

Caledonian Cables Ltd

Industrial Cables

Norma Portuguesa



Addison





Company Profile

Caledonian, established in 1978, offers one of the most complete lines of fiber and copper cabling system solutions with over hundreds of different cabling system products. Our superior products provide leading edge within every cable series and for every application.

Among the national and international standards with which our cables could comply are: BS - British Standard; LPCB Fire Performance Standard, ISO Standard etc. Caledonian Cables offers a comprehensive stock of cables and cabling products through its nationwide network of resellers and distributors. Caledonian Cables has continually expanded its global presence in Europe and Asia.

Caledonian & Addison, produces a wide range of cables for communication, power and electronics in its primary plants in UK, Italy and Spain. To stay in front, we continually keep expanding our manufacturing capabilities in more low cost region such as Romania, Taiwan, Malaysia etc. This low-cost manufacturing facilities enable us provide a flexible, scalable global system that delivers superior operational performance and optimal results for our customers.

Our extensive global network of manufacturing facilities gives us significant scale and the flexibility to fulfill our customer requirements. This global presence provides design and consultancy solutions that are combined with core cable manufacturing, logistic services, and vertically integrated with our E-commerce technologies, to optimize customer operations by lowering costs and reducing time to market.

Caledonian & Addison has been respected for its high standards of quality, excellent service level, competitive pricing and a unique and innovative spirit. With our latest technologies, we are both inspired and well-positioned to meet the changing needs of our customers. We have the resources to diversify and to enhance our product lines and services. We understand the need for change and with our accurate planning, we are ready for the future and the promise of new marketing opportunities. Our tradition of growth through excellence is assured.

Our Design Centers work closely with customers to constantly improve its standard range of products and technologies and to develop customized, country and industry-specific solutions. Caledonian & Addison has established an extensive network of design, manufacturing, and logistics facilities in the world's major markets to serve the growing outsourcing needs of both multinational and regional customers.



Our Certificate



REGISTRATION CERTIFICATE

This document certifies that the administration systems of

Caledonian Cables Limited / Addison Technology Limited

Marchants Industrial Centre, Mill Lane, Laughton, Lewes, Sussex, BN8 6AJ, United Kingdom

***have been assessed and approved by QAS International
to the following management systems, standards and guidelines:***

ISO 9001 : 2008

With the permitted exclusion of clauses 7.3 Design and Development

The approved administration systems apply to the following:

***The manufacture and supply of electrical cables and
ancillary power equipment to customers internationally.***

Original Approval ***6th September 1997***

Current Certificate ***7th February 2014***

Certificate Expiry ***7th February 2015***

Certificate Number ***A6211***

Signed: Certification Officer


On behalf of QAS International

This certificate remains valid while the holder maintains their quality administration systems in accordance with the standards and guidelines stated above, which will be audited annually by QAS International. The holder is entitled to display the above registration mark for the duration of this certificate, which should be returned to QAS International upon reasonable request.
Issuing Office: QAS International, 20A Oxford Street, Malmesbury, Wiltshire SN16 9AX, UK



Registered Company



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H05VV-F

Application and Description

These cables are suited for medium mechanical stress in damp and wet environments such as refrigerators, washing machines, spin dryers and other appliances, as long as it meets applicable equipment specifications. These cables are also suited for cooking and heating apparatus, provided that the cable does not come into direct contact with the hot parts of the apparatus or with any other heat source. Further applications of this cable include: Fixed installation in furniture, partition walls, decorative covering, and in the hollow spaces of prefabricated building parts. They are not suitable for outdoor use, industrial (except clothing manufacture) or farming applications. Max operating voltage in single or three phase system is Uo/U 318/550 volts. In a direct system, max operating voltage is Uo/U 413/825 volts.

Standard and Approval

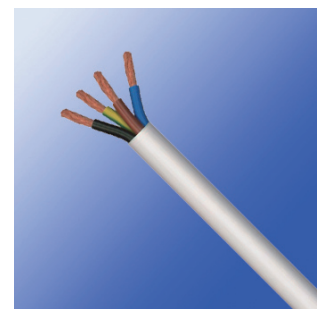
NP2356/5

Cable Construction

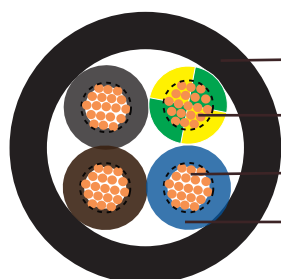
- Bare copper fine wire conductor
- Stranded to DIN VDE 0295 cl. 5, BS 6360 cl. 5, IEC 60228 cl. 5 and HD 383
- PVC core insulation T12 to VDE-0281 Part 1
- Color coded to HD 308
- Green-yellow grounding (3 conductors and above)
- PVC outer jacket TM2

Technical Characteristics

- Working voltage: 300/500 volts
- Test voltage: 2000 volts
- Flexing bending radius: $7.5 \times \varnothing$
- Static bending radius: $4 \times \varnothing$
- Flexing temperature: -5°C to $+70^{\circ}\text{C}$
- Static temperature: -40°C to $+70^{\circ}\text{C}$
- Short circuit temperature: $+160^{\circ}\text{C}$
- Flame retardant: IEC 60332.1
- Insulation resistance: $20 \text{ M}\Omega \times \text{km}$



H05VV-F



- PVC outer jacket
- Green/Yellow wire
- Bare copper conductor
- PVC insulation

Cable Parameter

No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Thickness of Insulation mm	Nominal Thickness of Sheath mm	Nominal Overall Diameter mm	Nominal Copper Weight kg/km	Nominal Weight kg/km
2 x 0.75	0.6	0.8	6.4	14.4	57
3 x 0.75	0.6	0.8	6.8	21.6	68
4 x 0.75	0.6	0.8	7.4	29	84
5 x 0.75	0.6	0.9	8.5	36	106
2 x 1.00	0.6	0.8	6.8	19	65
3 x 1.00	0.6	0.8	7.2	29	79
4 x 1.00	0.6	0.9	8.0	38	101
5 x 1.00	0.6	0.9	8.8	48	123
2 x 1.50	0.7	0.8	7.6	29	87
3 x 1.50	0.7	0.9	8.2	43	111
4 x 1.50	0.7	1.0	9.2	58	142
5 x 1.50	0.7	1.1	10.5	72	176
2 x 2.50	0.8	1.0	9.2	48	134
3 x 2.50	0.8	1.1	10.1	72	169
4 x 2.50	0.8	1.1	11.2	96	211
5 x 2.50	0.8	1.2	12.4	120	262
3 x 4.00	0.8	1.2	11.3	115	233
4 x 4.00	0.8	1.2	12.5	154	292
5 x 4.00	0.8	1.4	13.7	192	369
3 x 6.00	0.8	1.1	13.1	181	328
4 x 6.00	0.8	1.3	13.9	230	490



H05V-K

Application and Description

These insulated wires are determined for installation to the inside of apparatus as well as for the protective laying to the lightings, in dry rooms, in production facilities, switch and distributors boards, in tubes, under and surface mounting of plasters.

