HELKAMA

THE PERFECT CONNECTION

# INDUSTRIAL CABLES
# OPTICAL FIBER CABLES

11/2022

HELKAMA INDUSTRIAL

# Follow the lead.

## From design to manufacturing.

Helkama Bica Oy is a Finnish family enterprise with over half a century of experience in the development and production of Marine and Telecom cables. We provide solutions and manufacture different types of cables for Marine, Telecom, Industrial, Flexible, Offshore (SHF2), Optical fiber, Instrumentation and Fire-resistant applications.

Helkama Industrial Cables catalogue introduces our instrumentation, fire-resistant, optical fiber, power and data cables suitable for industrial use and a variety of applications. Our range covers cables for both indoor and outdoor use, and all Helkama industrial cables are halogen-free.

Helkama R&D team is a busy bunch continuously developing and improving the product selection to better cater for today's diverse market demands. In addition to standard cables, Helkama also designs and manufactures fully customized cables to suit customer specific requirements. If for any reason you can't find the perfect cable for your project in this or any other one of our catalogues, no worries! Just contact our sales team for a customized solution for your project, from design to manufacturing!

The name Helkama stands for quality, flexibility and outstanding personal service. Our high technical quality has been achieved by not only continuous development work, but by working closely together with our clients. And our focus is seriously on service. Or rather, we are serious when it comes to service. Our sales team is there to help with Your project from the design phase all the way to the cables arriving on time for the construction crew on-site.

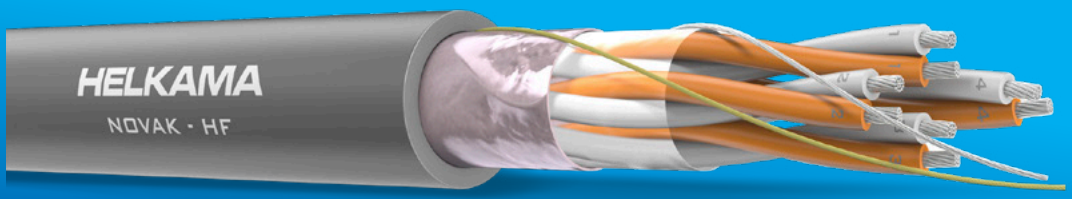
We export cables yearly to more than 60 countries worldwide, and we are known as a stable partner for several multinational corporations. Our short delivery times backed up by extensive stocks enable us to deliver punctually, giving our clients better project schedule control.

So follow the lead, and get the best cabling solution for Your projects from Helkama!

# Contents

# NOVAK-HF

## 75 V




| | |
|---|---|
| **CONDUCTOR** | Tinned copper conductor |
| **INSULATION** | PE |
| **TWISTED PAIR** | Two cores twisted together<br>Each pair with different lay |
| **STRANDING** | Units of 4 pairs cabled together |
| **SCREEN** | Aluminium polyester tape and tinned copper drain wire |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour light grey |
| **REFERENCE STANDARD** | EN 50288-7 |

## APPLICATION

Cable for instrumentation, process control and computer systems. For fixed installation.

## PHYSICAL PROPERTIES:

| | |
|---|---|
| **MIN. BENDING RADIUS (installation/fixed)** | 9 x Ø/6 x Ø |
| **CORE IDENTIFICATION** | Pair colours white and orange<br>Pair identification with colour code and identification number<br>Unit identification with numbered tape |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Dca s2, d2, a1 |
| **RATED VOLTAGE** | 75 V |
| **UV RESISTANCE** | UL1581 section 1200 |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -40 – 70 °C |





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## ELECTRICAL PROPERTIES:

| | | Unit |
|---|---|---|
| Pair loop resistance (20 °C), max. | 81 | ohm/km |
| Nominal pair capacitance (800 Hz) | 80 | nF/km |
| Loop inductance | 0.6 | mH/km |
| Insulation resistance (20 °C), min. | 100 | Mohm/km |

## NOVAK-HF

| Part number | No. of conductors x Conductor area (mm²) | Nominal outer Ø mm | Weight kg/km |
|---|---|---|---|
| 3150103022 | 2 x 2 x 0.5 + 0.5 | 7.0 | 55 |
| 3150103042 | 4 x 2 x 0.5 + 0.5 | 8.0 | 80 |
| 3150103082 | 8 x 2 x 0.5 + 0.5 | 11.0 | 145 |
| 3150103122 | 12 x 2 x 0.5 + 0.5 | 12.0 | 205 |
| 3150103242 | 24 x 2 x 0.5 + 0.5 | 17.0 | 375 |

Standard length 1000 m







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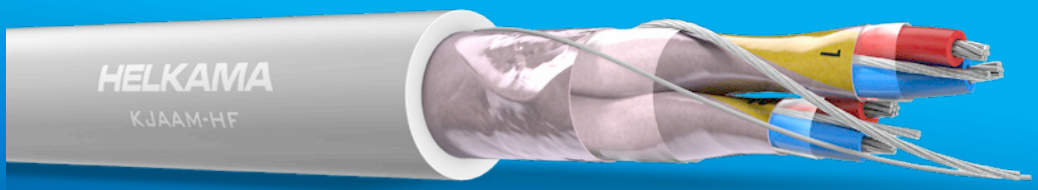
# KJAAM-HF

## 75 V




| | |
|---|---|
| **CONDUCTOR** | Tinned copper conductor |
| **INSULATION** | PE |
| **TWISTED PAIR** | Two insulated cores twisted together |
| **INDIVIDUAL SCREEN** | Aluminium polyester tape and tinned copper drain wire |
| **SCREEN** | Aluminium polyester tape and tinned copper drain wire |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour light grey |
| **REFERENCE STANDARD** | EN 50288-7 |

## APPLICATION

Cable for instrumentation, process control, computer and sound reproduction systems. Designed for transmission of digital and low-level analog signals, provides excellent protection against electromagnetic interference. For fixed installation.

## PHYSICAL PROPERTIES:

| | |
|---|---|
| **MIN. BENDING RADIUS (installation/fixed)** | 9 x Ø/6 x Ø |
| **CORE IDENTIFICATION** | Pair colours blue/red<br>Pair identification on numbered tape over pairs |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Dca s2, d2, a1 |
| **RATED VOLTAGE** | 75 V |
| **UV RESISTANCE** | UL1581 section 1200 |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -40 – 70 °C |





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## ELECTRICAL PROPERTIES:

| | | Unit |
|---|---|---|
| Pair DC resistance (20 °C), max. | 81 | ohm/km |
| Nominal pair capacitance (800 Hz) | 100 | nF/km |
| Loop inductance | 0.6 | mH/km |
| Insulation resistance, min. | 2000 | Mohm/km |

## KJAAM-HF

| Part number | No. of conductors x Conductor area (mm²) | Nominal outer Ø mm | Weight kg/km |
|---|---|---|---|
| 3050103012 | 1 x (2+1) x 0.5 | 4.8 | 33 |
| 3050103022 | 2 x (2+1) x 0.5 + 0.5 | 8.0 | 70 |
| 3050103042 | 4 x (2+1) x 0.5 + 0.5 | 10.0 | 120 |
| 3050103082 | 8 x (2+1) x 0.5 + 0.5 | 12.6 | 205 |
| 3050103122 | 12 x (2+1) x 0.5 + 0.5 | 15.1 | 286 |
| 3050103242 | 24 x (2+1) x 0.5 + 0.5 | 20.2 | 522 |

Standard length 1000 m






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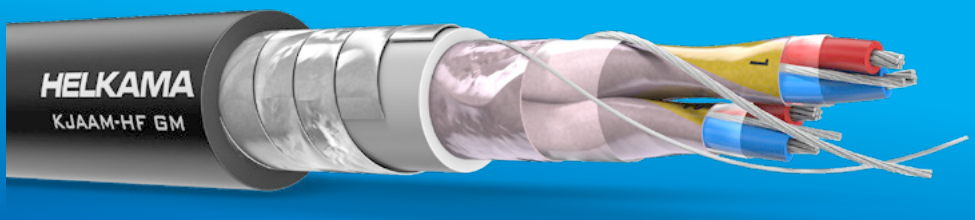
# KJAAM-HF GM

## 75 V




| | |
|---|---|
| **CONDUCTOR** | Tinned copper conductor |
| **INSULATION** | PE |
| **TWISTED PAIR** | Two insulated cores twisted together |
| **INDIVIDUAL SCREEN** | Aluminium polyester tape and tinned copper drain wire |
| **SCREEN** | Aluminium polyester tape and tinned copper drain wire |
| **INNER SHEATH** | LSZH Thermoplastic<br>Standard colour light grey |
| **ARMOUR** | Two galvanized steel tapes |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour black |
| **REFERENCE STANDARD** | EN 50288-7 |

## APPLICATION

Cable for instrumentation, process control, computer and sound reproduction systems. Designed for transmission of digital and low-level analog signals, provides excellent protection against electromagnetic interference. Armoured with galvanized steel tapes. For fixed installation.

## PHYSICAL PROPERTIES:

| | |
|---|---|
| **MIN. BENDING RADIUS (installation/fixed)** | 15 x Ø/10 x Ø |
| **CORE IDENTIFICATION** | Pair colours blue/red<br>Pair identification on numbered tape over pairs |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Fca<br>IEC 60332-1-2<br>IEC 60332-3-22 |
| **RATED VOLTAGE** | 75 V |
| **UV RESISTANCE** | UL1581 section 1200 |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -40 – 70 °C |





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## ELECTRICAL PROPERTIES:

| | | Unit |
|---|---|---|
| Pair DC resistance (20 °C), max. | 81 | ohm/km |
| Nominal pair capacitance (800 Hz) | 100 | nF/km |
| Loop inductance | 0.6 | mH/km |
| Insulation resistance, min. | 2000 | Mohm/km |

## KJAAM-HF GM

| Part number | No. of conductors x Conductor area (mm²) | Nominal outer Ø mm | Weight kg/km |
|---|---|---|---|
| 30212 | 4 x (2+1) x 0.5 + 0.5 | 13.2 | 257 |
| 30214 | 8 x (2+1) x 0.5 + 0.5 | 16.3 | 380 |
| 30216 | 12 x (2+1) x 0.5 + 0.5 | 19.1 | 527 |
| 30218 | 24 x (2+1) x 0.5 + 0.5 | 25.2 | 868 |

Standard length 1000 m







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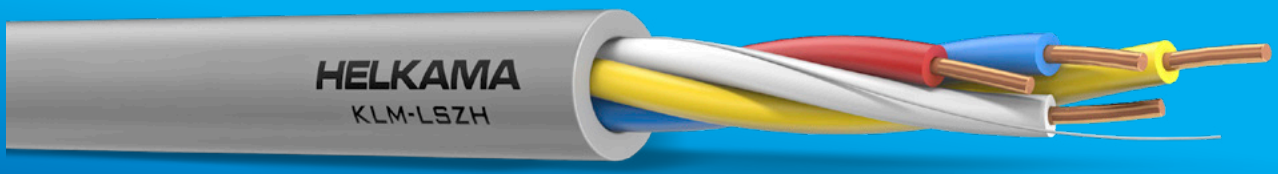
# KLM-LSZH

## 75 V




| | |
|---|---|
| **CONDUCTOR** | Solid copper conductor |
| **INSULATION** | PE |
| **STRANDING** | Conductors twisted together |
| **SHEATH** | LSZH Thermoplastic<br>Standard colours light grey, red, blue |
| **REFERENCE STANDARD** | EN 50288-7, SFS 2751 |

## APPLICATION

Cable for instrumentation, alarm systems and personal call finders. For fixed installation.

## PHYSICAL PROPERTIES:

| | |
|---|---|
| **MIN. BENDING RADIUS (installation/fixed)** | 15 x Ø/10 x Ø |
| **CORE IDENTIFICATION** | 1. Blue<br>2. Yellow<br>3. White<br>4. Red |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Dca, s2, d2, a1<br>IEC 60332-1-2 |
| **RATED VOLTAGE** | 75 V |
| **MIN. INSTALLATION TEMPERATURE** | -5 °C |
| **OPERATING TEMPERATURE** | -5 – 70 °C |





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## ELECTRICAL PROPERTIES:

| | | Unit |
|---|---|---|
| Loop resistance (20 °C), max. | 73.4 | ohm/km |
| Insulation resistance, min. | > 500 | Mohm x km |
| Test voltage DC 60 s | | |
| Conductor/Conductor | 2.25 | kV |

## KLM-LSZH

| Part number | No. of conductors x Conductor Ø | Nominal outer Ø mm | Weight kg/km | Colour | Standard length m | |
|---|---|---|---|---|---|---|
| 3400225020 | 2 x 0.8 + 0.8 | 3.8 ± 0.3 | 19 | Grey | 150 | coil |
| 3402225020 | 2 x 0.8 + 0.8 | 3.8 ± 0.3 | 19 | Grey | 600 | drum |
| 3400225020 | 2 x 0.8 + 0.8 | 3.8 ± 0.3 | 19 | Blue | 150 | coil |
| 3402225020 | 2 x 0.8 + 0.8 | 3.8 ± 0.3 | 19 | Blue | 600 | drum |
| 3400225020 | 2 x 0.8 + 0.8 | 3.8 ± 0.3 | 19 | Red | 150 | coil |
| 3402225020 | 2 x 0.8 + 0.8 | 3.8 ± 0.3 | 19 | Red | 600 | drum |
| 3400225040 | 4 x 0.8 + 0.8 | 4.4 ± 0.3 | 32 | Grey | 150 | coil |
| 3402225040 | 4 x 0.8 + 0.8 | 4.4 ± 0.3 | 32 | Grey | 600 | drum |
| 3400225040 | 4 x 0.8 + 0.8 | 4.4 ± 0.3 | 32 | Blue | 150 | coil |
| 3402225040 | 4 x 0.8 + 0.8 | 4.4 ± 0.3 | 32 | Blue | 600 | drum |
| 3400225040 | 4 x 0.8 + 0.8 | 4.4 ± 0.3 | 32 | Red | 150 | coil |
| 3402225040 | 4 x 0.8 + 0.8 | 4.4 ± 0.3 | 32 | Red | 600 | drum |







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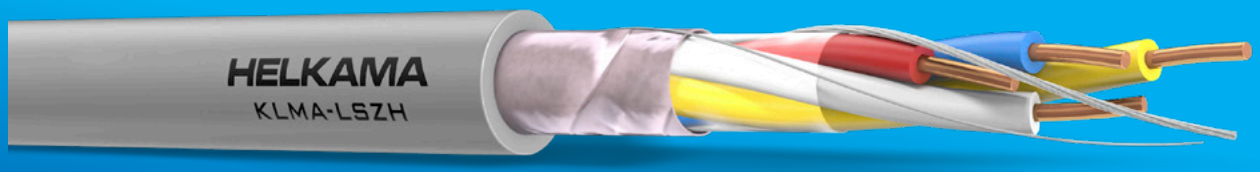
# KLMA-LSZH

## 75 V




| | |
|---|---|
| **CONDUCTOR** | Solid copper conductor |
| **INSULATION** | PE |
| **STRANDING** | Conductors twisted together<br>Solid tinned copper drain wire under screen |
| **SCREEN** | Aluminium polyester tape |
| **SHEATH** | LSZH Thermoplastic<br>Standard colours light grey, red, blue |
| **REFERENCE STANDARD** | EN 50288-7, SFS 2755 |

## APPLICATION

Cable for instrumentation, alarm systems and personal call finders. For fixed installation.

