
6. Sheath

Twinax + 1 conductor 2PF860



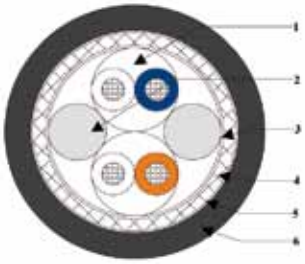
1. 2 conductors
2. 1 conductor
3. Tapes
4. Braid
5. Sheath

Composite 2PC352



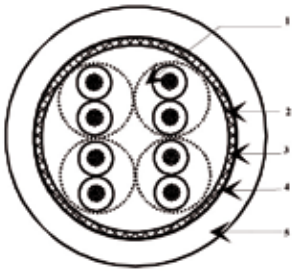
1. 2 fillers
2. 2 conductors
3. 2 pairs
4. Tapes
5. Braid
6. Sheath

Shielded pairs 2PC912



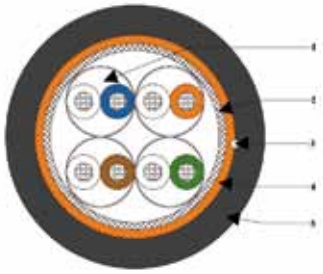
1. 2 pairs
2. Fillers
3. Tape
4. Braid
5. Tape
6. Sheath

Shielded pairs 2PF953



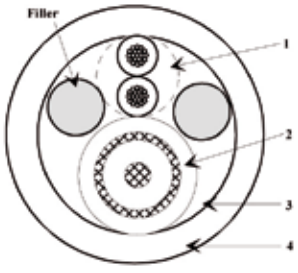
1. 4 pairs
2. Polyester/alu tape
3. Braid
4. Tape
5. Sheath

Shielded pairs 2PC854



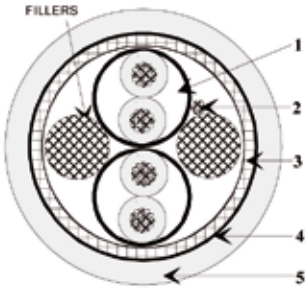
1. 4 pairs individually shielded
2. Braid
3. Rip cord
4. Inner Sheath
5. Outer Sheath

Composite 2PF704



1. 1 pair
2. 1 coaxial 75 Ω
3. Tape
4. Sheath

Shielded pairs 2PC747



1. 2 pairs
2. Drain wire
3. Braid
4. Tape
5. Sheath

OPTICAL FIBER CABLES

Applications

Nexans produces a range of optical fiber cables for onboard communication and data transmission. With a FLAMEX® halogen free insulation and a FLAMEX® halogen free jacket, they conform to the rolling stock requirements.

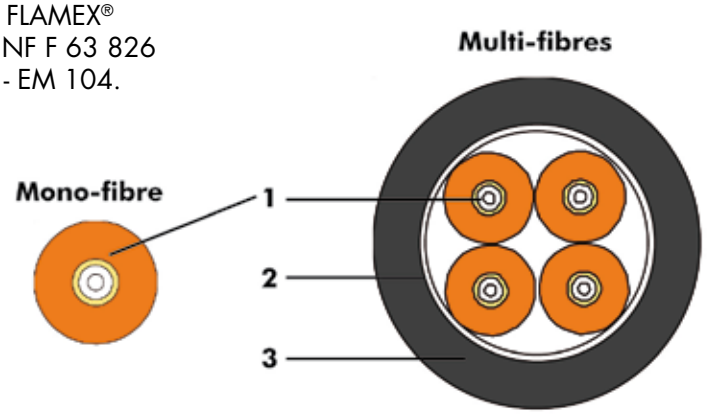
Halogen free mono and multi-fibres

FO 62.5 µm

Design

1- Patch cord
Core: Glass
Ø = 62.5 ± 3 µm
Cladding: Glass
Ø = 125 ± 3 µm
Coating: Acrylate
Ø = 245 ± 10 µm
Buffer: Thermoplastic elastomer
Ø = 900 ± 50 µm
REINFORCEMENT: Aramid yarns
SHEATH: Halogen free FLAMEX® according to NF F 63 808 or EN 264-1 - EM 104.
Ø = 2.00 ± 0.15 mm

2- Tape (for multi-fibres)
3- Outer sheath
Halogen free FLAMEX® according to NF F 63 826 or EN 264-1 - EM 104.