Standard and Approval

NP2356/3

Cable Construction

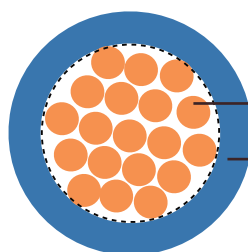
- Fine bare copper strands
- Strands to VDE-0295 Class-5, IEC 60228 Class-5
- Special PVC T11 core insulation
- Color coded to HD 308

Technical Characteristics

- Working voltage: 300/500v
- Test voltage: 2000 volts
- Flexing bending radius: 12.5 x Ø
- Static bending radius: 12.5 x Ø
- Flexing temperature: -5° C to +70° C
- Static temperature: -30° C to +80° C
- Flame retardant: IEC 60332.1
- Insulation resistance: 10 MΩ x km



H05V-K



Bare copper conductor

PVC insulation



Cable Parameter

No. of Cores x Nominal Cross Sectional Area # x <i>mm</i> ²	Nominal Thickness of Insulation <i>mm</i>	Nominal Overall Diameter <i>mm</i>	Nominal Copper Weight <i>kg/km</i>	Nominal Weight <i>kg/km</i>
1 x 0.5	0,6	2.1	4.9	10
1 x 0.75	0,6	2.4	7.2	13
1 x 1	0,6	2.6	9.6	15



H07V-K

Application and Description

These are not suitable to be installed for laying in tubes, under and surface mounting of plaster and also in closed installation conduits. These are not allowed to install for direct laying on cable trays, channel or tanks. These types are permitted for the inner wiring of equipment, distributor and switchboards and also for protective laying to the lightings with a nominal voltage up to 1000 V alternating current or up to 750 V direct current against earth.

Standard and Approval

NP2356/3

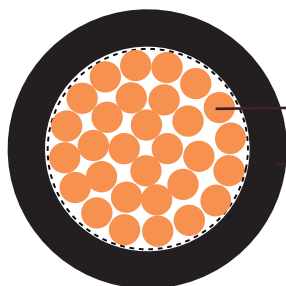
Cable Construction

- Fine bare copper strands
- Strands to VDE-0295 Class-5, IEC 60228 Class-5
- Special PVC T11 core insulation
- Color coded to HD 308

Technical Characteristics

- Working voltage: 450/750V
- Test voltage: 2500 volts
- Flexing bending radius: $12.5 \times \varnothing$
- Static bending radius: $12.5 \times \varnothing$
- Flexing temperature: -5°C to $+70^{\circ} \text{C}$
- Static temperature: -30°C to $+80^{\circ} \text{C}$
- Short circuit temperature: $+160^{\circ} \text{C}$
- Flame retardant: IEC 60332.1
- Insulation resistance: $10 \text{ M}\Omega \times \text{km}$





Bare copper conductor

PVC insulation

H07V-K

Cable Parameter

No. of Cores x Nominal Cross Sectional Area # x <i>mm</i> ²	Nominal Thickness of Insulation <i>mm</i>	Nominal Overall Diameter <i>mm</i>	Nominal Copper Weight <i>kg/Km</i>	Nominal Weight <i>kg/Km</i>
1 x 1.5	0,7	3.1	14.4	20
1 x 2.5	0,8	3.6	24.0	31
1 x 4	0,8	4.3	38.0	48
1 x 6	0,8	4.9	58.0	69
1 x 10	1,0	6.4	96.0	121
1 x 16	1,0	8.1	154.0	211
1 x 25	1,2	9.8	240	303
1 x 35	1,2	11.1	336	417
1 x 50	1,4	13.1	480	539
1 x 70	1,4	15.5	672	730
1 x 95	1,6	17.2	912	900
1 x 120	1,6	19.7	1152	1135
1 x 150	1,8	21.3	1440	1410
1 x 185	2,0	23.4	1776	1845
1 x 240	2,2	27.1	2304	2270



H05V-U / H07V-U/H07V-R

Application and Description

H05 V-U/(H)05 V-U

These insulated wires are determined for the installation to the inside of apparatus as well as for the protective laying to the lightings, in dry rooms, in production facilities, switch and distributor boards, in tubes, under and surface mounting of plasters.

H07 V-U/(H)07 V-U

These insulated wires are suitable for laying tubes, under and surface mounting of plasters and also in closed installation conduits. These are not allowed to install for direct laying in cable trays, channels or tanks. These types are permitted for the inner wiring of equipment, distributor and switchboards and also for protective laying to the lightings with a nominal voltage up to 1000 V alternating current or up to 750 V direct current against ground.

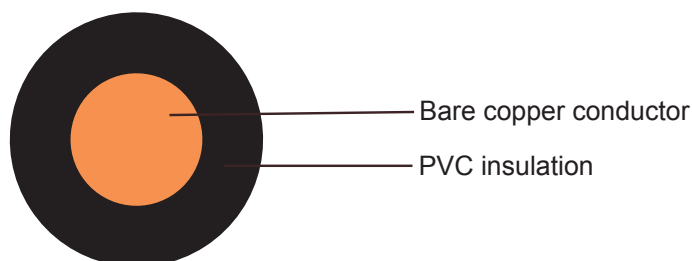
H07 V-R

These cables are preferably for installation indoors, in cable ducts and in industrial plants or switching stations, under ground installation. Can be used in switchboards and distributor boards or where a thicker strand of multi-wire is required.