## PHYSICAL PROPERTIES:

| | |
|---|---|
| **MIN. BENDING RADIUS (installation/fixed)** | 15 x Ø/10 x Ø |
| **CORE IDENTIFICATION** | 1. Blue<br>2. Yellow<br>3. White<br>4. Red |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Dca, s2, d1, a1<br>IEC 60332-1-2 |
| **RATED VOLTAGE** | 75 V |
| **MIN. INSTALLATION TEMPERATURE** | -5 °C |
| **OPERATING TEMPERATURE** | -5 – 70 °C |





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## ELECTRICAL PROPERTIES:

| | | Unit |
|---|---|---|
| Loop resistance (20 °C), max. | 73.4 | ohm/km |
| Insulation resistance, min. | > 500 | Mohm x km |
| Test voltage DC 60 s | | |
| Conductor/Conductor | 2.25 | kV |
| Conductor/Screen | 1.5 | kV |

## KLMA-LSZH

| Part number | No. of conductors x Conductor Ø | Nominal outer Ø mm | Weight kg/km | Colour | Standard length m | |
|---|---|---|---|---|---|---|
| 3410225020 | 2 x 0.8 + 0.8 | 3.9 ± 0.3 | 25 | Grey | 150 | coil |
| 3412225020 | 2 x 0.8 + 0.8 | 3.9 ± 0.3 | 25 | Grey | 600 | drum |
| 3410225020 | 2 x 0.8 + 0.8 | 3.9 ± 0.3 | 25 | Blue | 150 | coil |
| 3412225020 | 2 x 0.8 + 0.8 | 3.9 ± 0.3 | 25 | Blue | 600 | drum |
| 3410225020 | 2 x 0.8 + 0.8 | 3.9 ± 0.3 | 25 | Red | 150 | coil |
| 3412225020 | 2 x 0.8 + 0.8 | 3.9 ± 0.3 | 25 | Red | 600 | drum |
| 3410225040 | 4 x 0.8 + 0.8 | 4.5 ± 0.3 | 37 | Grey | 150 | coil |
| 3412225040 | 4 x 0.8 + 0.8 | 4.5 ± 0.3 | 37 | Grey | 600 | drum |
| 3410225040 | 4 x 0.8 + 0.8 | 4.5 ± 0.3 | 37 | Blue | 150 | coil |
| 3412225040 | 4 x 0.8 + 0.8 | 4.5 ± 0.3 | 37 | Blue | 600 | drum |
| 3410225040 | 4 x 0.8 + 0.8 | 4.5 ± 0.3 | 37 | Red | 150 | coil |
| 3412225040 | 4 x 0.8 + 0.8 | 4.5 ± 0.3 | 37 | Red | 600 | drum |







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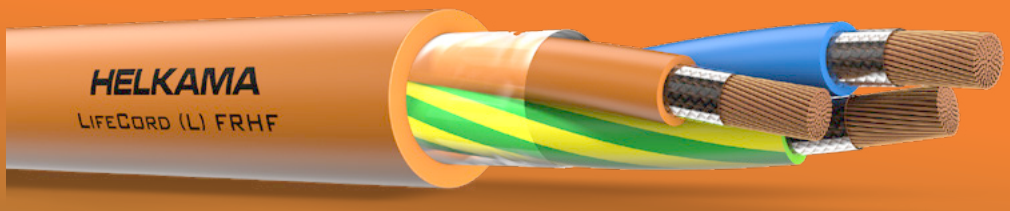
# LIFECORD (L) FRHF

## 0.6/1 kV




| | |
|---|---|
| **CONDUCTOR** | 1.5 mm² solid copper conductor<br>>1.5 mm² stranded copper conductor |
| **INSULATION** | Mica tape<br>XLPE |
| **STRANDING** | Conductors twisted together |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour orange |
| **REFERENCE STANDARD** | IEC 60502-1 (partly) |

## APPLICATION

Fire-resistant unarmoured power and control cable 0.6/1 kV. For fixed installation.

## PHYSICAL PROPERTIES:

| | |
|---|---|
| **MIN. BENDING RADIUS (installation/fixed)** | 9 x Ø/6 x Ø |
| **CORE IDENTIFICATION** | 2 cores blue and brown<br>3 cores blue, brown and yellow/green<br>5 cores blue, brown, black, grey and yellow/green<br>7-27 cores black numbers on white base |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1-2<br>IEC 60332-3-22 |
| **RATED VOLTAGE** | AC 0.6/1 kV (1.2 kV)<br>DC 0.9/1.5 kV (if voltage to earth does not exceed 0.9 kV) |
| **FIRE-RESISTANT** | IEC 60331-21 |
| **HALOGEN-FREE** | IEC 60754 series |
| **SMOKE EMISSION** | IEC 61034 series |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -40 – 90 °C (short cirquit max 5 s duration 250 °C) |





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## LIFECORD (L) FRHF

| Part number | | No. of conductors x Conductor area (mm²) | Nominal outer Ø mm | Weight kg/km |
|---|---|---|---|---|
| Normal | G-type | | | |
| 75400 | | 2 x 1.5 | 8.5 | 80 |
| 75401 | | 2 x 2.5 | 10.0 | 120 |
| 75402 | | 2 x 6 | 13.0 | 260 |
| 75403 | | 2 x 10 | 15.0 | 385 |
| 75410 | 75411 | 3 x 1.5 | 9.0 | 105 |
| 75412 | 75413 | 3 x 2.5 | 10.5 | 150 |
| 75414 | 75415 | 3 x 6 | 14.0 | 330 |
| 75416 | 75417 | 3 x 10 | 16.0 | 485 |
| 75430 | 75431 | 5 x 1.5 | 11.0 | 165 |
| 75432 | 75433 | 5 x 2.5 | 12.5 | 225 |
| 75434 | 75435 | 5 x 6 | 16.7 | 496 |
| 75436 | 75437 | 5 x 10 | 19.5 | 736 |
| 75438 | | 7 x 1.5 | 12.0 | 207 |
| 75439 | | 7 x 2.5 | 14.0 | 295 |
| 75440 | | 12 x 1.5 | 16.0 | 342 |
| 75441 | | 12 x 2.5 | 18.3 | 480 |
| 75442 | | 19 x 1.5 | 18.4 | 505 |
| 75443 | | 19 x 2.5 | 21.6 | 718 |
| 75444 | | 27 x 1.5 | 22.4 | 712 |
| 75445 | | 27 x 2.5 | 26.5 | 1025 |

Standard length 500 m

G-type with yellow/green earth conductor and G-marking on sheath e.g. 3G1.5







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# FIRELINE 750

## 500 V


| | |
|---|---|
| **CONDUCTOR** | Solid or stranded copper conductor |
| **INSULATION** | Mica tape<br>XLPE |
| **STRANDING** | Conductors cabled together<br>Tinned copper drain wire under the screen |
| **SCREEN** | Aluminium polyester tape |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour red |
| **REFERENCE STANDARD** | EN 50288-7 |

## APPLICATION

Fire-resistant collectively screened instrumentation and control cable. For fixed installation.

## PHYSICAL PROPERTIES:

| | |
|---|---|
| **MIN. BENDING RADIUS (installation/fixed)** | 6 x Ø/4 x Ø |
| **CORE IDENTIFICATION** | 2 cores blue and brown<br>3 cores brown, black and grey<br>4 cores blue, brown, black and grey<br>7-19 cores black numbers on white base |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1-2<br>IEC 60332-3-22 |
| **RATED VOLTAGE** | 500 V |
| **FIRE-RESISTANT** | IEC 60331-21 |
| **UV RESISTANT** | IEC 60068-2-5 |
| **HALOGEN-FREE** | IEC 60754 series |
| **SMOKE EMISSION** | IEC 61034 series |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -40 - 70 °C |
| **MAX. CONDUCTOR TEMPERATURE** | 90 °C |





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## ELECTRICAL PROPERTIES:

| Conductor area | 1 | 1.5 | 2.5 | Unit mm² |
|---|---|---|---|---|
| Conductor resistance, (20 °C) max. | 18.1 | 12.1 | 7.4 | ohm/km |
| Capacitance (800 Hz) | 70 | 80 | 87 | nF/km |
| Loop inductance, max. | 0.67 | 0.68 | 0.63 | mH/km |

## FIRELINE 750

| Part number | No. of conductors x Conductor area (mm²) | Nominal outer Ø mm | Weight kg/km |
|---|---|---|---|
| 75001 | 2 x 1.0 | 7.5 | 80 |
| 75002 | 3 x 1.0 | 7.9 | 90 |
| 75003 | 4 x 1.0 | 8.5 | 105 |
| 75004 | 7 x 1.0 | 10.0 | 150 |
| 75005 | 12 x 1.0 | 13.0 | 240 |
| --- | 19 x 1.0 | 15.5 | 340 |
| 75011 | 2 x 1.5 | 8.0 | 95 |
| 75012 | 3 x 1.5 | 8.5 | 110 |
| 75022 | 3 x 1.5 S* | 8.5 | 110 |
| 75013 | 4 x 1.5 | 9.2 | 130 |
| 75014 | 7 x 1.5 | 11.0 | 195 |
| 75015 | 12 x 1.5 | 14.2 | 305 |
| 75016 | 19 x 1.5 | 16.5 | 450 |
| 75021 | 2 x 2.5 | 9.5 | 135 |
| 75112 | 3 x 2.5 | 9.8 | 155 |
| 75023 | 4 x 2.5 | 10.6 | 185 |
| 75024 | 7 x 2.5 | 12.6 | 280 |
| 75025 | 12 x 2.5 | 16.8 | 450 |
| --- | 19 x 2.5 | 20.0 | 680 |

Standard length 1000 m

* S = G-type, with yellow/green earth conductor and G-marking on sheath 3G1.5
Core identification black, blue, yellow/green







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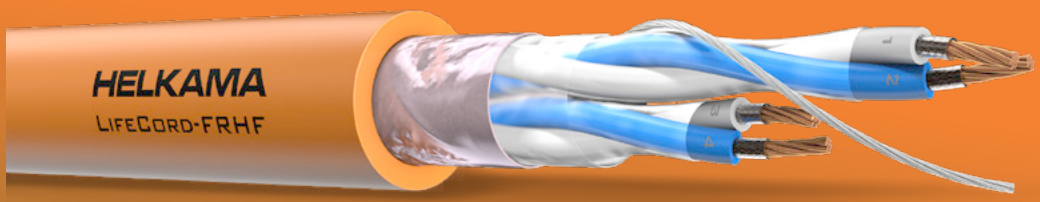
# LIFECORD-FRHF

## 300 V




| | |
|---|---|
| **CONDUCTOR** | Stranded copper conductor |
| **INSULATION** | Mica tape<br>XLPE |
| **STRANDING** | Pairs cabled together<br>Tinned copper drain wire under the screen |
| **SCREEN** | Aluminium polyester tape, coverage 100% |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour orange |
| **REFERENCE STANDARD** | EN 50288-7 |

## APPLICATION

Fire-resistant screened instrumentation and communication cable 300 V. For fixed installation where the cable has to maintain its functionality during fire.