Marking

Exemple:
FILOTEX P - P/Number Nexans - number of fiber x 62.5/125 - SHEATH NF F 63 826 - month and year of production

Standards

According to: NF F 16 101, BS 6853, DIN 5510.

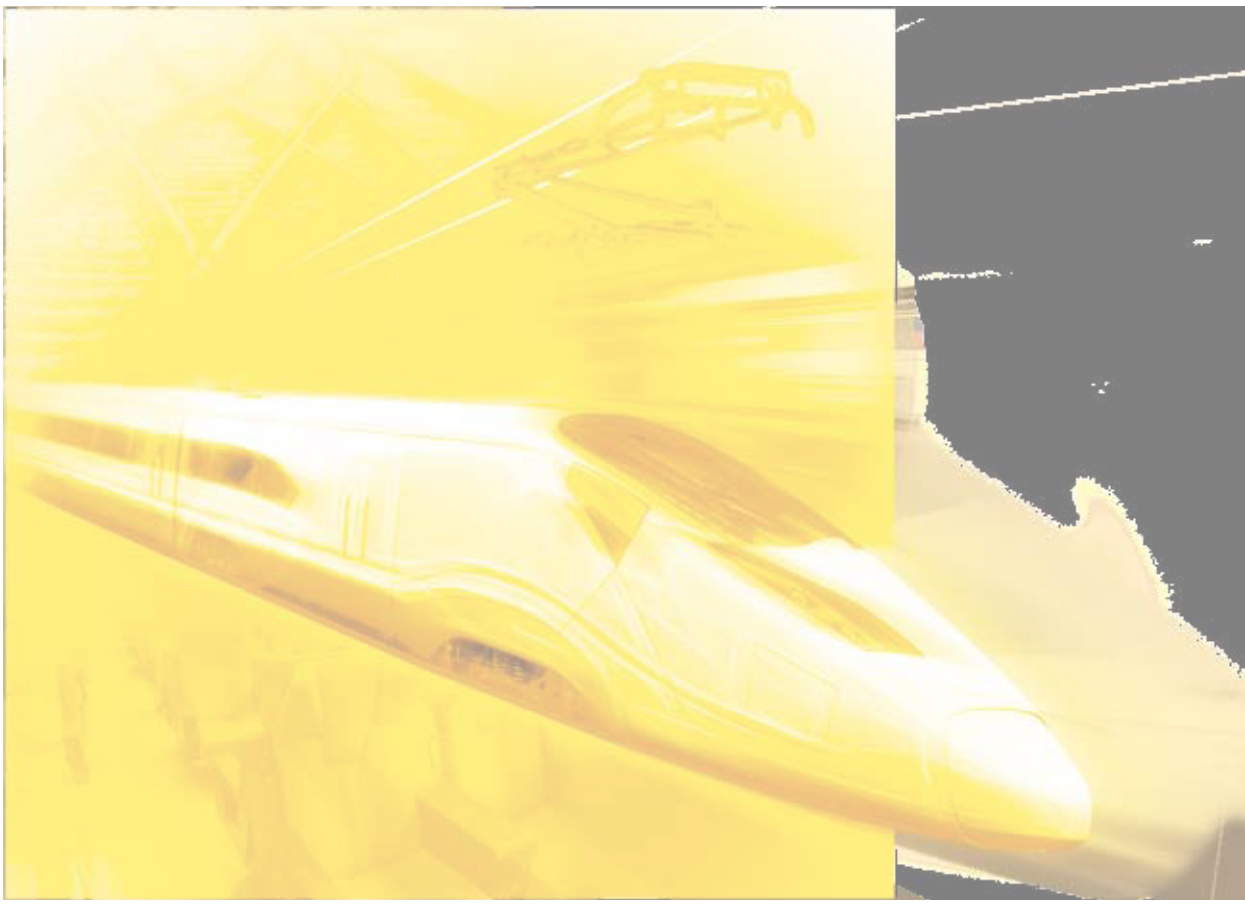
- 40°C to +105°C	Good chemical resistance (acids, oils, ...)	Flame and fire retardant (IEC 60 332-3 cat. C and NF C 32 070 C1 & C2)	Low smoke emission and low opacity (IEC 61 034, Class F1, NF F 16 101)	Non corrosive and non toxic (IEC 60 754-2)	Flexible	Halogen free (IEC 60 754-1)	Screened versions

Characteristics

Insulation material according to NF F 63 808 or EN 264-1 - EM 104.
External sheath according to NF F 63 826 or EN 264-1 - EM 104.