Standard and Approval

NP2356/3

Cable Construction



H07V-U



- Solid bare copper single wire
 - Solid to DIN VDE 0295 cl-1 and IEC 60228 cl-1(for H05V-U / H07V-U), cl-2(for H07V-R)
 - Special PVC T11 core insulation
 - Color coded to HD 308
-



Technical Characteristics

- Working voltage: 300/500v (H05V-U) 450/750v (H07V-U/H07-R)
- Test voltage: 2000V(H05V-U)/ 2500V (H07V-U/H07-R)
- Bending radius: 15 x Ø
- Flexing temperature: -5° C to +70° C
- Static temperature: -30° C to +90° C
- Short circuit temperature: +160° C
- Flame retardant: IEC 60332.1
- Insulation resistance: 10 MΩ x km

Cable Parameter

No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Thickness of Insulation mm	Nominal Overall Diameter mm	Nominal Copper Weight kg/km	Nominal Weight kg/km
H05V-U				
1 x 0.5	0.6	2.1	4.8	9
1 x 0.75	0.6	2.2	7.2	11
1 x 1	0.6	2.4	9.6	14
H07V-U				
1 x 1.5	0.7	2.9	14.4	21
1 x 2.5	0.8	3.5	24.0	33
1 x 4	0.8	3.9	38.0	49
1 x 6	0.8	4.5	58.0	69
1 x 10	1.0	5.7	96.0	115
H07V-R				
1 x 1.5	0.7	3	14.4	23
1 x 2.5	0.8	3.6	24	35
1 x 4	0.8	4.2	39	51
1 x 6	0.8	4.7	58	71
1 x 10	1	6.1	96	120
1 x 16	1	7.2	154	170
1 x 25	1.2	8.4	240	260
1 x 35	1.2	9.5	336	350
1 x 50	1.4	11.3	480	480
1 x 70	1.4	12.6	672	680
1 x 95	1.6	14.7	912	930
1 x 120	1.6	16.2	1152	1160
1 x 150	1.8	18.1	1440	1430
1 x 185	2	20.2	1776	1780
1 x 240	2.2	22.9	2304	2360



H1VV-U

Application and Description

These cables are used for electricity supply in low voltage installation system, They are suitable for installation in indoors and outdoors, in cable ducts, underground, in power and switching stations, local energy distributions, industrial plants, where there is no risk of mechanical damage.

Standard and Approval

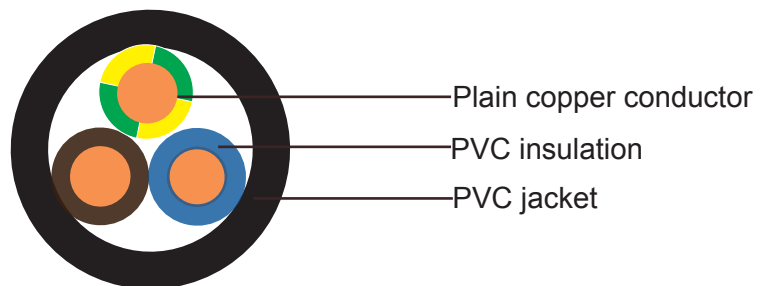
IEC 60502-1

Cable Construction

- Solid copper conductor, class 1 to IEC 60228
- PVC insulation
- Color coded to HD 308
- Flexible PVC outer jacket

Technical Characteristics

- Working Voltage: 600/1000 volts
- Test voltage: 3500 volts
- Flexing bending radius: 15 x Ø
- Static bending radius: 12 x Ø
- Flexing temperature: -5° C to +50° C
- Fixed installation temperature: - 40° C to +70° C
- Flame retardant: IEC 60332-1, EN 50265-2-1
- Insulation resistance: >100 MΩ x km



H1VV-U



Cable Parameter

No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km	No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km
1x1.5	6.4	58	30x1.5	26	1020
1x2.5	6.8	71	40x1.5	29	1290
2x1.5	12	205	48x1.5	32	1520
2x2.5	13	250	61x1.5	35	1900
3x1.5	13	230	5x2.5	16	375
3x2.5	13.5	280	7x2.5	17	460
4x1.5	13.5	265	10x2.5	20	590
4x2.5	14.5	325	12x2.5	21	660
5x1.5	14.5	300	14x2.5	22	740
7x1.5	15.5	360	19x2.5	24	940
10x1.5	19	460	21x2.5	25	1030
12x1.5	19.5	510	24x2.5	27	1150
14x1.5	20	570	30x2.5	29	1370
19x1.5	22	710	40x2.5	32	1810
21x1.5	23	770	48x2.5	36	2130
24x1.5	25	870	61x2.5	39	2630



H1VV-R

Application and Description

These cables are used for electricity supply in low voltage installation system, They are suitable for installation in indoors and outdoors, in cable ducts, underground, in power and switching stations, local energy distributions, industrial plants, where there is no risk of mechanical damage.

Standard and Approval

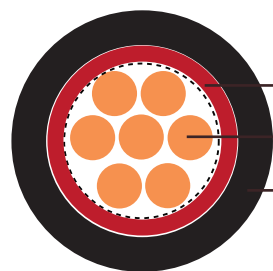
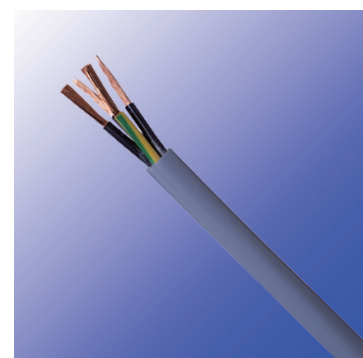
IEC 60502-1

Cable Construction

- Stranded copper conductor, class 2 to IEC 60228
- PVC insulation
- Color coded to HD 308
- Flexible PVC outer jacket

Technical Characteristics

- Working Voltage: 600/1000 volts
- Test voltage: 3500 volts
- Flexing bending radius: $15 \times \varnothing$
- Static bending radius: $12 \times \varnothing$
- Flexing temperature: -5°C to $+50^{\circ} \text{C}$
- Fixed installation temperature: -40°C to $+70^{\circ} \text{C}$
- Flame retardant: IEC 60332-1, EN 50265-2-1
- Insulation resistance: $>100 \text{ M}\Omega \times \text{km}$



- PVC insulation
- Plain copper conductor
- PVC jacket

H1VV-R



Cable Parameter

No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km	No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km
1x4	7.5	95	3x4	15.5	380
1x6	8	120	3x6	17	470
1x10	9	165	3x10	18.5	630
1x16	10	230	3x16	21	880
1x25	12	340	3x25	24.5	1280
1x35	13	450	3x35	27	1660
1x50	14.5	570	3x50	30	2110
1x70	16	800	3x70	35	2980
1x95	18.5	1070	3x95	40	3930
1x120	20	1300	3x120	43	4780
1x150	22	1600	3x150	48	5880
1x185	24	1980	3x185	52	7230
1x240	27	2560	3x240	59	9390
1x300	30	3180	3x300	65	11620
1x400	33	4060	3x400	72	14730
1x500	37	5140	4x4	16.5	450
1x630	42	6600	4x6	18	560
2x4	15	330	4x10	20	770
2x6	16	400	4x16	23	1080
2x10	17.5	525	4x25	26.5	1580
2x16	20	720	4x35	29.5	2070
2x25	23.5	1030	4x50	34	2680
2x35	25.5	1320	4x70	38	3760
2x50	28.5	1670	4x95	44	4960
2x70	32	2290	4x120	48	6110
2x95	37	3060	4x150	53	7450
2x120	40	3700	4x185	58	9220
2x150	44	4500	4x240	65	11900
2x185	48	5570	4x300	72	14730
2x240	55	7180	4x400	81	18830



FXV

Application and Description

These cables for energy distribution are suitable for all types of low voltage industrial-type connections. in urban grids, building installations. etc. Its high flexibility makes the installation process substantially easier and as a result is particularly suitable for use in difficult layouts. They can be buried or installed in a tube as well as outdoors. They are can also be used for street lighting, power supply of buildings, ship installations and generator installations. Lastly, these cables can withstand damp conditions including total immersion in water.