## PHYSICAL PROPERTIES:

| | |
|---|---|
| **MIN. BENDING RADIUS (installation/fixed)** | 9 x Ø/6 x Ø |
| **CORE IDENTIFICATION** | Pair colours white/blue<br>Black identification numbers |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1-2<br>IEC 60332-3-22 |
| **RATED VOLTAGE** | 300 V |
| **FIRE-RESISTANT** | Ø < 20 mm IEC 60331-2<br>Ø > 20 mm IEC 60331-1 |
| **HALOGEN-FREE** | IEC 60754 series |
| **SMOKE EMISSION** | IEC 61034 series |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -40 – 90 °C |





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## ELECTRICAL PROPERTIES:

| | | Unit |
|---|---|---|
| Pair loop resistance (20 °C), max. | 52 | ohm/km |
| Nominal pair capacitance (800 Hz) | 45 | nF/km |
| Loop inductance | 0.6 | mH/km |
| Insulation resistance (20 °C), min. | ≥1500 | Mohm/km |

## LIFECORD-FRHF

| Part number | No. of conductors x Conductor area (mm²) | Nominal outer Ø mm | Weight kg/km | Standard length m |
|---|---|---|---|---|
| 0245130 | 1 x 2 x 0.75 | 8.5 | 75 | 1000 |
| 0245122 | 2 x 2 x 0.75 | 13.0 | 135 | 1000 |
| 0245124 | 4 x 2 x 0.75 | 15.5 | 215 | 1000 |
| 0245126 | 8 x 2 x 0.75 | 20.0 | 380 | 1000 |
| 0245127 | 12 x 2 x 0.75 | 24.0 | 545 | 1000 |
| 0245128 | 19 x 2 x 0.75 | 29.5 | 805 | 500 |
| 0245129 | 24 x 2 x 0.75 | 33.5 | 1030 | 500 |







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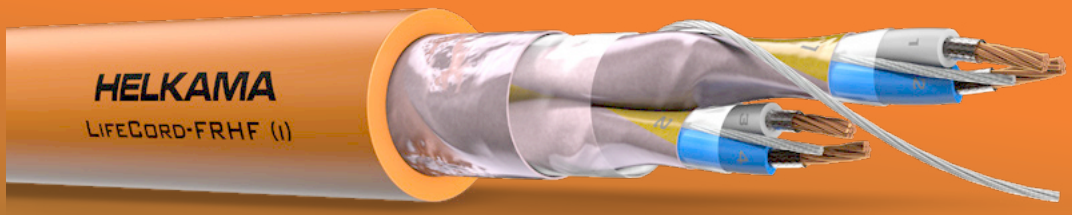
# LIFECORD-FRHF (i)

## 300 V




| | |
|---|---|
| **CONDUCTOR** | Stranded copper conductor |
| **INSULATION** | Mica tape<br>XLPE |
| **STRANDING** | Pairs and copper drain wire cabled together |
| **PAIR SCREEN** | Aluminium polyester tape |
| **SCREEN** | Aluminium polyester tape, coverage 100%<br>Tinned copper drain wire under the screen |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour orange |
| **REFERENCE STANDARD** | EN 50288-7 |

## APPLICATION

Fire-resistant individually and collectively screened cable for instrumentation and communication applications.
For fixed installation where the cable has to maintain its functionality during fire.

## PHYSICAL PROPERTIES:

| | |
|---|---|
| **MIN. BENDING RADIUS (installation/fixed)** | 9 x Ø/6 x Ø |
| **CORE IDENTIFICATION** | Pair colours white/blue<br>Black identification numbers |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1-2<br>IEC 60332-3-22 |
| **RATED VOLTAGE** | 300 V |
| **FIRE-RESISTANT** | Ø < 20 mm IEC 60331-2<br>Ø > 20 mm IEC 60331-1 |
| **HALOGEN-FREE** | IEC 60754 series |
| **SMOKE EMISSION** | IEC 61034 series |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -40 - 90 °C |





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## ELECTRICAL PROPERTIES:

| | | Unit |
|---|---|---|
| Loop resistance of pair (20 °C), max. | 52 | ohm/km |
| Nominal pair capacitance (800 Hz) | 55 | nF/km |
| Loop inductance | 0.6 | mH/km |
| Insulation resistance (20 °C), min. | ≥1500 | Mohm/km |

## LIFECORD-FRHF (i)

| Part number | No. of conductors x Conductor area (mm²) | Nominal outer Ø mm | Weight kg/km | Standard length m |
|---|---|---|---|---|
| 0245140 | 1 x 2 x 0.75 | 8.3 | 85 | 1000 |
| 0245142 | 2 x 2 x 0.75 | 13.5 | 155 | 1000 |
| 0245144 | 4 x 2 x 0.75 | 15.5 | 245 | 1000 |
| 0245146 | 8 x 2 x 0.75 | 20.0 | 430 | 1000 |
| 0245147 | 12 x 2 x 0.75 | 24.5 | 625 | 1000 |
| 0245148 | 19 x 2 x 0.75 | 30.0 | 945 | 500 |
| 0245149 | 24 x 2 x 0.75 | 34.0 | 1205 | 500 |







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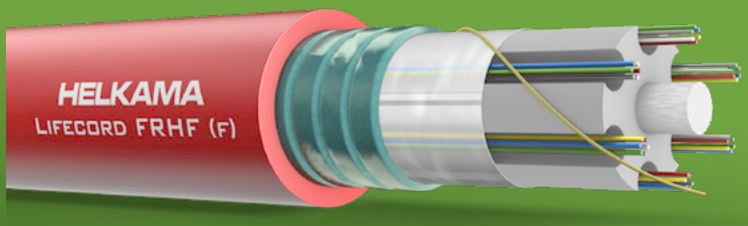
# LIFECORD-FRHF (f)




| | |
|---|---|
| **CENTRAL ELEMENT** | Glass fiber, Ø 3.3 mm |
| **PP-SLOTTED CORE** | Ø 8.0 mm |
| **OPTICAL FIBERS** | 250 µm |
| **WATER BLOCKING** | Water swellable tape<br>Corrugated steel tape |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour red |
| **REFERENCE STANDARD** | Helkama specification |

## APPLICATION

Fire-resistant optical fiber cable for indoor application. For fixed installation where the cable has to maintain its functionality during fire.

## PHYSICAL PROPERTIES:

| | | Unit | Mechanical test |
|---|---|---|---|
| **MAX PULLING FORCE** | 2500 | N | IEC 60794-1-2 E1 |
| **CRUSH STRENGTH/ 100 mm (PLATE)** | 7000 | N | IEC 60794-1-2 E3 |
| **CRUSH STRENGTH/ 25 mm (MANDREL)** | 1500 | N | IEC 60794-1-2 E3 |
| **IMPACT STRENGTH** | 50 | J | IEC 60794-1-2 E4 |
| **MIN. BENDING RADIUS (installation/fixed)** | 270/200 | mm | |
| **NOMINAL OUTER Ø** | 13.5 | mm | |
| **CABLE WEIGHT** | 196 | kg/km | |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1-2<br>IEC 60332-3-22 |
| **FIRE-RESISTANT** | IEC 60331-25 |
| **HALOGEN-FREE** | IEC 60754 series |
| **SMOKE EMISSION** | IEC 61034 series |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -30 – 70 °C |





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## LIFECORD-FRHF (f)

| Part number | Cable type |
|---|---|
| 15001 | LifeCord FRHF 1 x 4 GKL |
| 15005 | LifeCord FRHF 1 x 4 SML |
| 15006 | LifeCord FRHF 1 x 6 SML |
| 15008 | LifeCord FRHF 2 x 6 SML |
| 15012 | LifeCord FRHF 4 x 6 SML |
| 15020 | LifeCord FRHF 1 x 4 SML + 2 x 4 GKL |
| 15039 | LifeCord FRHF 1 x 4 SML + 1 x 4 OM3L |
| 15041 | LifeCord FRHF 1 x 6 SML + 3 x 4 GKL |
| 15043 | LifeCord FRHF 2 x 6 SML + 3 x 4 GKL |
| 15045 | LifeCord FRHF 2 x 6 SML + 3 x 4 OM3L |
| 15048 | LifeCord FRHF 3 x 6 SML + 3 x 6 GKL |
| 15062 | LifeCord FRHF 2 x 4 GKL |
| 15063 | LifeCord FRHF 3 x 4 GKL |
| 15066 | LifeCord FRHF 6 x 4 GKL |
| 15071 | LifeCord FRHF 1 x 4 OM3L |
| 15073 | LifeCord FRHF 2 x 4 OM3L |
| 15075 | LifeCord FRHF 3 x 4 OM3L |
| 15081 | LifeCord FRHF 6 x 4 OM3L |
| 15095 | LifeCord FRHF 3 x 4 OM4L |

Other types on request






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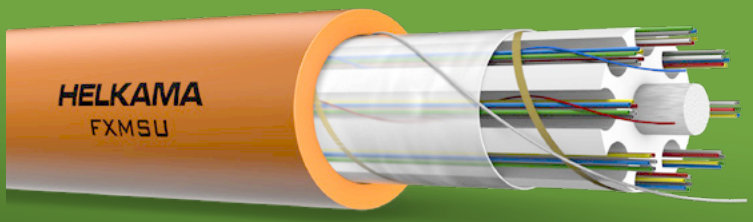
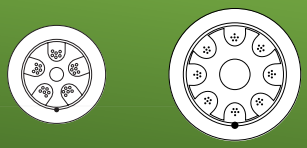
# FXMSU



| | | Max 30 fibers | Max 48 fibers | Unit |
|---|---|---|---|---|
| **CENTRAL ELEMENT, GLASS FIBER** | | 1.5 | 3.3 | Ø mm |
| **PP-SLOTTED CORE** | | 6.0 | 9.5 | Ø mm |
| **OPTICAL FIBERS** | | 250 | 250 | Ø µm |
| **WRAPPING** | Aramid binding yarn | | | |
| **WATER BLOCKING** | Water swellable tape | | | |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour orange | | | |
| **REFERENCE STANDARD** | Helkama specification | | | |

## APPLICATION

Optical fiber cable for indoor/outdoor application.

## PHYSICAL PROPERTIES:

| | Max 30 fibers | Max 48 fibers | Unit | Mechanical test |
|---|---|---|---|---|
| **TENSILE STRENGTH** | 500 | 1750 | N | EN 187000 method 501 |
| **CRUSH STRENGTH/ 100 mm (PLATE)** | 4000 | 4000 | N | EN 187000 method 504 |
| **CRUSH STRENGTH/ 25 mm (MANDREL)** | 650 | 1000 | N | EN 187000 method 504 |
| **IMPACT STRENGTH** | 25 | 50 | J | EN 187000 method 505 |
| **LONGITUDINAL WATER TIGHTNESS** | | | | EN 18700 method 605B |
| **MIN. BENDING RADIUS (installation/fixed)** | 15/10 x Ø | 15/10 x Ø | | |
| **NOMINAL OUTER Ø** | 9.4 | 13.1 | mm | |
| **CABLE WEIGHT** | 75 | 146 | kg/km | |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Eca<br>IEC 60332-1-2<br>IEC 60332-3-22 |
| **UV RESISTANCE** | UL1581 section 1200 |
| **HALOGEN-FREE** | IEC 60754-1 |
| **ACIDITY OF COMBUSTION GASES** | IEC 60754-2 |
| **CONDUCTIVITY OF COMBUSTION GASES** | IEC 60754-2 |
| **SMOKE EMISSION** | IEC 61034 series |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -45 – 70 °C |

Subject to change without prior notice. See latest update on our webpage.





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## FXMSU

| Part number | Cable type |
|---|---|
| 10001 | FXMSU 1 x 4 SML (L) |
| 10022 | FXMSU 1 x 6 SML (L) |
| 10003 | FXMSU 2 x 4 SML (L) |
| 10024 | FXMSU 2 x 6 SML (L) |
| 10028 | FXMSU 4 x 6 SML (L) |
| 14404 | FXMSU 1 x 4 GKL (L) |
| 14408 | FXMSU 2 x 4 GKL (L) |
| 14410 | FXMSU 3 x 4 GKL (L) |
| 14416 | FXMSU 4 x 6 GKL (L) |
| 14420 | FXMSU 1 x 4 SML + 1 x 4 GKL (L) |
| 14422 | FXMSU 1 x 4 SML + 2 x 4 GKL (L) |
| 14424 | FXMSU 2 x 4 SML + 2 x 4 GKL (L) |
| 14426 | FXMSU 1 x 6 SML + 3 x 4 GKL (L) |
| 14428 | FXMSU 2 x 6 SML + 3 x 4 GKL (L) |
| 14384 | FXMSU 1 x 4 OM3L (L) |
| 14386 | FXMSU 2 x 4 OM3L (L) |
| 14388 | FXMSU 3 x 4 OM3L (L) |
| 14398 | FXMSU 4 x 6 OM3L (L) |
| 14450 | FXMSU 1 x 4 SML + 2 x 4 OM3L (L) |
| 14451 | FXMSU 2 x 4 SML + 2 x 4 OM3L (L) |
| 14454 | FXMSU 1 x 6 SML + 3 x 4 OM3L (L) |
| 14455 | FXMSU 2 x 6 SML + 3 x 4 OM3L (L) |
| 14541 | FXMSU 1 x 4 OM4L (L) |
| 14542 | FXMSU 2 x 4 OM4L (L) |
| 14543 | FXMSU 3 x 4 OM4L (L) |
| 14564 | FXMSU 4 x 6 OM4L (L) |
| 14470 | FXMSU 1 x 4 SML + 2 x 4 OM4L (L) |
| 14472 | FXMSU 2 x 4 SML + 2 x 4 OM4L (L) |
| 14474 | FXMSU 1 x 6 SML + 3 x 4 OM4L (L) |
| 14620 | FXMSU 2 x 6 SML + 3 x 4 OM4L (L) |
| 14478 | FXMSU 4 x 6 SML + 4 x 6 OM4L |
| 10016 | FXMSU 8 x 6 SML |
| 14219 | FXMSU 8 x 6 GKL |
| 14244 | FXMSU 4 x 6 SML + 4 x 6 GKL |
| 14256 | FXMSU 8 x 6 OM3L |
| 14264 | FXMSU 4 x 6 SML + 4 x 6 OM3L |
| 14568 | FXMSU 8 x 6 OM4L |

Other types on request






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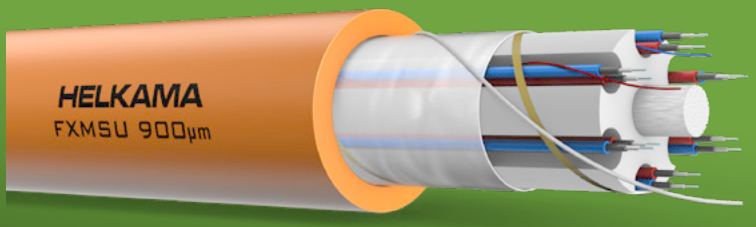
# FXMSU 900 µm




| | | Max 12 fibers | Unit |
|---|---|---|---|
| **CENTRAL ELEMENT, GLASS FIBER** | | 2.6 | Ø mm |
| **PP-SLOTTED CORE** | | 9.0 | Ø mm |
| **OPTICAL FIBERS** | | 900 | Ø µm |
| **WRAPPING** | Aramid binding yarn | | |
| **WATER BLOCKING** | Water swellable tape | | |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour orange or black | | |
| **REFERENCE STANDARD** | Helkama specification | | |

## APPLICATION

Halogen-free optical fiber cable with 900 µm tight-buffered fiber for indoor/outdoor application.