Physical & mechanical characteristics	2PH526	2PH527	2PH528	2PH529	2PH530
Fibre Count	1	2	4	6	8
Cable diameter (mm)	2.00	6.00	7.00	8.00	8.50
Cable weight (kg/km)	6	20	40	60	80
Max. loading (IEC 794-1-E1)					
Static (N)	250	500	1000	1500	2000
Dynamic (N)	125	250	500	750	1000
Mini. Bend radius (IEC 794-1-E10)					
Static (mm)	20	60	70	80	85
Dynamic (mm)	40	120	140	160	170
Crush resistance (IEC 794-1-E3)	250 N/cm				

Attenuation	Value	Unit
850 nm (cabled)	≤ 3.5	dB/Km
1300 nm (cabled)	≥ 1.5	dB/Km



PART 5
Roof cable 26/45 kV (54 kV)

FLAMEX® Panto

Applications

For inside and outside use in railway vehicles. Installation in cable ducts and tubes. Current-carrying capacity acc. to EN 50 343. Satisfies performance requirements to Hazard Level 4 acc. to pr EN 45 545-1.
Available on request: completely pre-assembled flexible cables with plugs and sealing ends, electrically tested.

In line with EN 50 264 and NF F 16 101
Halogen free medium voltage cable
26/45 kV (54 kV)

Conductor temperature: +90°C

Design

1- Conductor
Flexible stranded tinned copper, acc. to IEC 60 228 class 5
2- Inner conductive layer
Conductive rubber
3- Insulation
HEPR, type EI110 acc. to EN 50 264-1, high voltage compound, ozone resistant
4. Outer conductive layer
Conductive rubber (Thermo-Strip)
5. Separator tape
6. Screen
Single wires, tinned (Ø 0,6 mm), separator

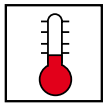
7. Outer sheath
Special cross-linked EVA, type EM104 acc. to EN 50 264-1, oil, diesel-oil, ozone and UV resistant

Marking

Ink white marking e.g.:
FLAMEX® Panto DTREN 150 018 SNCF 10-5299319
95/16 mm2 Cue_F - S 26/52 kV (ww/YYYY) FA-Nr. ...

Standards

International EN 50 264-1
National NF F 16 101


- 40°C to +90°C


Gases toxicity EN 50305-9.2


Flame retardant EN 60 332-1-2 & EN 60 332-3-24 & EN 60 332-3-25


Smoke density EN/IEC 61 034-2


Gases corrosivity EN 50 267-2-2


Bending factor for static use 6 (xD)


Bending factor for dynamic use 10 (xD)

Halogen free (IEC 60 754-1)

FLAMEX® Panto

Nexans ref.	Cross section (mm²)	Screen section (mm²)	Diameter over external semi-conductor (mm)	Min. outer diam. (mm)	Max. outer diam. (mm)	Fire load (kWh/m)	Approx. weight (kg/km)
79477900	95	16	32.0	40	42	8	2500

Selling delivery information

Other cross-sections on request.
Special conditions relating temperature and bending radii (e.g. by compelled guidance into cluthes, wagon transition and boogies) on request.

Electrical properties

Nominal voltage	Uo/U (Umax) = 26/45 (54) kV
Max. operating voltage	Uo max = 32 kV
Test voltage	Core/Screen (5 minutes) Uo = 70 kV
	Core/Screen (1 minutes) Uo = 75 kV
Partial discharge measurement by 52 kV, on pre-assembled flexible cable	≤ 5 pC

Max. operating temperature at conductor

Conductor at normal operation	≤ 90 °C/250.000 h
	≤ 120 °C/20.000 h
Overload	≤ 160 °C / 50 h
Conductor under short-circuit conditions (tinned)	≤ 200 °C

PART 6
Electrical data

Current rating of wires in accordance with NF F 61 012

Current rating of COPPER wires in free air without any corrective factor

Current rating (A)		
Class of temperatures	**105°C**	**140°C**
Standard	**NF F 63 295 NF F 63 296 NF F 63 808 NF F 63 826**	**NF F 63 827**
Cross section (mm²)		
0.6	16	20
0.75		
1/0.93	23	27
1.34	28	33
1.5	30	36
1.82	34	40
2.5/2.61	42	49
4	55	65
4.32	57	68
6	70	83
10	96	113
16	125	151
25	162	198
35	203	244
50	246	303
70	308	372
95	365	447
120	421	518
150	482	592
185	563	672
240	680	791
300	784	903