Standard and Approval

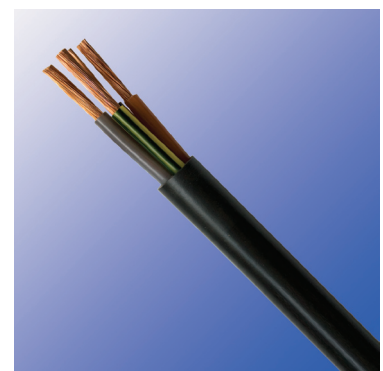
IEC 60502-1

Cable Construction

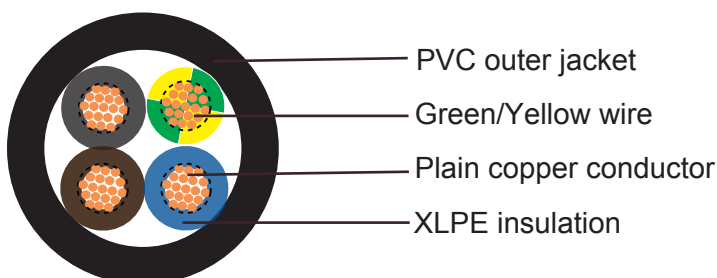
- Flexible plain copper strands
- Strands to VDE-0295 Class-5, IEC 60228 Class-5
- XLPE (Cross-Linked Polyethylene) insulation to IEC60502
- Color coded to HD 308
- Flexible PVC (Polyvinyl Chloride) jacket

Technical Characteristics

- Voltage Rating: 600/1000V
- Temperature Rating: -15°C to +90°C
- Minimum Bending Radius: 5 x overall diameter
- Flame retardant: IEC 60332.1
- Insulation resistance: 20 MΩ x km



FXV





Cable Parameter

No. of Cores x Cross Sectional Area # x mm ²	Nominal Thickness of Insulation mm	Nominal Thickness of Sheath mm	Nominal Overall Diameter mm	Nominal Weight kg/km
1 x 2.5	0.7	1.4	6.2	54
1 x 4.0	0.7	1.4	6.7	70
1 x 6.0	0.7	1.4	7.3	90
1 x 10.0	0.7	1.4	8.2	133
1 x 16.0	0.7	1.4	9.2	189
1 x 25.0	0.9	1.4	11	284
1 x 35.0	0.9	1.4	12.1	381
1 x 50.0	1	1.4	13.8	517
1 x 70.0	1.1	1.4	15.7	712
1 x 95.0	1.1	1.5	17.6	923
1 x 120.0	1.2	1.5	19.2	1165
1 x 150.0	1.4	1.6	21.5	1446
1 x 185.0	1.6	1.7	23.9	1748
1 x 240.0	1.7	1.8	26.9	2280
1 x 300.0	1.8	1.8	29.6	2829
1 x 400.0	2	2.0	33.8	3731
1 x 500.0	2.2	2.2	37.4	4776
1 x 630.0	2.4	2.4	42.7	6276
2 x 1.5	0.7	1.8	8.2	90
2 x 2.5	0.7	1.8	9.2	120
2 x 4.0	0.7	1.8	10.3	161
2 x 6.0	0.7	1.8	11.3	211
2 x 10.0	0.7	1.8	13.2	316
2 x 16.0	0.7	1.8	14.9	450
3 x 1.5	0.7	1.8	8.9	108
3 x 2.5	0.7	1.8	9.8	144
3 x 4.0	0.7	1.8	11	198
3 x 6.0	0.7	1.8	12.1	263
3 x 10.0	0.7	1.8	14.3	405
3 x 16.0	0.7	1.8	16.4	593
3 x 25.0	0.9	1.8	21.3	975
3 x 35.0	0.9	1.8	24.1	1319
3 x 50.0	1	1.8	27.8	1812
3 x 70.0	1.1	1.9	30.8	2463



Norma Portuguesa

No. of Cores x Cross Sectional Area # x mm ²	Nominal Thickness of Insulation mm	Nominal Thickness of Sheath mm	Nominal Overall Diameter mm	Nominal Weight kg/km
4 x 1.5	0.7	1.8	9.7	129
4 x 2.5	0.7	1.8	10.7	175
4 x 4.0	0.7	1.8	12	243
4 x 6.0	0.7	1.8	13.4	328
4 x 10.0	0.7	1.8	15.7	505
4 x 16.0	0.7	1.8	18.2	749
4 x 25.0	0.9	1.8	24.1	1245
4 x 35.0	0.9	1.8	26.3	1671
4 x 50.0	1	1.8	31.3	2313
4 x 70.0	1.1	2.0	36.1	3204
4 x 95.0	1.1	2.2	40.2	4126
4 x 120.0	1.2	2.4	44.6	5245
4 x 150.0	1.4	2.6	49.8	6573
4 x 185.0	1.6	2.8	56.1	8050
4 x 240.0	1.7	3.0	64.5	10695
5 x 1.5	0.7	1.8	10.4	153
5 x 2.5	0.7	1.8	11.6	213
5 x 4.0	0.7	1.8	13.2	298
5 x 6.0	0.7	1.8	14.7	403
5 x 10.0	0.7	1.8	17.2	624
5 x 16.0	0.7	1.8	20.2	931
5 x 25.0	0.9	1.8	25.6	1555
5 x 35.0	0.9	1.8	29.3	2076
5 x 50.0	1	2.0	34.5	2878



XV

Application and Description

These cables are used for electricity supply in low voltage installation system, They are suitable for installation in indoors and outdoors, in cable ducts, underground, in power and switching stations, local energy distributions, industrial plants, where there is no risk of mechanical damage.