## PHYSICAL PROPERTIES:

| | Max 12 fibers | Unit | Mechanical test |
|---|---|---|---|
| **TENSILE STRENGTH** | 1150 | N | EN 187000 method 501 |
| **CRUSH STRENGTH/ 100 mm (PLATE)** | 4000 | N | EN 187000 method 504 |
| **CRUSH STRENGTH/ 25 mm (MANDREL)** | 1000 | N | EN 187000 method 504 |
| **IMPACT STRENGTH** | 30 | J | EN 187000 method 505 |
| **LONGITUDINAL WATER TIGHTNESS** | | | EN 18700 method 605B |
| **MIN. BENDING RADIUS (installation/fixed)** | 15/10 x Ø | | |
| **NOMINAL OUTER Ø** | 12.4 | mm | |
| **CABLE WEIGHT** | 124 | kg/km | |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Eca<br>IEC 60332-1-2<br>IEC 60332-3-22 |
| **UV RESISTANCE** | UL1581 section 1200 |
| **HALOGEN-FREE** | IEC 60754-1 |
| **ACIDITY OF COMBUSTION GASES** | IEC 60754-2 |
| **CONDUCTIVITY OF COMBUSTION GASES** | IEC 60754-2 |
| **SMOKE EMISSION** | IEC 61034 series |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -45 - 70 °C |





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## FXMSU 900 µm

| Part number | Cable type | Colour |
|---|---|---|
| 10044 | FXMSU 900 µm 3 x 2 SMT | Orange |
| 10046 | FXMSU 900 µm 4 x 2 SMT | Black |
| 10047 | FXMSU 900 µm 5 x 2 SMT | Black |
| 10048 | FXMSU 900 µm 6 x 2 SMT | Orange |
| 10049 | FXMSU 900 µm 6 x 2 SMT | Black |
| 14501 | FXMSU 900 µm 1 x 2 GKT | Orange |
| 14502 | FXMSU 900 µm 2 x 2 GKT | Orange |
| 14503 | FXMSU 900 µm 2 x 2 OM3T | Black |
| 14504 | FXMSU 900 µm 4 x 2 GKT | Orange |
| 14505 | FXMSU 900 µm 4 x 2 OM3T | Orange |
| 14506 | FXMSU 900 µm 6 x 2 GKT | Orange |
| 14507 | FXMSU 900 µm 5 x 2 GKT | Orange |
| 14509 | FXMSU 900 µm 5 x 2 OM3T | Black |
| 14511 | FXMSU 900 µm 4 x 2 OM3T | Black |
| 14513 | FXMSU 900 µm 6 x 2 OM3T | Orange |
| 14516 | FXMSU 900 µm 2 x 2 OM3T | Orange |
| 14520 | FXMSU 900 µm 2 x 2 SMT + 2 x 2 OM3T | Black |
| 14522 | FXMSU 900 µm 2 x 2 SMT + 4 x 2 GKT | Orange |

Other types on request






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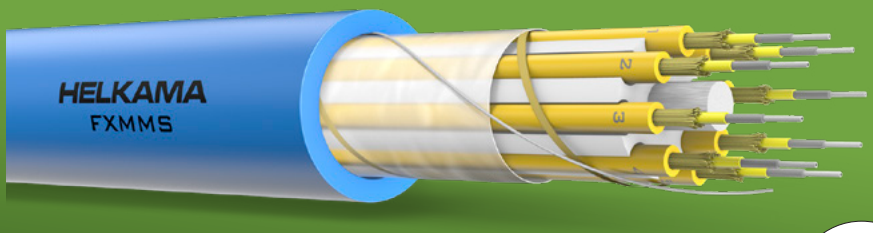
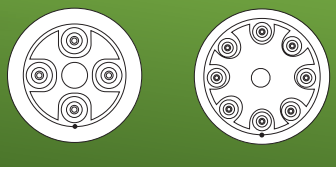
# FXMMS



| | | Max 4 fibers | Max 8 fibers | Unit |
|---|---|---|---|---|
| **CENTRAL ELEMENT, GLASS FIBER** | | 2.0 | 2.0 | Ø mm |
| **PP-SLOTTED CORE** | | 7.5 | 9.7 | Ø mm |
| **INSTALLATION CABLE UNIT** | FMS 1 (2 mm)<br>Yellow colour (SMT fibers)<br>Green colour (GKT, OM3T and OM4T fibers) | | | |
| **WRAPPING** | Aramid binding yarn<br>Fire barrier tape<br>Rip cord under sheath | | | |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour blue (SMT fibers)<br>Standard colour green (GKT, OM3T and OM4T fibers) | | | |
| **REFERENCE STANDARD** | Helkama specification | | | |

## APPLICATION

Halogen-free optical fiber installation cable for indoor application.

## PHYSICAL PROPERTIES:

| | Max 4 fibers | Max 8 fibers | Unit | Mechanical test |
|---|---|---|---|---|
| **TENSILE STRENGTH** | 1500 | 1750 | N | EN 187000 method 501 |
| **CRUSH STRENGTH/ 100 mm (PLATE)** | 4000 | 7000 | N | EN 187000 method 504 |
| **CRUSH STRENGTH/ 25 mm (MANDREL)** | 750 | 1000 | N | EN 187000 method 504 |
| **IMPACT STRENGTH** | 30 | 30 | J | EN 187000 method 505 |
| **MIN. BENDING RADIUS (installation/fixed)** | 15/10 x Ø | 15/10 x Ø | mm | |
| **NOMINAL OUTER Ø** | 10.7 | 13.1 | mm | |
| **CABLE WEIGHT** | 102 | 142 | kg/km | |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Eca<br>IEC 60332-1<br>IEC 60332-3-22 |
| **HALOGEN-FREE** | IEC 60754-1 |
| **ACIDITY OF COMBUSTION GASES** | IEC 60754-2 |
| **CONDUCTIVITY OF COMBUSTION GASES** | IEC 60754-2 |
| **SMOKE EMISSION** | IEC 61034 series |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -45 – 70 °C |





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## FXMMS

| Part number | Cable type |
|---|---|
| 10810 | FXMMS 2 SMT (2 mm) |
| 10812 | FXMMS 4 SMT (2 mm) |
| 10814 | FXMMS 6 SMT (2 mm) |
| 10816 | FXMMS 8 SMT (2 mm) |
| 13747 | FXMMS 2 GKT (2 mm) |
| 13748 | FXMMS 4 GKT (2 mm) |
| 13749 | FXMMS 6 GKT (2 mm) |
| 13750 | FXMMS 8 GKT (2 mm) |
| 13872 | FXMMS 2 OM3T (2 mm) |
| 13874 | FXMMS 4 OM3T (2 mm) |
| 13876 | FXMMS 6 OM3T (2 mm) |
| 13878 | FXMMS 8 OM3T (2 mm) |
| 13910 | FXMMS 2 OM4T (2 mm) |
| 13912 | FXMMS 4 OM4T (2 mm) |
| 13914 | FXMMS 6 OM4T (2 mm) |
| 13916 | FXMMS 8 OM4T (2 mm) |

Other types on request






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# FMS


| | |
|---|---|
| **OPTICAL FIBER** | SMT 10/125/900 µm<br>GKT 62.5/125/900 µm<br>OM3T 50/125/900 µm<br>OM4T 50/125/900 µm |
| **INSTALLATION CABLE UNIT** | 1 (2 mm) / FMS 2 (2 mm)<br>FMS 2 with separation neck |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour yellow (SMT fibers)<br>Standard colour green (GKT, OM3T and OM4T fibers) |
| **REFERENCE STANDARD** | Helkama specification |

## APPLICATION

Halogen-free installation cable.

## PHYSICAL PROPERTIES:

| | FMS1 | FMS2 | Unit | Mechanical test |
|---|---|---|---|---|
| **TENSILE STRENGTH** | 100 | 200 | N | EN 187000 method 501 |
| **CRUSH STRENGTH/ 100 mm (PLATE)** | 1250 | 1250 | N | EN 187000 method 504 |
| **CRUSH STRENGTH/ 25 mm (MANDREL)** | 100 | 100 | N | EN 187000 method 504 |
| **IMPACT STRENGTH** | 15 | 15 | J | EN 187000 method 505 |
| **MIN. BENDING RADIUS (installation/fixed)** | 20/12.5 x Ø | | | |
| **NOMINAL OUTER Ø** | 1.95 | 1.95 x 4.0 | mm | |
| **CABLE WEIGHT** | 3.6 | 7.2 | kg/km | |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1-2 |
| **HALOGEN-FREE** | IEC 60754-1 |
| **ACIDITY OF COMBUSTION GASES** | IEC 60754-2 |
| **CONDUCTIVITY OF COMBUSTION GASES** | IEC 60754-2 |
| **SMOKE EMISSION** | IEC 61034 series |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -45 – 70 °C |





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## FMS 1 / FMS 2

| Part number | Cable type |
|---|---|
| 10806 | FMS 1 SMT (2 mm) |
| 13722 | FMS 1 GKT (2 mm) |
| 13726 | FMS 1 OM3T (2 mm) |
| --- | FMS 1 OM4T (2 mm) |
| 10807 | FMS 2 SMT (2 mm) |
| 13723 | FMS 2 GKT (2 mm) |
| 13727 | FMS 2 OM3T (2 mm) |
| --- | FMS 2 OM4T (2 mm) |

Other types on request







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# FMMS


| | |
|---|---|
| **OPTICAL FIBER** | SMT 10/125/900 µm<br>GKT 62.5/125/900 µm<br>OM3T 50/125/900 µm<br>OM4T 50/125/900 µm |
| **INSTALLATION CABLE UNIT** | FMS 1 (2 mm) |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour yellow (SMT fibers),<br>Standard colour green (GKT, OM3T and OM4T fibers) |
| **REFERENCE STANDARD** | Helkama specification |

## APPLICATION

Halogen-free 2 mm duplex installation cable.

## PHYSICAL PROPERTIES:

| | | Unit | Mechanical test |
|---|---|---|---|
| **TENSILE STRENGTH** | 200 | N | EN 187000 method 501 |
| **CRUSH STRENGTH/ 100 mm (PLATE)** | 1500 | N | EN 187000 method 504 |
| **CRUSH STRENGTH/ 25 mm (MANDREL)** | 150 | N | EN 187000 method 504 |
| **IMPACT STRENGTH, R=300 mm** | 20 | J | EN 187000 method 505 |
| **MIN. BENDING RADIUS (installation/fixed)** | 40/25 | mm | |
| **NOMINAL OUTER Ø** | 3.7 x 5.7 | mm | |
| **CABLE WEIGHT** | 21 | kg/km | |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1-2 |
| **HALOGEN-FREE** | IEC 60754-1 |
| **ACIDITY OF COMBUSTION GASES** | IEC 60754-2 |
| **CONDUCTIVITY OF COMBUSTION GASES** | IEC 60754-2 |
| **SMOKE EMISSION** | IEC 61034 series |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -20 – 60 °C |





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## FMMS

| Part number | Cable type |
|---|---|
| 10706 | FMMS 2 SMT (2 mm) |
| 13782 | FMMS 2 GKT (2 mm) |
| 13784 | FMMS 2 OM3T (2 mm) |
| 13785 | FMMS 2 OM4T (2 mm) |

Other types on request







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# XCMK-HF

## 0.6/1 kV


| | | |
|---|---|---|
| **CONDUCTOR** | Stranded copper conductor, IEC 60228 / class 2 (class 5 on request) | |
| **INSULATION** | XLPE | |
| **STRANDING** | Parallel Cores (concentric)<br>Extruded Filler (concentric) | Stranded Cores (braided)<br>Dummy cores (braided) |
| **SCREEN** | Concentric conductor 2.5 $mm^2$ | Braided 6-16 $mm^2$ |
| **SHEATH** | LSZH Thermoplastic<br>Standard colour black, other colours on request | |
| **REFERENCE STANDARD** | IEC 60502-1 | |

## APPLICATION

Flame retardant, screened power supply cable for fixed installations.