Current rating of ALUMINUM wires in free air without any corrective factor

Current rating (A)	
Class of temperatures	**105°C**
Cross section (mm²)	NF F 63 826
50	189
70	237
95	281
120	324
150	371
185	433
240	523
300	603

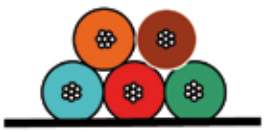
Derating coefficient for MULTICORE CABLES in free air

Derating coefficient				
Number of cores	**2 to 4**	**5 to 8**	**9 to 13**	**14 to 20**
Derating coefficient (K)	0.85	0.80	0.75	0.70

Derating coefficient for working temperatures higher than 25°C (K2)

Derating coefficient (K2)		
Class of temperatures (C)	**105°C**	**140°C**
Ambient temperature (T)		
45°C	0.866	0.908
50°C	0.828	0.884
55°C	0.790	0.859
60°C	0.750	0.834
65°C	0.707	0.807
70°C	0.661	0.780
75°C	0.612	0.752
80°C	0.559	0.722
85°C	0.500	0.692
90°C	0.433	0.659
95°C	0.353	0.626
100°C	-	0.590
105°C	-	0.552
110°C	-	0.511

Derating coefficient for cables in accordance with installation rules (K3)

Derating coefficient (K3)				
Number of cables	**Type of installation**	**In clamp**	**In duct**	**In tube**
				
1	-	1.00	0.90	0.80
2 to 4	Lain close each other	0.98	0.88	0.78
	In bundle* or in layer	0.95	0.85	0.75
5 to 8	Lain close each other	0.93	0.83	0.73
	In bundle* or in layer	0.90	0.80	0.70
9 to 12	In bundle* or in layer	0.85	0.75	0.65
13 to 16	In bundle* or in layer	0.80	0.70	0.60
17 to 20	In bundle* or in layer	0.75	0.65	0.55
More	In bundle* or in layer	0.70	0..60	0.50

* Bundle type of installation not recommended for power cables without any approval from railway companies.

Calculation: see NF F guide to use.

Current rating of wires in accordance with EN 50 355

Current rating of copper wires in free air for SINGLE CORE CABLES

Current rating (A)			
Class of temperatures	**90°C**	**120°C**	**150°C**
Standards	**EN 50 264 EN 50 306**	**EN 50 382**	**EN 50 382**
Section (mm^2)			
0.5	14	-	-
0.75	16	-	-
1	20	24.5	28.1
1.5	25	31	35.2
2.5	33	40	46.5
4	46	57	64.7
6	60	74	84
10	85	105	119
16	110	136	154
25	150	185	198
35	190	235	244
50	240	297	303
70	300	371	422
95	360	445	506
120	425	526	598
150	490	606	689
185	560	693	788
240	675	835	950
300	775	959	1091
400	950	1117	1337

Derating coefficient for MULTICORE CABLES in free air

Derating coefficient	
Number of cores	**2 to 4**
Derating coefficient (K2)	**0.8**

Derating coefficient for working temperatures higher than 45°C k1

Derating coefficient (K1)			
Class of temperatures (C)	**90°C**	**120°C**	**150°C**
Ambient temperature (T)			
55°C	0.88	0.93	0.95
65°C	0.75	0.86	0.90
75°C	0.58	0.77	0.85
85°C	0.33	0.68	0.79
95°C	-	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 (EN standard) for cables in accordance with installation rules (K2)

Derating coefficient (K2)				
Number of cores loaded	**Type of installation**	**On open clamp In one layer Type b**	**In clamp In two layers Type c**	**In closed tube Type d**
				
1	-	1.00		0.76
4	Lain close each other or in b	0.78	0.71	0.56
	In bundle	0.78	0.71	0.56
5 to 8	Lain close each other	0.74	0.52	0.40
	In bundle	0.74	0.52	0.40
9 to 12	In bundle	0.73	0.45	0.34
13 to 16	In bundle	0.72	0.41	0.31
17 to 20	In bundle	0.71	0.38	0.29

Calculation I cable: > I load / k1 x k2 x k3 x k4 see EN guide to use

Nexans

l expert in cables and cabling systems