Standard and Approval

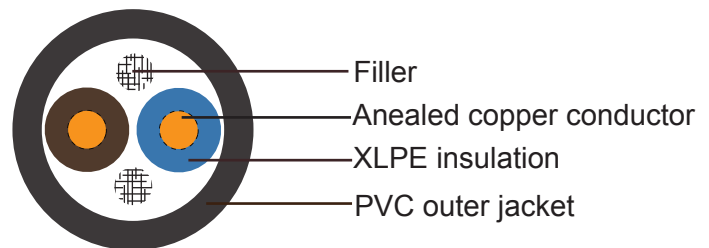
IEC 60502-1 NP2363

Cable Construction

- Plain copper conductor, , class 1(<6mmsq)/class2(>6mmsq) to IEC 60228
- XLPE insulation
- Colour coded to HD 308
- Not fibrous and not hygroscopic filler(optional)
- Flexible PVC, type ST2 outer jacket

Technical Characteristics

- Voltage Rating: 600/1000V
- Test voltage: 3500 volts
- Minimum bending radius: 12 x Ø
- Operation temperature range: -15 °C to 90 °C
- Short-circuit temperature: 250 °C
- Flame retardant: IEC 60332.1
- Insulation resistance: 20 MΩ x km



Cable Parameter

No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km	No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km
1x35	120	390	3x185+1x95	525	7810
1x50	135	515	3x240+1x120	590	10000
1x70	155	720	5x1.5	115	180



Norma Portuguesa

No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km	No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km
1x95	175	975	5x2.5	125	240
1x120	195	1225	5x4	135	330
1x150	210	1490	5x6	150	465
1x185	235	1855	5x10	180	685
1x240	265	2385	5x16	210	1020
1x300	285	2995	3x25+2G16	255	1440
1x400	320	3905	3x35+2G16	275	1785
1x500	360	4835	3x50+2G25	315	2415
2x1.5	95	115	3x70+2G35	360	3345
2x2.5	100	140	3x95+2G50	405	4480
2x4	110	185	3x120+2G70	465	5875
2x6	120	255	3x150+2G70	495	6835
2x10	145	365	3x185+2G95	555	8700
2x16	185	610	3x240+2G120	625	11125
2x25	215	890	5x1.5	110	180
2x35	235	1135	6x1.5	115	215
2x50	265	1475	7x1.5	115	220
3x1.5	100	130	8x1.5	132	265
3x2.5	105	170	10x1.5	143	280
3x4	115	225	12x1.5	147	320
3x6	125	295	14x1.5	155	360
3x10	150	455	16x1.5	162	405
3x16	195	745	19x1.5	171	460
3x25	230	1110	24x1.5	198	570
3x35	250	1440	30x1.5	21	685
3x50	280	1880	37x1.5	226	820
4x1.5	105	155	5x2.5	120	245
4x2.5	115	200	6x2.5	126	285
4x4	125	275	7x2.5	126	295
4x6	140	365	8x2.5	145	355
4x10	165	560	10x2.5	158	385
4x16	195	830	12x2.5	163	440
3x25+1x16	240	1280	14x2.5	171	500
3x35+1x16	260	1610	16x2.5	18	565
3x50+1x25	295	2150	19x2.5	189	650
3x70+1x35	335	3000	24x2.5	22	805
3x95+1x50	380	4015	30x2.5	233	975
3x120+1x70	435	5210	37x2.5	252	1180
3x150+1x70	470	6180			



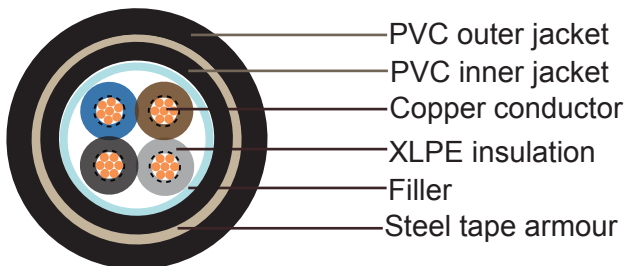
XAV

Application

These cables are suitable for direct burial without extra mechanical protection, fixed to the walls, laid on cable trays or raceways. May also be suitable for use in premises which poses a risk of explosion with mechanical protection is necessary and in this case the intensity must be reduced by 15%.

Standard and Approval

IEC60502-1, NP2365



Cable Construction

- Flexible copper strands
- Strands to IEC 60228, $\leq 4\text{mm}^2$, class 1, $\geq 6\text{mm}^2$, class 2
- XLPE insulation according to NF C 32-321
- Color coded to HD 308
- Not fibrous and not hygroscopic filler(optional)
- PVC inner jacket
- Two steel tapes helically wrapped armour
- Flexible PVC outer jacket



Technical Characteristics

- Working Voltage: 600/1000 volts
- Test voltage: 3500 volts
- Minimum bending radius: 6 x Ø
- Operation temperature range: -10 °C to 60 °C
- Short-circuit temperature: 250 °C
- Flame retardant: IEC 60332-1/NF C 32-070 C2
- Insulation resistance: 20 MΩ x km

Cable Parameter

Cross Section mm ²	Insulation thickness mm	Amour thickness mm	Minimum Sheath thickness mm	Maximum Overall diameter mm	Approx Cable weight kg/km
2x1.5	0.7	0.2	1.3	11.5	230
2x2.5	0.7	0.2	1.3	12.5	275
2x4	0.7	0.2	1.4	13.5	330
2x6	0.7	0.2	1.4	15.5	430
2x10	0.7	0.2	1.4	16.5	555
2x16	0.7	0.2	1.5	19	770
2x25	0.9	0.2	1.6	22.5	1080
2x35	0.9	0.2	1.7	25	1390
3x1.5	0.7	0.2	1.3	12	255
3x2.5	0.7	0.2	1.3	13	305
3x4	0.7	0.2	1.4	14	380
3x6	0.7	0.2	1.4	16	500
3x10	0.7	0.2	1.5	17.5	665
3x16	0.7	0.2	1.5	20	930
3x25	0.9	0.2	1.6	24	1325
3x35	0.9	0.2	1.7	26.5	1720
3x50	0.9	0.2	1.8	29	2125
3x70	1.1	0.2	2	34.5	3080
3x95	1.1	0.5	2.1	40	4505
3x120	1.2	0.5	2.3	44.5	5540