## PHYSICAL PROPERTIES:

| | |
|---|---|
| **MIN. BENDING RADIUS (installation/fixed)** | 9 x Ø/6 x Ø |
| **CORE IDENTIFICATION** | Brown and blue |

## MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Dca s2, d2, a1 |
| **RATED VOLTAGE** | AC 0.6/1 kV (1.2 kV)<br>DC 0.9/1.5 kV (if voltage to earth does not exceed 0.9 kV) |
| **UV RESISTANCE** | IEC 68-2-5 |
| **HALOGEN-FREE** | IEC 60754 series |
| **MAXIMUM CONDUCTOR TEMPERATURE** | 90 °C |
| **MIN. INSTALLATION TEMPERATURE** | -15 °C |
| **OPERATING TEMPERATURE** | -40 – 80 °C fixed installation |





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## XCMK-HF 1 kV CONCENTRIC CONDUCTOR

| Part number | No. of conductors x Conductor area (mm²) | No. of wires x Ø of wires (mm) | Screen area (mm²) | Nominal outer Ø (mm) | Weight kg/km | Current rating A |
|---|---|---|---|---|---|---|
| 6030409020 | 2 x 4 | 7 x 0.85 | 2.5 | 12.9 | 265 | 34 |
| 6030410020 | 2 x 6 | 7 x 1.05 | 2.5 | 14.1 | 331 | 44 |
| 6030411020 | 2 x 10 | 7 x 1.35 | 2.5 | 15.9 | 454 | 61 |
| 6030412020 | 2 x 16 | 19 x 1.04 | 2.5 | 18.4 | 612 | 82 |
| 6030413020 | 2 x 25 | 37 x 0.93 | 2.5 | 21.8 | 833 | 108 |
| 6030414020 | 2 x 35 | 37 x 1.1 | 2.5 | 24.2 | 1055 | 133 |

Standard length 1000 m

## XCMK-HF 1 kV BRAIDED

| Part number | No. of conductors x Conductor area (mm²) | No. of wires x Ø of wires (mm) | Screen area (mm²) | Nominal outer Ø (mm) | Weight kg/km | Current rating A |
|---|---|---|---|---|---|---|
| 6030210020 | 2 x 6/6 | 7 x 1.05 | 6 | 13.7 | 319 | 44 |
| 6030211020 | 2 x 10/10 | 7 x 1.35 | 10 | 16.0 | 455 | 61 |
| 6030212020 | 2 x 16/16 | 19 x 1.04 | 16 | 18.3 | 660 | 82 |
| 6030213020 | 2 x 25/16 | 37 x 0.93 | 16 | 22.1 | 891 | 108 |
| 6030214020 | 2 x 35/16 | 37 x 1.1 | 16 | 24.5 | 1124 | 133 |

Standard length 1000 m







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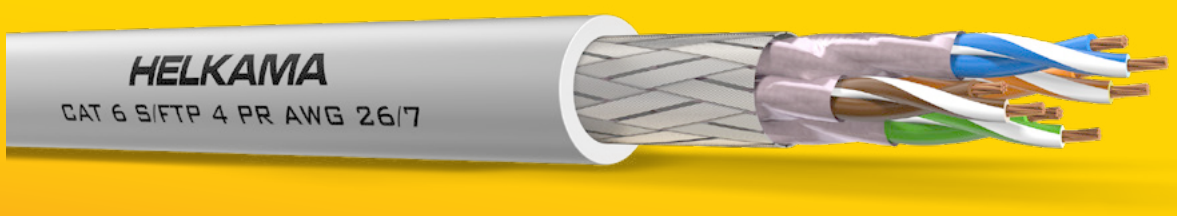
# CAT 6

## S/FTP 4 PR AWG 26/7




| | |
|---|---|
| **CONDUCTOR** | Stranded copper conductor 26 AWG/7 |
| **INSULATION** | Foam PE |
| **PAIR SHIELDING** | Aluminium foil |
| **SHIELDING** | Tinned copper wire braid |
| **SHEATH** | LSZH |
| **REFERENCE STANDARD** | IEC 61156-6 & ISO/IEC 11801 |

### PHYSICAL PROPERTIES:

| | |
|---|---|
| **BENDING RADIUS (Installation)** | 8 x Ø |
| **MAX. RECOMMENDED PULLING TENSION** | 80 N |
| **NOMINAL OUTER Ø** | 6.1 ± 0.3 mm |
| **CABLE WEIGHT** | 37 kg/km |
| **CORE IDENTIFICATION** | |
| **Pair colours** | 1. White/Blue stripe & Blue<br>2. White/Orange stripe & Orange<br>3. White/Green stripe & Green<br>4. White/Brown stripe & Brown |
| **PACKAGING** | 500 m drum |

### MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1<br>IEC 60332-3-22 |
| **HALOGEN-FREE** | IEC 60754 series |
| **SMOKE EMISSION** | IEC 61034 series |
| **MAX. CONDUCTOR DC RESISTANCE** | 145 Ω/km @20 °C |
| **CONDUCTOR LOOP RESISTANCE** | max. 29 Ω/100 m @20 °C |
| **NOM. MUTUAL CAPACITANCE** | ≤ 5.6 nF/100 m @1 kHz |
| **CAPACITANCE UNBALANCE PAIR TO GROUND** | ≤ 1600 pF/km @1 kHz |
| **MIN. INSULATION RESISTANCE** | 5000 MΩ/m |
| **IMPEDANCE** | 100 ± 25 Ω @100 MHz |
| **RATED TEMPERATURE** | 75 °C |
| **OPERATING TEMPERATURE RANGE** | 20 °C - 75 °C |





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## ITEM NUMBERS:

| Part number | Cable type | Colour | Standard length m |
|---|---|---|---|
| 3370149072 | CAT 6 S/FTP AWG 26/7 | Black | 500 |
| 3370249072 | CAT 6 S/FTP AWG 26/7 | Yellow | 500 |
| 3370349072 | CAT 6 S/FTP AWG 26/7 | Grey | 500 |
| 3370449072 | CAT 6 S/FTP AWG 26/7 | White | 500 |
| 3370549072 | CAT 6 S/FTP AWG 26/7 | Orange | 500 |
| 3370649072 | CAT 6 S/FTP AWG 26/7 | Blue | 500 |
| 3370749072 | CAT 6 S/FTP AWG 26/7 | Red | 500 |
| 3370849072 | CAT 6 S/FTP AWG 26/7 | Green | 500 |

## PERFORMANCE:

| **F** (MHz) | **ATT** (dB/100 m) | **RL** (dB) | **NEXT** (dB) | **PS NEXT** (dB) | **ACRF (EL FEXT)** (dB/100 m) | **PS ACRF (PS EL FEXT)** (dB/100 m) | **PD** (ns/100 m) |
|---|---|---|---|---|---|---|---|
| 1.0 | 2.6 | 34 | 91 | 84 | 92 | 89 | 485 |
| 4.0 | 4.9 | 33 | 93 | 85 | 90 | 87 | 463 |
| 8.0 | 7.0 | 35 | 93 | 88 | 93 | 90 | 457 |
| 10.0 | 7.7 | 38 | 104 | 97 | 102 | 99 | 455 |
| 16.0 | 9.8 | 34 | 110 | 103 | 107 | 104 | 452 |
| 20.0 | 11.1 | 34 | 107 | 101 | 108 | 105 | 451 |
| 25.0 | 12.5 | 39 | 114 | 107 | 111 | 108 | 450 |
| 31.2 | 14.1 | 39 | 110 | 104 | 111 | 108 | 449 |
| 62.5 | 20.2 | 40 | 112 | 106 | 114 | 111 | 447 |
| 100.0 | 25.9 | 43 | 113 | 107 | 118 | 115 | 445 |
| 200.0 | 36.9 | 35 | 111 | 103 | 111 | 108 | 444 |
| 250.0 | 41.4 | 28 | 109 | 103 | 109 | 106 | 443 |
| 300.0 | 45.7 | 29 | 109 | 103 | 112 | 109 | 443 |
| 400.0 | 53.3 | 38 | 108 | 101 | 112 | 109 | 443 |
| 500.0 | 60.1 | 31 | 110 | 97 | 110 | 107 | 443 |
| 600.0 | 66.2 | 27 | 111 | 102 | 111 | 108 | 442 |

**F** = Frequency
**ATT** = Attenuation
**RL** = Return Loss
**NEXT =** Near End Crosstalk
**PS NEXT =** Power Sum Near End Crosstalk
**ACRF (EL FEXT) =** Attenuation to Crosstalk Ratio Far End Crosstalk
**PS ACRF (PS EL FEXT) =** Power Sum Attenuation to Crosstalk Ratio Far End Crosstalk
**PD =** Phase Delay






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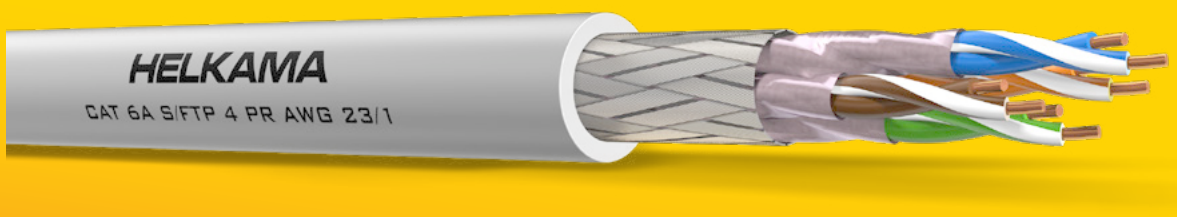
# CAT 6 A

## S/FTP 4 PR AWG 23/1




| | |
|---|---|
| **CONDUCTOR** | Solid copper conductor 23 AWG/1 |
| **INSULATION** | Foam PE |
| **PAIR SHIELDING** | Aluminium foil |
| **SHIELDING** | Tinned copper wire braid |
| **SHEATH** | LSZH |
| **REFERENCE STANDARD** | IEC 61156-5 & ISO/IEC 11801 |

### PHYSICAL PROPERTIES:

| | |
|---|---|
| **BENDING RADIUS (Installation)** | 8 x Ø |
| **MAX. RECOMMENDED PULLING TENSION** | 80 N |
| **NOMINAL OUTER Ø** | 7.1 ± 0.3 mm |
| **CABLE WEIGHT** | 51 kg/km |
| **CORE IDENTIFICATION** | |
| **Pair colours** | 1. White/Blue stripe & Blue<br>2. White/Orange stripe & Orange<br>3. White/Green stripe & Green<br>4. White/Brown stripe & Brown |
| **PACKAGING** | 500 m drum, 1000 m drum |

### MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Dca-s1a, d1, a1<br>IEC 60332-1-2<br>IEC 60332-3-22 |
| **MAX. CONDUCTOR DC RESISTANCE** | 93.8 Ω/km @20 °C |
| **CONDUCTOR LOOP RESISTANCE** | max. 19 Ω/100 m @20 °C |
| **NOM. MUTUAL CAPACITANCE** | ≤ 5.6 nF/100 m @1 kHz |
| **CAPACITANCE UNBALANCE PAIR TO GROUND** | ≤ 1600 pF/km @1 kHz |
| **MIN. INSULATION RESISTANCE** | 5000 MΩ/m |
| **IMPEDANCE** | 100 ± 25 Ω @100 MHz |
| **RATED TEMPERATURE** | 75 °C |
| **OPERATING TEMPERATURE RANGE** | -20 °C - 75 °C |





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## ITEM NUMBERS:

| Part number | Cable type | Colour | Standard length m |
|---|---|---|---|
| 3388124042 | CAT 6A S/FTP AWG 23/1 | Black | 500 |
| 3388224042 | CAT 6A S/FTP AWG 23/1 | Yellow | 500 |
| 3388324042 | CAT 6A S/FTP AWG 23/1 | Grey | 500 |
| 3388424042 | CAT 6A S/FTP AWG 23/1 | White | 500 |
| 3388524042 | CAT 6A S/FTP AWG 23/1 | Orange | 500 |
| 3388624042 | CAT 6A S/FTP AWG 23/1 | Blue | 500 |
| 3388724042 | CAT 6A S/FTP AWG 23/1 | Red | 500 |
| 3388824042 | CAT 6A S/FTP AWG 23/1 | Green | 500 |
| 3389124042 | CAT 6A S/FTP AWG 23/1 | Black | 1000 |
| 3389224042 | CAT 6A S/FTP AWG 23/1 | Yellow | 1000 |
| 3389324042 | CAT 6A S/FTP AWG 23/1 | Grey | 1000 |
| 3389424042 | CAT 6A S/FTP AWG 23/1 | White | 1000 |
| 3389524042 | CAT 6A S/FTP AWG 23/1 | Orange | 1000 |
| 3389624042 | CAT 6A S/FTP AWG 23/1 | Blue | 1000 |
| 3389724042 | CAT 6A S/FTP AWG 23/1 | Red | 1000 |
| 3389824042 | CAT 6A S/FTP AWG 23/1 | Green | 1000 |

## PERFORMANCE:

| **F** (MHz) | **ATT** (dB/100 m) | **RL** (dB) | **NEXT** (dB) | **PS NEXT** (dB) | **ACRF (EL FEXT)** (dB/100 m) | **PS ACRF (PS EL FEXT)** (dB/100 m) | **PD** (ns/100 m) |
|---|---|---|---|---|---|---|---|
| 1.0 | 1.8 | 26 | 85 | 82 | 85 | 83 | 448 |
| 4.0 | 3.4 | 35 | 88 | 83 | 86 | 82 | 433 |
| 8.0 | 4.8 | 38 | 86 | 84 | 88 | 82 | 428 |
| 10.0 | 5.4 | 36 | 100 | 96 | 95 | 92 | 427 |
| 16.0 | 6.9 | 40 | 101 | 98 | 96 | 93 | 425 |
| 20.0 | 7.8 | 38 | 101 | 97 | 97 | 93 | 425 |
| 25.0 | 8.7 | 41 | 100 | 98 | 95 | 90 | 424 |
| 31.2 | 9.8 | 38 | 103 | 100 | 89 | 87 | 423 |
| 62.5 | 14.0 | 43 | 101 | 97 | 92 | 88 | 421 |
| 100.0 | 17.8 | 42 | 106 | 101 | 85 | 82 | 420 |
| 200.0 | 25.2 | 37 | 97 | 94 | 74 | 71 | 419 |
| 250.0 | 28.4 | 31 | 99 | 97 | 72 | 70 | 419 |
| 300.0 | 31.2 | 32 | 101 | 97 | 71 | 68 | 419 |
| 400.0 | 36.0 | 30 | 99 | 96 | 63 | 60 | 419 |
| 500.0 | 40.6 | 22 | 96 | 95 | 60 | 58 | 419 |

**F** = Frequency
**ATT** = Attenuation
**RL** = Return Loss
**NEXT** = Near End Crosstalk
**PS NEXT** = Power Sum Near End Crosstalk
**ACRF (EL FEXT)** = Attenuation to Crosstalk Ratio Far End Crosstalk
**PS ACRF (PS EL FEXT)** = Power Sum Attenuation to Crosstalk Ratio Far End Crosstalk
**PD** = Phase Delay






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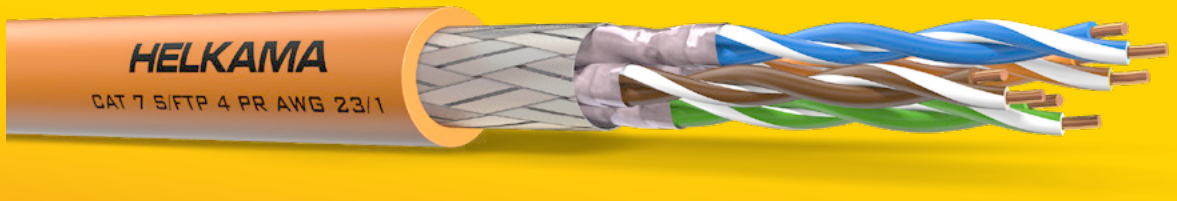
# CAT 7