Cross Section mm ²	Insulation thickness mm	Amour thickness mm	Minimum Sheath thickness mm	Maximum Overall diameter mm	Approx Cable weight kg/km
3x150	1.4	0.5	2.4	48.5	6655
3x185	1.6	0.5	2.5	53.5	8150
3x240	1.7	0.5	2.7	61	10575
3x300	1.8	0.5	2.9	66.5	13055
3x50+35	1.0/0.9	0.2	1.9	33	2730
3x70+50	1.1/0.9	0.2	2	36	3440
3x95+50	1.1/1.0	0.5	2.2	42.5	5080
3x120+70	1.2/1.1	0.5	2.3	46.5	6275
3x150+70	1.4/1.1	0.5	2.5	50	7340
3x185+70	1.6/1.1	0.5	2.6	56	8975
3x240+95	1.7/1.1	0.5	2.8	62.5	11435
4x1.5	0.7	0.2	1.3	13	290
4x2.5	0.7	0.2	1.4	14	355
4x4	0.7	0.2	1.4	15	440
4x6	0.7	0.2	1.4	17	585
4x10	0.7	0.2	1.5	19	800
4x16	0.7	0.2	1.6	22	1120
4x25	0.9	0.2	1.7	26	1650
4x35	0.9	0.2	1.8	29	2135
4x50	1	0.2	1.9	32.5	2745
4x70	1.1	0.5	2.1	39	4295
4x95	1.1	0.5	2.3	44.5	5660
4x120	1.2	0.5	2.4	48.5	6880
4x150	1.4	0.5	2.6	53	8315
4x185	1.6	0.5	2.7	60.5	10510
4x240	1.7	0.5	2.9	67	13370
4x300	1.8	0.5	3.1	73	16360
5x1.5	0.7	0.2	1.4	14	335
5x2.5	0.7	0.2	1.4	15	415
5x4	0.7	0.2	1.4	16	515
5x6	0.7	0.2	1.5	18.5	705
5x10	0.7	0.2	1.6	21	955
5x16	0.7	0.2	1.8	23.5	1340
5x25	0.9	0.2	1.8	29.5	2085
7x1.5	0.7	0.2	1.4	15	395



Norma Portuguesa

Cross Section mm ²	Insulation thickness mm	Amour thickness mm	Minimum Sheath thickness mm	Maximum Overall diameter mm	Approx Cable weight kg/km
7x2.5	0.7	0.2	1.4	16	495
12x1.5	0.7	0.2	1.5	19	605
12x2.5	0.7	0.2	1.5	20.5	750
19x1.5	0.7	0.2	1.5	21.5	775
19x2.5	0.7	0.2	1.6	24	1045
24x1.5	0.7	0.2	1.6	24.5	980
24x2.5	0.7	0.5	1.7	29	1570
27x1.5	0.7	0.2	1.7	25	1050
27x2.5	0.7	0.2	1.8	28.5	1410
37x1.5	0.7	0.2	1.7	28	1320
37x2.5	0.7	0.2	1.8	31.5	1790



FXZ1

Application and Description

These cables with zero halogen are high security cables. In case of fire, they do not emit toxic or corrosive gases, thereby protecting public health and avoiding any possible damage to electronic equipment. For this reason, its use is recommended in public places such as: hospitals, schools, museums, airports, bus terminals, shops in general, tunnels, the underground, etc., as well as in calculation centres, offices, production plants, laboratories, etc.

Standard and Approval

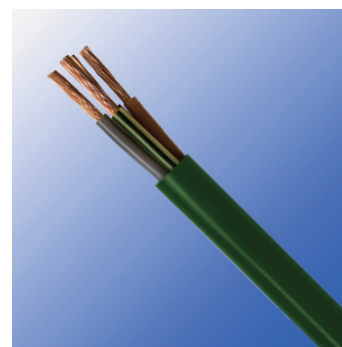
IEC 60502-1

Cable Construction

- Flexible electrolytic annealed copper conductor
- Class 5 in accordance with IEC 60228
- XLPE insulation type DIX 3 according to HD603.
- Color coded to HD 308
- LOSH polyolephine outer sheath

Technical Characteristics

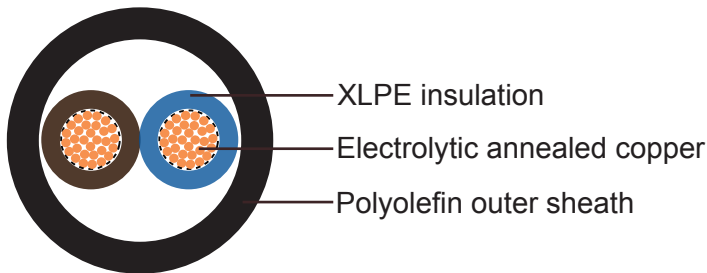
- Working voltage: 600/1000 volts
- Test voltage: 3500 volts
- Minimum bending radius: 10 x Ø
- Working temperature: -15° C to +90° C
- Short circuit temperature: +250° C
- Insulation resistance: 20 MΩ x km
- Halogen free: IEC 60754-1, EN 50267-2-1
- No corrosive gases: IEC 60754-2, EN 50267-2-2
- No toxic gases: NES 02-713, NF X 70-100
- Low smoke density: IEC 61034, EN 50268-2
- Flame retardant: IEC 60332-1, EN 50265-2-1
- Non-flame propagating: IEC 60332-3, EN 50266-2



FXZ1



Norma Portuguesa



Cable Parameter

No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km	No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km
1×1.5	5.7	45	3×10/6	16.1	493
1×2.5	6.1	57	3×16/10	18.0	724
1×4	6.7	73	3×25/16	21.8	1091
1×6	7.2	94	3×35/16	24.1	1405
1×10	8.1	136	3×50/25	28.1	1968
1×16	9.0	192	3×70/35	32.6	2722
1×25	11.0	286	3×95/50	37.0	3598
1×35	12.1	380	3×120/70	41.5	4609
1×50	13.8	520	3×150/70	44.9	5579
1×70	15.9	716	3×185/95	51.5	6926
1×95	17.6	924	3×240/120	58.8	9030
1×120	19.4	1167	4G 1.5	9.7	136
1×150	21.5	1456	4G 2.5	10.6	182
1×185	24.1	1762	4G 4	12.0	252
1×240	26.9	2283	4G 6	13.3	336
1×300	29.6	2832	4G 10	15.4	513
1×400	33.8	3735	4×16	18.7	783
1×500	38.0	4845	4×25	23.1	1196
1×630	43.1	6311	4×35	25.5	1616
2×1.5	8.3	97	4×50	30.3	2242
2×2.5	9.2	127	4×70	35.3	3119
2×4	10.1	167	4×95	39.4	4037
2×6	11.2	219	4×120	43.6	5104
2×10	13.0	323	4×150	49.8	6569
2×16	15.8	490	4×185	56.5	8063



No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km	No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km
3G1.5	8.8	114	4×240	63.1	10421
3G2.5	9.8	151	5G 1.5	10.3	159
3G4	11	206	5G 2.5	11.6	217
3G6	12	271	5G 4	13.0	302
3G10	14.1	412	5G 6	14.6	406
3×16	16.9	624	5G 10	16.8	625
3×25	20.6	947	5G 16	20.4	956
3×35	23.4	1276	5G 25	25.1	1459
3×50	26.8	1752	5G 35	28.1	1968
3×70	31.5	2436	5G 50	33.7	2779



XZ1

Application and Description

These cables with zero halogen are high security cables. In case of fire, they do not emit toxic or corrosive gases, thereby protecting public health and avoiding any possible damage to electronic equipment. For this reason, its use is recommended in public places such as: hospitals, schools, museums, airports, bus terminals, shops in general, tunnels, the underground, etc., as well as in calculation centres, offices, production plants, laboratories, etc.

Standard and Approval

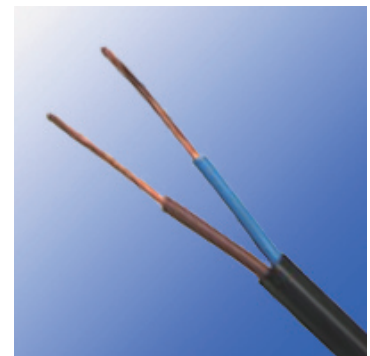
IEC 60502-1

Cable Construction

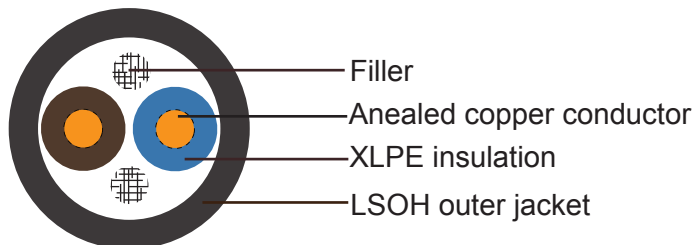
- Plain copper conductor, class 1 (<6mm²)/class 2 (>6mm²) to IEC 60228
- XLPE insulation
- Colour coded to HD 308
- Not fibrous and not hygroscopic filler (optional)
- Flexible LSOH outer jacket

Technical Characteristics

- Voltage Rating: 600/1000V
- Test voltage: 3500 volts
- Minimum bending radius: 12 x Ø
- Operation temperature range: -15 °C to 90 °C
- Short-circuit temperature: 250 °C
- Halogen free: IEC 60754-1. EN 50267-2-1
- No corrosive gases: IEC 60754-2. EN 50267-2-2
- No toxic gases: NES 02-713. NFx70-100
- Low smoke density: IEC 61034. EN 50268-2
- Flame retardant: IEC 60332-1. EN 50265-2-1
- Non-flame propagating IEC 60332-3. EN 50266-2
- Insulation resistance: 20 MΩ x km



XZ1



Cable Parameter

No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km	No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km
1x10	85	135	4x6	140	355
1x16	95	195	4x10	165	550
1x25	110	295	3x16+1x10	185	745
1x35	120	385	3x25+1x16	220	1140
1x50	135	510	3x35+1x16	240	1330
1x70	155	715	3x50+1x25	265	1795
1x95	175	970	3x70+1x35	310	2535
1x120	195	1215	3x95+1x50	350	3460
1x150	210	1480	3x120+1x70	385	4385
1x185	235	1840	3x150+1x70	425	5295
1x240	265	2375	3x185+1x95	450	6735
1x300	285	2980	3x240+1x120	525	8550
2x1.5	95	110	5x1.5	115	175
2x2.5	100	135	5x2.5	125	230
2x4	110	180	5x4	135	320
2x6	120	235	5x6	150	435
2x10	145	350	5x10	180	670
2x16	165	500	3x16+2G10	200	865
3x1.5	100	125	3x25+2G16	235	1315
3x2.5	105	160	3x35+2G16	260	1680
3x4	115	220	3x50+2G25	295	2250
3x6	125	290	3x70+2G35	340	3160
3x10	150	440	3x95+2G50	405	4485
3x16	175	635	3x120+2G70	465	5875
4x1.5	105	145	3x150+2G70	495	6835
4x2.5	115	195	3x185+2G95	510	7900
4x4	125	265	3x240+2G120	625	11115



XG (frs)/ XZ1(frs)

Application and Description

These cables are specially designed to transmit electric power in the extrem conditions that there are in a large fire. assuring electric supply to emergency circuits. like signaling lights. fume extractors. acustic alarms. water pumps. etc. In case of fire. it does not emit toxic or corrosive gases. thereby protecting public health and avoiding any possible damage to electronic equipment. For this reason. its use is recommended in public places such as: hospitals. schools. museums. airports. bus terminals. shops in general. tunnels. the underground. etc.. as well as in calculation centres. offices. production plants. laboratories. etc.

Standard and Approval

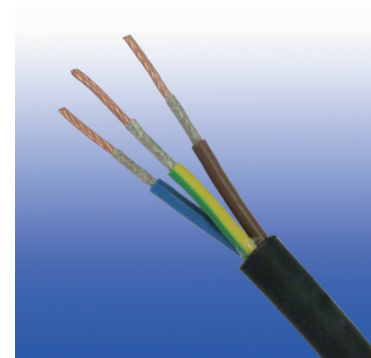
IEC 60502-1

Cable Construction

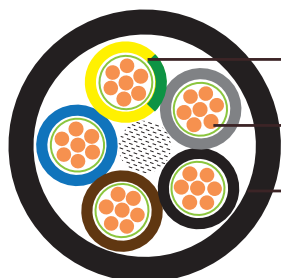
- Plain copper conductor, , class 1(<6mmsq)/class2(>6mmsq) to IEC 60228
- Mica tape+XLPE insulation
- Colour coded to HD 308
- Not fibrous and not hygroscopic filler(optional)
- Flexible LSOH outer jacket

Technical Characteristics

- Voltage Rating: 600/1000V
- Test voltage: 3500 volts
- Minimum bending radius: 12 x Ø
- Operation temperature range: -15 °C to 90 °C
- Short-circuit temperature: 250 °C
- Halogen free: IEC 60754-1. EN 50267-2-1
- No corrosive gases: IEC 60754-2. EN 50267-2-2
- No toxic gases: NES 02-713. NFx70-100
- Low smoke density: IEC 61034. EN 50268-2
- Flame retardant: IEC 60332-1. EN 50265-2-1
- Non-flame propagating IEC 60332-3. EN 50266-2
- Insulation resistance: 20 MΩ x km



XG(frs)