## S/FTP 4 PR AWG 23/1




| | |
|---|---|
| **CONDUCTOR** | Solid copper conductor 23 AWG/1 |
| **INSULATION** | Foam PE |
| **PAIR SHIELDING** | Aluminium foil |
| **SHIELDING** | Tinned copper wire braid |
| **SHEATH** | LSZH |
| **REFERENCE STANDARD** | IEC 61156-5 & ISO/IEC 11801 |

### PHYSICAL PROPERTIES:

| | |
|---|---|
| **BENDING RADIUS (Installation)** | 8 x Ø |
| **MAX. RECOMMENDED PULLING TENSION** | 80 N |
| **NOMINAL OUTER Ø** | 7.7 ± 0.3 mm |
| **CABLE WEIGHT** | 66 kg/km |
| **CORE IDENTIFICATION** | |
| **Pair colours** | 1. White/Blue stripe & Blue<br>2. White/Orange stripe & Orange<br>3. White/Green stripe & Green<br>4. White/Brown stripe & Brown |
| **PACKAGING** | 500 m drum, 1000 m drum |

### MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Dca-s1a, d2, a1<br>IEC 60332-1-2<br>IEC 60332-3-22 |
| **MAX. CONDUCTOR DC RESISTANCE** | 95 Ω/km @20 °C |
| **CONDUCTOR LOOP RESISTANCE** | max. 19 Ω/100 m @20 °C |
| **NOM. MUTUAL CAPACITANCE** | ≤ 5.6 nF/100 m @1 kHz |
| **CAPACITANCE UNBALANCE PAIR TO GROUND** | ≤ 1600 pF/km @1 kHz |
| **MIN. INSULATION RESISTANCE** | 5000 MΩ/m |
| **IMPEDANCE** | 100 ± 25 Ω @100 MHz |
| **RATED TEMPERATURE** | 75 °C |
| **OPERATING TEMPERATURE RANGE** | -20 °C - 75 °C |





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| Part number | Cable type | Colour | Standard length m |
|---|---|---|---|
| 3340124042 | CAT 7 S/FTP AWG 23/1 | Black | 500 |
| 3340224042 | CAT 7 S/FTP AWG 23/1 | Yellow | 500 |
| 3340324042 | CAT 7 S/FTP AWG 23/1 | Grey | 500 |
| 3340424042 | CAT 7 S/FTP AWG 23/1 | White | 500 |
| 3340524042 | CAT 7 S/FTP AWG 23/1 | Orange | 500 |
| 3340624042 | CAT 7 S/FTP AWG 23/1 | Blue | 500 |
| 3340724042 | CAT 7 S/FTP AWG 23/1 | Red | 500 |
| 3340824042 | CAT 7 S/FTP AWG 23/1 | Green | 500 |
| 3341124042 | CAT 7 S/FTP AWG 23/1 | Black | 1000 |
| 3341224042 | CAT 7 S/FTP AWG 23/1 | Yellow | 1000 |
| 3341324042 | CAT 7 S/FTP AWG 23/1 | Grey | 1000 |
| 3341424042 | CAT 7 S/FTP AWG 23/1 | White | 1000 |
| 3341524042 | CAT 7 S/FTP AWG 23/1 | Orange | 1000 |
| 3341624042 | CAT 7 S/FTP AWG 23/1 | Blue | 1000 |
| 3341724042 | CAT 7 S/FTP AWG 23/1 | Red | 1000 |
| 3341824042 | CAT 7 S/FTP AWG 23/1 | Green | 1000 |

## PERFORMANCE:

| **F** (MHz) | **ATT** (dB/100 m) | **RL** (dB) | **NEXT** (dB) | **PS NEXT** (dB) | **ACRF (EL FEXT)** (dB/100 m) | **PS ACRF (PS EL FEXT)** (dB/100 m) | **PD** (ns/100 m) |
|---|---|---|---|---|---|---|---|
| 4.0 | 3.6 | 30 | 98 | 95 | 96 | 92 | 449 |
| 8.0 | 5.0 | 32 | 98 | 95 | 94 | 89 | 444 |
| 10.0 | 5.6 | 35 | 98 | 95 | 91 | 90 | 442 |
| 16.0 | 7.2 | 35 | 98 | 95 | 81 | 76 | 440 |
| 20.0 | 8.1 | 38 | 99 | 96 | 81 | 77 | 439 |
| 25.0 | 9.1 | 39 | 98 | 95 | 84 | 76 | 438 |
| 31.2 | 10.0 | 39 | 97 | 94 | 83 | 77 | 437 |
| 62.5 | 14.5 | 34 | 95 | 92 | 79 | 76 | 436 |
| 100.0 | 17.7 | 32 | 92 | 89 | 82 | 73 | 435 |
| 200.0 | 26.1 | 30 | 88 | 85 | 69 | 66 | 434 |
| 250.0 | 27.9 | 28 | 86 | 83 | 74 | 65 | 434 |
| 300.0 | 31.9 | 27 | 86 | 83 | 69 | 64 | 433 |
| 400.0 | 37.8 | 28 | 83 | 80 | 59 | 56 | 433 |
| 500.0 | 40.7 | 23 | 81 | 78 | 56 | 51 | 433 |
| 600.0 | 45.8 | 25 | 80 | 77 | 58 | 52 | 433 |

**F** = Frequency
**ATT** = Attenuation
**RL** = Return Loss
**NEXT** = Near End Crosstalk
**PS NEXT** = Power Sum Near End Crosstalk
**ACRF (EL FEXT)** = Attenuation to Crosstalk Ratio Far End Crosstalk
**PS ACRF (PS EL FEXT)** = Power Sum Attenuation to Crosstalk Ratio Far End Crosstalk
**PD** = Phase Delay






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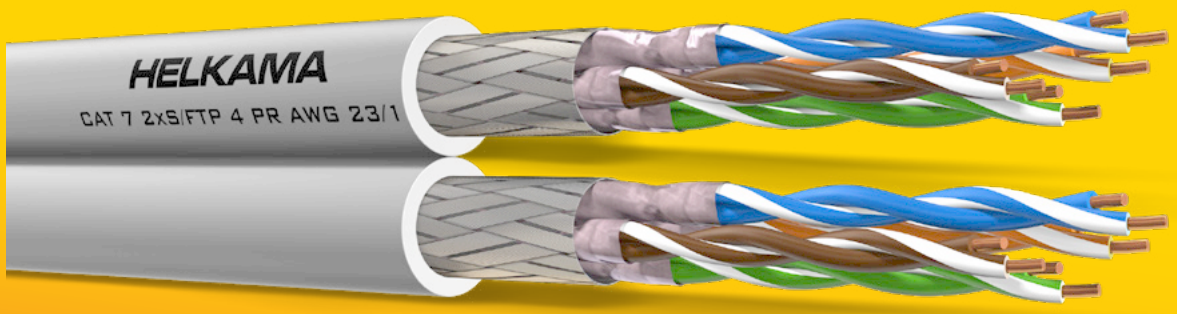
# CAT 7

## 2XS/FTP 4 PR AWG 23/1




| | |
|---|---|
| **CONDUCTOR** | Solid copper conductor 23 AWG/1 |
| **INSULATION** | Foam PE |
| **PAIR SHIELDING** | Aluminium foil |
| **SHIELDING** | Tinned copper wire braid |
| **SHEATH** | LSZH |
| **REFERENCE STANDARD** | IEC 61156-5 & ISO/IEC 11801 |

### PHYSICAL PROPERTIES:

| | |
|---|---|
| **BENDING RADIUS (Installation)** | 8 x Ø |
| **MAX. RECOMMENDED PULLING TENSION** | 80 N |
| **NOMINAL OUTER Ø** | 7.1 ± 0.3 mm X 14.3 ±1 mm |
| **CABLE WEIGHT** | 132 kg/km |
| **CORE IDENTIFICATION** | |
| **Pair colours** | 1. White/Blue stripe & Blue<br>2. White/Orange stripe & Orange<br>3. White/Green stripe & Green<br>4. White/Brown stripe & Brown |
| **PACKAGING** | 500 m drum, 1000 m drum |

### MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | Dca-s1a, d2, a1<br>IEC 60332-1-2<br>IEC 60332-3-22 |
| **MAX. CONDUCTOR DC RESISTANCE** | 95 Ω/km @20 °C |
| **CONDUCTOR LOOP RESISTANCE** | max. 19 Ω/100 m @20 °C |
| **NOM. MUTUAL CAPACITANCE** | ≤ 5.6 nF/100 m @1 kHz |
| **CAPACITANCE UNBALANCE PAIR TO GROUND** | ≤ 1600 pF/km @1 kHz |
| **MIN. INSULATION RESISTANCE** | 5000 MΩ/m |
| **IMPEDANCE** | 100 ± 25 Ω @100 MHz |
| **RATED TEMPERATURE** | 75 °C |
| **OPERATING TEMPERATURE RANGE** | -20 °C - 75 °C |





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## ITEM NUMBERS:

| Part number | Cable type | Colour | Standard length m |
|---|---|---|---|
| 3340124082 | CAT 7 2xS/FTP AWG 23/1 | Black | 500 |
| 3340224082 | CAT 7 2xS/FTP AWG 23/1 | Yellow | 500 |
| 3340324082 | CAT 7 2xS/FTP AWG 23/1 | Grey | 500 |
| 3340424082 | CAT 7 2xS/FTP AWG 23/1 | White | 500 |
| 3340524082 | CAT 7 2xS/FTP AWG 23/1 | Orange | 500 |
| 3340624082 | CAT 7 2xS/FTP AWG 23/1 | Blue | 500 |
| 3340724082 | CAT 7 2xS/FTP AWG 23/1 | Red | 500 |
| 3340824082 | CAT 7 2xS/FTP AWG 23/1 | Green | 500 |

## PERFORMANCE:

| **F** (MHz) | **ATT** (dB/100 m) | **RL** (dB) | **NEXT** (dB) | **PS NEXT** (dB) | **ACRF (EL FEXT)** (dB/100 m) | **PS ACRF (PS EL FEXT)** (dB/100 m) | **PD** (ns/100 m) |
|---|---|---|---|---|---|---|---|
| 4.0 | 3.6 | 30 | 98 | 95 | 96 | 92 | 449 |
| 8.0 | 5.0 | 32 | 98 | 95 | 94 | 89 | 444 |
| 10.0 | 5.6 | 35 | 98 | 95 | 91 | 90 | 442 |
| 16.0 | 7.2 | 35 | 98 | 95 | 81 | 76 | 440 |
| 20.0 | 8.1 | 38 | 99 | 96 | 81 | 77 | 439 |
| 25.0 | 9.1 | 39 | 98 | 95 | 84 | 76 | 438 |
| 31.2 | 10.0 | 39 | 97 | 94 | 83 | 77 | 437 |
| 62.5 | 14.5 | 34 | 95 | 92 | 79 | 76 | 436 |
| 100.0 | 17.7 | 32 | 92 | 89 | 82 | 73 | 435 |
| 200.0 | 26.1 | 30 | 88 | 85 | 69 | 66 | 434 |
| 250.0 | 27.9 | 28 | 86 | 83 | 74 | 65 | 434 |
| 300.0 | 31.9 | 27 | 86 | 83 | 69 | 64 | 433 |
| 400.0 | 37.8 | 28 | 83 | 80 | 59 | 56 | 433 |
| 500.0 | 40.7 | 23 | 81 | 78 | 56 | 51 | 433 |
| 600.0 | 45.8 | 25 | 80 | 77 | 58 | 52 | 433 |

**F** = Frequency
**ATT** = Attenuation
**RL** = Return Loss
**NEXT** = Near End Crosstalk
**PS NEXT** = Power Sum Near End Crosstalk
**ACRF (EL FEXT)** = Attenuation to Crosstalk Ratio Far End Crosstalk
**PS ACRF (PS EL FEXT)** = Power Sum Attenuation to Crosstalk Ratio Far End Crosstalk
**PD** = Phase Delay






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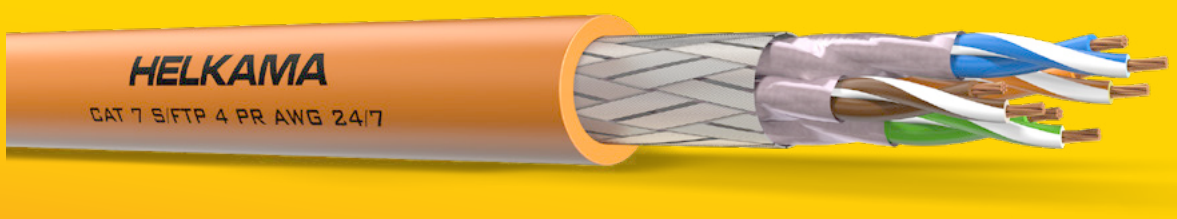
# CAT 7

## S/FTP 4PR AWG 24/7




| | |
|---|---|
| **CONDUCTOR** | Stranded copper conductor 24 AWG/7 |
| **INSULATION** | Foam PE |
| **PAIR SHIELDING** | Aluminium foil |
| **SHIELDING** | Tinned copper wire braid |
| **SHEATH** | LSZH |
| **REFERENCE STANDARD** | IEC 61156-6 & ISO/IEC 11801 |

### PHYSICAL PROPERTIES:

| | |
|---|---|
| **BENDING RADIUS (Installation)** | 8 x Ø |
| **MAX. RECOMMENDED PULLING TENSION** | 80 N |
| **NOMINAL OUTER Ø** | 7.6 ± 0.3 mm |
| **CABLE WEIGHT** | 61 kg/km |
| **CORE IDENTIFICATION** | |
| **Pair colours** | 1. White/Blue stripe & Blue<br>2. White/Orange stripe & Orange<br>3. White/Green stripe & Green<br>4. White/Brown stripe & Brown |
| **PACKAGING** | 500 m drum, 1000 m drum |

### MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1<br>IEC 60332-3-22 |
| **HALOGEN-FREE** | IEC 60754 series |
| **SMOKE EMISSION** | IEC 61034 series |
| **MAX. CONDUCTOR DC RESISTANCE** | 148 Ω/km @20 °C |
| **CONDUCTOR LOOP RESISTANCE** | max. 29 Ω/100 m @20 °C |
| **NOM. MUTUAL CAPACITANCE** | ≤ 5.6 nF/100 m @1 kHz |
| **CAPACITANCE UNBALANCE PAIR TO GROUND** | ≤ 1600 pF/km @1 kHz |
| **MIN. INSULATION RESISTANCE** | 5000 MΩ/m |
| **IMPEDANCE** | 100 ± 25 Ω @100 MHz |
| **RATED TEMPERATURE** | 80 °C |
| **OPERATING TEMPERATURE RANGE** | -20 °C - 75 °C |





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## ITEM NUMBERS:

| Part number | Cable type | Colour | Standard length m |
|---|---|---|---|
| 3360124042 | CAT 7 S/FTP AWG 24/7 | Black | 500 |
| 3360224042 | CAT 7 S/FTP AWG 24/7 | Yellow | 500 |
| 3360324042 | CAT 7 S/FTP AWG 24/7 | Grey | 500 |
| 3360424042 | CAT 7 S/FTP AWG 24/7 | White | 500 |
| 3360524042 | CAT 7 S/FTP AWG 24/7 | Orange | 500 |
| 3360624042 | CAT 7 S/FTP AWG 24/7 | Blue | 500 |
| 3360724042 | CAT 7 S/FTP AWG 24/7 | Red | 500 |
| 3360824042 | CAT 7 S/FTP AWG 24/7 | Green | 500 |
| 3361124042 | CAT 7 S/FTP AWG 24/7 | Black | 1000 |
| 3361224042 | CAT 7 S/FTP AWG 24/7 | Yellow | 1000 |
| 3361324042 | CAT 7 S/FTP AWG 24/7 | Grey | 1000 |
| 3361424042 | CAT 7 S/FTP AWG 24/7 | White | 1000 |
| 3361524042 | CAT 7 S/FTP AWG 24/7 | Orange | 1000 |
| 3361624042 | CAT 7 S/FTP AWG 24/7 | Blue | 1000 |
| 3361724042 | CAT 7 S/FTP AWG 24/7 | Red | 1000 |
| 3361824042 | CAT 7 S/FTP AWG 24/7 | Green | 1000 |

## PERFORMANCE:

| **F** (MHz) | **ATT** (dB/100 m) | **RL** (dB) | **NEXT** (dB) | **PS NEXT** (dB) | **ACRF (EL FEXT)** (dB/100 m) | **PS ACRF (PS EL FEXT)** (dB/100 m) | **PD** (ns/100 m) |
|---|---|---|---|---|---|---|---|
| 1.0 | 2.6 | 34 | 91 | 84 | 92 | 89 | 485 |
| 4.0 | 4.9 | 33 | 93 | 85 | 90 | 87 | 463 |
| 8.0 | 7.0 | 35 | 93 | 88 | 93 | 90 | 457 |
| 10.0 | 7.7 | 38 | 104 | 97 | 102 | 99 | 455 |
| 16.0 | 9.8 | 34 | 110 | 103 | 107 | 104 | 452 |
| 20.0 | 11.1 | 34 | 107 | 101 | 108 | 105 | 451 |
| 25.0 | 12.5 | 39 | 114 | 107 | 111 | 108 | 450 |
| 31.2 | 14.1 | 39 | 110 | 104 | 111 | 108 | 449 |
| 62.5 | 20.2 | 40 | 112 | 106 | 114 | 111 | 447 |
| 100.0 | 25.9 | 43 | 113 | 107 | 118 | 115 | 445 |
| 200.0 | 36.9 | 35 | 111 | 103 | 111 | 108 | 444 |
| 250.0 | 41.4 | 28 | 109 | 103 | 109 | 106 | 443 |
| 300.0 | 45.7 | 29 | 109 | 103 | 112 | 109 | 443 |
| 400.0 | 53.3 | 38 | 108 | 101 | 112 | 109 | 443 |
| 500.0 | 60.1 | 31 | 110 | 97 | 110 | 107 | 443 |
| 600.0 | 66.2 | 27 | 111 | 102 | 111 | 108 | 442 |

**F** = Frequency
**ATT** = Attenuation
**RL** = Return Loss
**NEXT** = Near End Crosstalk
**PS NEXT** = Power Sum Near End Crosstalk
**ACRF (EL FEXT)** = Attenuation to Crosstalk Ratio Far End Crosstalk
**PS ACRF (PS EL FEXT)** = Power Sum Attenuation to Crosstalk Ratio Far End Crosstalk
**PD** = Phase Delay






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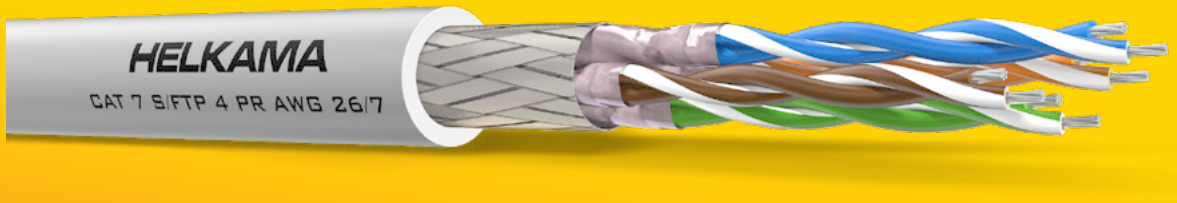
# CAT 7

## S/FTP 4 PR AWG 26/7




| | |
|---|---|
| **CONDUCTOR** | Stranded tinned copper conductor 26 AWG/7 |
| **INSULATION** | Foam PE |
| **PAIR SHIELDING** | Aluminium foil |
| **SHIELDING** | Tinned copper wire braid |
| **SHEATH** | LSZH |
| **REFERENCE STANDARD** | IEC 61156-6 & ISO/IEC 11801 |

### PHYSICAL PROPERTIES:

| | |
|---|---|
| **BENDING RADIUS (Installation)** | 8 x Ø |
| **MAX. RECOMMENDED PULLING TENSION** | 80 N |
| **NOMINAL OUTER Ø** | 6.4 ± 0.3 mm |
| **CABLE WEIGHT** | 39 kg/km |
| **CORE IDENTIFICATION** | |
| **Pair colours** | 1. White/Blue stripe & Blue<br>2. White/Orange stripe & Orange<br>3. White/Green stripe & Green<br>4. White/Brown stripe & Brown |
| **PACKAGING** | 500 m drum, 1000 m drum |

### MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1<br>IEC 60332-3-22 |
| **HALOGEN-FREE** | IEC 60754 series |
| **SMOKE EMISSION** | IEC 61034 series |
| **MAX. CONDUCTOR DC RESISTANCE** | 145 Ω/km @20 °C |
| **CONDUCTOR LOOP RESISTANCE** | max. 29 Ω/100 m @20 °C |
| **NOM. MUTUAL CAPACITANCE** | ≤ 5.6 nF/100 m @1 kHz |
| **CAPACITANCE UNBALANCE PAIR TO GROUND** | ≤ 1600 pF/km @1 kHz |
| **MIN. INSULATION RESISTANCE** | 5000 MΩ/m |
| **IMPEDANCE** | 100 ± 25 Ω @100 MHz |
| **RATED TEMPERATURE** | 75 °C |
| **OPERATING TEMPERATURE RANGE** | -20 °C - 75 °C |





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## ITEM NUMBERS:

| Part number | Cable type | Colour | Standard length m |
|---|---|---|---|
| 3360149042 | CAT 7 S/FTP AWG 26/7 | Black | 500 |
| 3360249042 | CAT 7 S/FTP AWG 26/7 | Yellow | 500 |
| 3360349042 | CAT 7 S/FTP AWG 26/7 | Grey | 500 |
| 3360449042 | CAT 7 S/FTP AWG 26/7 | White | 500 |
| 3360549042 | CAT 7 S/FTP AWG 26/7 | Orange | 500 |
| 3360649042 | CAT 7 S/FTP AWG 26/7 | Blue | 500 |
| 3360749042 | CAT 7 S/FTP AWG 26/7 | Red | 500 |
| 3360849042 | CAT 7 S/FTP AWG 26/7 | Green | 500 |
| 3361149042 | CAT 7 S/FTP AWG 26/7 | Black | 1000 |
| 3361249042 | CAT 7 S/FTP AWG 26/7 | Yellow | 1000 |
| 3361349042 | CAT 7 S/FTP AWG 26/7 | Grey | 1000 |
| 3361449042 | CAT 7 S/FTP AWG 26/7 | White | 1000 |
| 3361549042 | CAT 7 S/FTP AWG 26/7 | Orange | 1000 |
| 3361649042 | CAT 7 S/FTP AWG 26/7 | Blue | 1000 |
| 3361749042 | CAT 7 S/FTP AWG 26/7 | Red | 1000 |
| 3361849042 | CAT 7 S/FTP AWG 26/7 | Green | 1000 |

## PERFORMANCE:

| **F** (MHz) | **ATT** (dB/100 m) | **RL** (dB) | **NEXT** (dB) | **PS NEXT** (dB) | **ACRF (EL FEXT)** (dB/100 m) | **PS ACRF (PS EL FEXT)** (dB/100 m) | **PD** (ns/100 m) |
|---|---|---|---|---|---|---|---|
| 4.0 | 4.9 | 32 | 107 | 95 | 117 | - | 463 |
| 8.0 | 6.8 | 32 | 107 | 98 | 107 | - | 457 |
| 10.0 | 7.6 | 35 | 105 | 96 | 100 | - | 456 |
| 16.0 | 9.6 | 34 | 104 | 95 | 116 | - | 453 |
| 20.0 | 10.8 | 43 | 117 | 98 | 106 | - | 452 |
| 25.0 | 12.2 | 40 | 115 | 100 | 103 | - | 451 |
| 31.2 | 13.7 | 39 | 107 | 100 | 108 | - | 450 |
| 62.5 | 19.7 | 42 | 114 | 102 | 113 | - | 447 |
| 100.0 | 25.1 | 39 | 102 | 100 | 109 | - | 446 |
| 200.0 | 35.9 | 37 | 111 | 104 | 102 | - | 445 |
| 250.0 | 40.1 | 33 | 104 | 99 | 112 | - | 444 |
| 300.0 | 44.3 | 33 | 114 | 101 | 109 | - | 444 |
| 600.0 | 63.9 | 27 | 102 | 93 | 106 | - | 443 |

**If FEXT loss is greater than 70 dB, PS ACR-F loss may not be measured**

**F** = Frequency
**ATT** = Attenuation
**RL** = Return Loss
**NEXT** = Near End Crosstalk
**PS NEXT** = Power Sum Near End Crosstalk
**ACRF (EL FEXT)** = Attenuation to Crosstalk Ratio Far End Crosstalk
**PS ACRF (PS EL FEXT)** = Power Sum Attenuation to Crosstalk Ratio Far End Crosstalk
**PD** = Phase Delay






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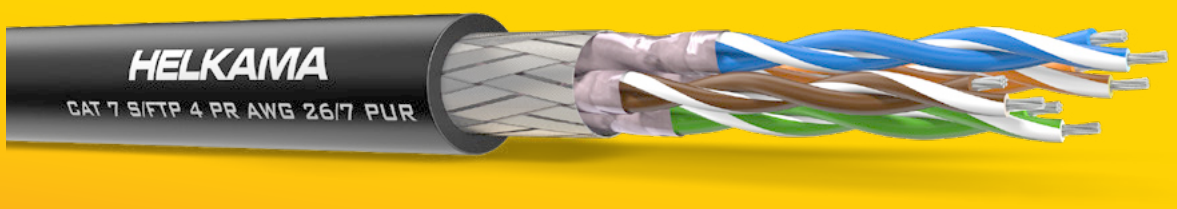
# CAT 7 PUR

## S/FTP 4 PR AWG 26/7




| | |
|---|---|
| **CONDUCTOR** | Stranded tinned copper conductor 26 AWG/7 |
| **INSULATION** | Foam PE |
| **PAIR SHIELDING** | Aluminium foil |
| **SHIELDING** | Tinned copper wire braid |
| **SHEATH** | Polyurethane compound |
| **REFERENCE STANDARD** | IEC 61156-6 |

### APPLICATION

Good mechanical characteristics, high tensile strength, resistant to UV, abrasion, chemicals, oil and other fluids

### PHYSICAL PROPERTIES:

| | |
|---|---|
| **BENDING RADIUS (Installation)** | 8 x Ø |
| **MAX. RECOMMENDED PULLING TENSION** | 80 N |
| **NOMINAL OUTER Ø** | 6.4 ± 0.3 mm |
| **CABLE WEIGHT** | 39 kg/km |
| **CORE IDENTIFICATION Pair colours** | 1. White/Blue stripe & Blue<br>2. White/Orange stripe & Orange<br>3. White/Green stripe & Green<br>4. White/Brown stripe & Brown |
| **PACKAGING** | 500 m drum, 1000 m drum |

### MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1 |
| **HALOGEN-FREE** | IEC 60754 series |
| **MAX. CONDUCTOR DC RESISTANCE** | 145 Ω/km @20 °C |
| **CONDUCTOR LOOP RESISTANCE** | max. 29 Ω/100 m @20 °C |
| **NOM. MUTUAL CAPACITANCE** | ≤ 5.6 nF/100 m @1 kHz |
| **CAPACITANCE UNBALANCE PAIR TO GROUND** | ≤ 1600 pF/km @1 kHz |
| **MIN. INSULATION RESISTANCE** | 5000 MΩ/m |
| **IMPEDANCE** | 100 ± 25 Ω @100 MHz |
| **RATED TEMPERATURE** | 75 °C |
| **OPERATING TEMPERATURE RANGE** | -20 °C - 75 °C |