Mica+XLPE insulation

Stranded copper conductors

LSOH jacket

Cable Parameter

No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km	No. of Cores x Nominal Cross Sectional Area # x mm ²	Nominal Overall Diameter mm	Nominal Weight kg/km
1x10	95	150	4x1.5	125	190
1x16	105	210	4x2.5	135	240
1x25	120	310	4x4	150	325
1x35	130	405	4x6	160	410
1x50	145	530	4x10	180	595
1x70	165	805	4x16	210	850
1x95	180	995	3x16+1 G 10	200	800
1x120	200	1235	3x25+1x16	235	1205
1x150	215	1500	3x35+1x16	255	1525
1x185	240	1865	3x50+1x25	290	2050
1x240	270	2400	3x70+1x35	355	2870
1x300	295	3010	3x95+1x50	375	3875
2x1.5	110	140	3x120+1x70	425	4965
2x2.5	120	175	5x1.5	135	225
2x4	130	225	5x2.5	145	295
2x6	140	280	5x4	165	390
2x10	155	385	5x6	175	500
2x16	180	545	5x10	195	730
2x25	210	810	5x16	230	1055
3x1.5	115	160	3x25+2G16	255	1390
3x2.5	120	175	3x35+2G16	310	2320
3x4	140	270	3x50+2G25	270	3190
3x6	145	335	3x70+2G35	355	4525
3x10	165	480	3x95+2G50	415	5989



Insulation Colour Code

Colour coded to HD 308

2 cores - Brown + Blue

3 cores (G) - Green-Yellow + Brown + Blue

3 cores - Brown + Black + Grey




























4 cores (G) - Green-Yellow + Brown + Black + Grey

4 cores - Blue + Brown + Black + Grey

5 cores (G) - Green-Yellow + Blue + Brown + Black + Grey

5 cores - Blue + Brown + Black + Grey + Black

Single core - Black, Blue, Green/Yellow, Red, Yellow, White, Violet, Brown, Grey, Orange, Pink

	With ground wire	Without ground wire
2 cores	-	 + 
3 cores	 +  + 	 +  + 
4 cores	 +  +  + 	 +  +  + 
5 cores	 +  +  +  + 	 +  +  +  + 
≥6 cores	 + black numbered	black numbered



Fire Performance Standard

At present, in cable industry, Fire Retardant, Low Smoke Halogen Free (LSZH), Low Smoke Fume (LSF) and Fire Resistant cables are all described as Fire survival Cables.

Flame Retardant

Fire retardant cables are designed for use in fire situations where the spread of flames along a cable route needs to be retarded. Due to relative low cost, fire retardant cables are widely used as fire survival cables. No matter the cables are installed in single wire or in bundles, during a fire, the flame spread will be retarded and the fire will be confined to a small area, thus reducing the fire hazard due to fire propagation.

Low Smoke & Halogen Free & Fire retardant (LSZH)

LSZH cables are not only characterized by the fire retardant performance but also by the halogen free properties, thus offering low corrosivity and toxicity. During a fire, the LSZH cables will emit less smoke and acid gases which may damage the human being and expensive equipment. Compared with normal PVC cables, LSZH cables outperform by their fire retardancy, low corrosivity and low smoke emission properties, however, normal PVC cables have better mechanical and electrical properties.

Low Smoke Fume (LSF)

The low halogen content and low corrosivity of low smoke fume cables lies somewhat in between their of fire retardant cables and LSZH cables. LSF cables also contain halogen but the content is much less than that of PVC cables. LSF cables are designed to reduce the spread of fire, toxic gases and smoke during fire. The LSF cables are usually manufactured from flame retardant PVC blended with HCL additive and smoke absorbent. These materials help improve the fire performance of the LSF cables.

Fire Resistant (FR)

Fire resistant cables are designed to maintain circuit integrity of those vital emergency services during the fire. The individual conductors are wrapped with a layer of fire resisting mica/glass tape which prevents phase to phase and phase to earth contact even after the insulation has been burnt away. The fire resistant cables exhibit same performance even under fire with water spray or mechanical shock situation.

Fire Performance Class

The main concerns for the cables in their fire survival properties are their flame spread, smoke characterization and gas toxicity. In American fire standard, the concern lies more on the first two and it differs from the European standard which concerns all these aspects. In USA, it is believed that the fire hazard is mainly due to CO toxic gas emitted and the heat release during the conversion of CO to CO₂ during the fire. Therefore, to control the heat release is the most important concern for reducing the fire hazard. However, in European countries, halogen content, the corrosivity of the gases, the smoke density and the toxicity of the gas are equally important factors affecting the safety and survival of human during a fire.



Standard for Flame Retardancy

The European Electrical Committee categorizes the fire performance of the cables into three classes, namely NF C 32-070, IEC 60332-2, IEC 60332-3. NF C 32-070 and IEC 60332-2 are used to assess the flame propagation characteristics of a single wire. IEC 60332-3 is used to assess the flame propagation characteristics of bundled cables. Comparatively speaking, IEC 60332-3 for bundled cables is more demanding than NF C 32-070 for single wires.

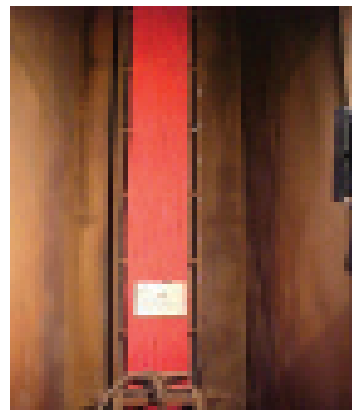
□ NF C 32-070/BS 4066-1/EN 50265/CEI 20-35/1 (Flame Test On Single Vertical Insulated Wires/Cables)

This test details a method of test for the assessment of the flame propagation characteristics of a single wire or cable. In this test, a 60cm cable sample is fixed vertically inside a metallic box and a 175mm long flame is applied at 45mm from a gas burner placed at 450mm from the top at the upper portion. The specimen is deemed to have passed this test, if after burning has ceased, the charred or affected position does not reach within 50mm of the lower edge of the top clamp which is equivalent to 425mm above the point of flame application. The test method is not suitable for the testing of some small wires due to the melting of the conductors during the time of application of the flame.



□ IEC 60332-3/BS 4066-3/EN 50266 /CEI 20-22/3(Flame Test On Bunched Wires/Cables)

IEC60332-3C describes a method of type approval testing to define the ability of bunched cables to resist fire propagation. In this test, a cable specimen, consisting of number of 3.5m length of cables are fixed to a vertical ladder tray where they are applied with a flame from a gas burner for a specified times under controlled air flow. Four categories (A, B, C & D) are defined and distinguished by test duration and the volume of non metallic material of the sample under test. The cable specimen is deemed to have met the requirements of the standard if, after burning has ceased, the extent of charred or affected portion does not reach a height exceeding 2.5m above the bottom edge of the burner.





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