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## ITEM NUMBERS:

| Part number | Cable type | Colour | Standard length m |
|---|---|---|---|
| 3350149042 | CAT 7 S/FTP AWG 26/7 PUR | Black | 500 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Yellow | 500 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Grey | 500 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | White | 500 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Orange | 500 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Blue | 500 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Red | 500 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Green | 500 |
| 3351149042 | CAT 7 S/FTP AWG 26/7 PUR | Black | 1000 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Yellow | 1000 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Grey | 1000 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | White | 1000 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Orange | 1000 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Blue | 1000 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Red | 1000 |
| --- | CAT 7 S/FTP AWG 26/7 PUR | Green | 1000 |

## PERFORMANCE:

| **F** (MHz) | **ATT** (dB/100 m) | **RL** (dB) | **NEXT** (dB) | **PS NEXT** (dB) | **ACRF (EL FEXT)** (dB/100 m) | **PS ACRF (PS EL FEXT)** (dB/100 m) | **PD** (ns/100 m) |
|---|---|---|---|---|---|---|---|
| 4.0 | 4.9 | 32 | 107 | 95 | 117 | - | 463 |
| 8.0 | 6.8 | 32 | 107 | 98 | 107 | - | 457 |
| 10.0 | 7.6 | 35 | 105 | 96 | 100 | - | 456 |
| 16.0 | 9.6 | 34 | 104 | 95 | 116 | - | 453 |
| 20.0 | 10.8 | 43 | 117 | 98 | 106 | - | 452 |
| 25.0 | 12.2 | 40 | 115 | 100 | 103 | - | 451 |
| 31.2 | 13.7 | 39 | 107 | 100 | 108 | - | 450 |
| 62.5 | 19.7 | 42 | 1114 | 102 | 113 | - | 447 |
| 100.0 | 25.1 | 39 | 102 | 100 | 109 | - | 446 |
| 200.0 | 35.9 | 37 | 111 | 104 | 102 | - | 445 |
| 250.0 | 40.1 | 33 | 104 | 99 | 112 | - | 444 |
| 300.0 | 4.3 | 33 | 114 | 101 | 109 | - | 444 |
| 600.0 | 63.9 | 27 | 102 | 93 | 106 | - | 443 |

**If FEXT loss is greater than 70 dB, PS ACR-F loss may not be measured**

**F** = Frequency
**ATT** = Attenuation
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**NEXT** = Near End Crosstalk
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**PS ACRF (PS EL FEXT)** = Power Sum Attenuation to Crosstalk Ratio Far End Crosstalk
**PD** = Phase Delay






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# CAN-BUS

## 1 X 2 X 0.75 120 Ω


| | |
|---|---|
| **CONDUCTOR** | Flexible tinned copper conductor 0.75 mm² |
| **INSULATION** | PE |
| **STRANDING** | Two cores form a pair |
| **SCREEN** | Tinned copper wire braid<br>Coverage 80% |
| **OUTER SHEATH** | LSZH |
| **COLOUR** | Violet |

### PHYSICAL PROPERTIES:

| | |
|---|---|
| **BENDING RADIUS** | 5 x Ø |
| **NOMINAL OUTER Ø** | 8.7 ± 0.3 mm |
| **CABLE WEIGHT** | 90 kg/km |
| **CORE IDENTIFICATION**<br>**Pair colours** | 1. White<br>2. Brown |
| **PART NUMBER** | 29994 |

### MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1-2<br>IEC 60332-3-22 |
| **OPERATING VOLTAGE** | 30 V |
| **TEST VOLTAGE** | 1000 V |
| **HALOGEN FREE** | IEC 60754 series |
| **SMOKE EMISSION** | IEC 61034 series |
| **CHARACTERISTIC IMPEDANCE** | 120 ± 12 Ω @1 MHz |
| **OPERATING TEMPERATURE RANGE** | -25 °C - 80 °C |





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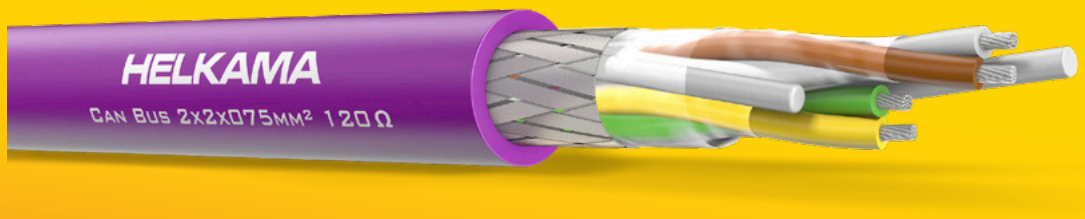
# CAN-BUS

## 2 X 2 X 0.75 120 Ω




| | |
|---|---|
| **CONDUCTOR** | Flexible tinned copper conductor 0.75 mm² |
| **INSULATION** | PE |
| **STRANDING** | Two cores form a pair (two pairs)<br>with fillers to obtain symmetrical and round construction |
| **SCREEN** | Tinned copper wire braid<br>Coverage 80% |
| **OUTER SHEATH** | LSZH |
| **COLOUR** | Violet |

### PHYSICAL PROPERTIES:

| | |
|---|---|
| **BENDING RADIUS** | 5 x Ø |
| **NOMINAL OUTER Ø** | 11.5 ± 0.3 mm |
| **CABLE WEIGHT** | 154 kg/km |
| **CORE IDENTIFICATION**<br>**Pair colours** | 1. White<br>2. Brown<br>3. Yellow<br>4. Green |
| **PART NUMBER** | 29995 |

### MAIN CHARACTERISTICS:

| | |
|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1-2<br>IEC 60332-3-22 |
| **OPERATING VOLTAGE** | 30 V |
| **TEST VOLTAGE** | 1000 V |
| **HALOGEN FREE** | IEC 60754 series |
| **SMOKE EMISSION** | IEC 61034 series |
| **CHARACTERISTIC IMPEDANCE** | 120 ± 12 Ω @1 MHz |
| **OPERATING TEMPERATURE RANGE** | -25 °C - 80 °C |







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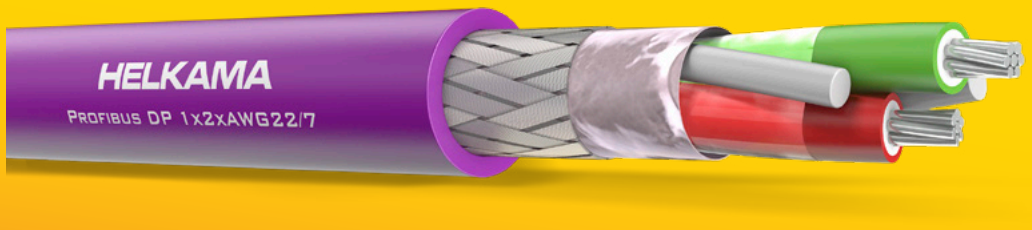
# PROFIBUS DP

## 1 X 2 X AWG 22/7 -HF




| | |
|---|---|
| **CONDUCTOR** | Stranded tinned copper conductor AWG 22/7 |
| **INSULATION** | Foam-Skin-PE |
| **STRANDING** | Two cores stranded together with 2 fillers |
| **SCREEN 1** | Aluminium polyester tape |
| **SCREEN 2** | Tinned copper wire braid |
| **OUTER SHEATH** | LSZH |
| **COLOUR** | Violet |

### PHYSICAL PROPERTIES:

| | |
|---|---|
| **BENDING RADIUS** | 5 x Ø |
| **NOMINAL OUTER Ø** | 7.8 ± 0.2 mm |
| **CABLE WEIGHT** | 70 kg/km |
| **CORE IDENTIFICATION** | 1. Red<br>2. Green |
| **PART NUMBER** | 29996 |

### MAIN CHARACTERISTICS:

| | | |
|---|---|---|
| **FIRE PERFORMANCE** | IEC 60332-1-2<br>IEC 60332-3-22 | |
| **HALOGEN FREE** | IEC 60754 series | |
| **SMOKE EMISSION** | IEC 61034 series | |
| **MAXIMUM RESISTANCE CONDUCTOR (LOOP)** | ≤ 110 Ω/km | |
| **CHARACTERISTIC IMPEDANCE** | 150 Ω ± 10% | |
| **MUTUAL CAPACITANCE** | 30 nF/km | |
| **ATTENUATION** | 9.6 kHz<br>38.4 kHz<br>4.0 MHz<br>16.0 MHz | ≤ 2.5 dB/km<br>≤ 4.0 dB/km<br>≤ 22.0 dB/km<br>≤ 42.0 dB/km |
| **OPERATING TEMPERATURE RANGE** | -25 °C - 70 °C | |





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# CHARACTERISTICS OF OPTICAL FIBER CABLES

## SINGLE-MODE FIBER

| Conditions | | SM/OS2 | Unit |
|---|---|---|---|
| Standards according to ITU-T | | **G.652.D** | |
| Attenuation (max) | 1310 nm | ≤ 0.40 | dB/km |
| | 1550 nm | ≤ 0.30 | dB/km |
| Cut-off wavelength | | ≤ 1260 | nm |
| Cut-off wavelength installation | | 1180 — 1250 | nm |
| Zero dispersion wavelength | | 1300 — 1324 | nm |
| Zero dispersion slope | | ≤ 0.092 | ps/nm²/km |
| Polarization mode dispersion | | ≤ 0.5 | ps/√km |
| Mode field diameter (MFD) | 1310 nm | 9.1 ± 0.4 | µm |
| | 1550 nm | 10.3 ± 0.4 | µm |
| Mode field eccentricity | | ≤ 1.0 | µm |
| Mode field eccentricity, installation | | ≤ 0.5 | µm |
| Cladding diameter | | 125 ± 2 | µm |
| Cladding diameter, installation | | 125 ± 1 | µm |
| Cladding ellipticity | | ≤ 1 | % |





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## MULTI MODE FIBER

| Conditions | | | | | Unit |
|---|---|---|---|---|---|
| Fiber class | | **GK/OM1** | **OM3** | **OM4** | |
| | | GKL 250 ± 10 | OM3L 250 ± 10 | OM4L 250 ± 10 | µm |
| | | GKT 900 ± 50 | OM3T 900 ± 50 | OM4T 900 ± 50 | µm |
| Attenuation (max) | 850 nm | 3.0 | 2.7 | 2.5 | dB/km |
| | 1300 nm | ≤ 1.0 | ≤ 0.8 | ≤ 0.8 | dB/km |
| Bandwidth | 850 nm (LED) | ≥ 200 | ≥ 1500 | ≥ 3500 | MHz x km |
| | 1300 nm (LED) | ≥ 500 | ≥ 500 | ≥ 500 | MHz x km |
| | 850 nm (Laser) | | ≥ 2000 | ≥ 4700 | MHz x km |
| Numerical aperture (NA) | | 0.275 ± 0.015 | 0.200 ± 0.015 | 0.200 ± 0.015 | |
| Core diameter | | 62.5 ± 3 | 50 ± 2 | 50 ± 2.5 | µm |
| Core ellipticity | | ≤ 6 | ≤ 6 | ≤ 6 | % |
| Core eccentricity | | ≤ 3 | ≤ 3 | ≤ 2 | µm |
| Cladding diameter | | 125 ± 2 | 125 ± 1 | 125 ± 1 | µm |
| Cladding ellipticity | | ≤ 2 | ≤ 2 | ≤ 2 | % |






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# GENERAL INFORMATION

## MATERIALS

### INSULATION MATERIALS

**XLPE**
Cross-linked polyethylene compound.
Excellent mechanical and electrical characteristics

**PE**
Polyethylene thermoplastic compound

### SHEATHING MATERIALS

**LSZH THERMOPLASTIC**
Low smoke zero halogen thermoplastic compound. Flame retardant and self-extinguishing in the event of fire.

**SHF1**
LSZH thermoplastic. Low smoke zero halogen thermoplastic compound. Flame retardant and self-extinguishing in the event of fire.

**SHF2**
Crosslinked thermoset plastic. Low smoke zero halogen cross-linked thermoset oil-resistant compound. Flame retardant and self-extinguishing in the event of fire.

### MARKING ON THE SHEATH

Lot number, Cable type, Cable size (number of cores x size of conductors mm²), Voltage, Temperature, Standards, Manufacturer's name, Production month and year, Meter marking.

## TESTS AND DEFINITIONS OF TERMS

### CPR CABLE CLASSIFICATION

B2ca, Cca, Dca, Eca
Analyses the reaction of electrical cables to fire. Four classes apply directly to electrical cables, classified according to their flame spread and heat release.

**ADDITIONAL CLASSIFICATION LEVELS: s, d, a**
Three additional CPR classification levels refer to:

| | |
|---|---|
| s = smoke | The opacity and amount of smoke produced |
| d = droplets | The flaming droplets released by the cable during combustion |
| a = acidity | The acidity of the smoke |

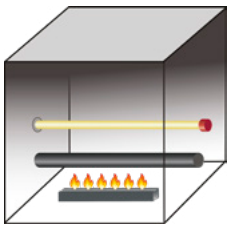
### HALOGEN-FREE

Halogen-free refers to the absence of halogens, such as chlorine and fluorine. Determined on the basis of the halogen content and the acidity of cable´s gases.
Halogen-free IEC 60754-series consists of standards IEC 60754-1 and IEC 60754-2.

**IEC 60754-1**
Determines halogen content of material. Halogen content of material may not exceed 0.5% or 5 mg/g.

**IEC 60754-2**
Determines degree of acidity of combustion gases. Limit values > 4.3 for pH and < 10 µS/mm for conductivity.

**SMOKE EMISSION**
**IEC 61034-1, IEC 61034-2**
Smoke emission refers to visibility in a fire. Greater light transmittance means better visibility.
Smoke Emission IEC 61034-series consists of standards IEC 61034-1 and IEC 61034-2.



**27 m³ cube smoke chamber**

*Requirements: 60% light transmittance*





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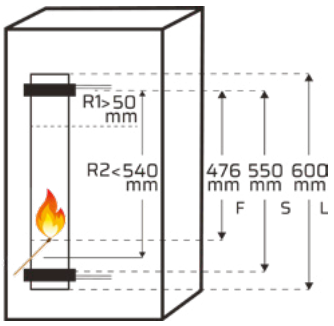
## FIRE PERFORMANCE

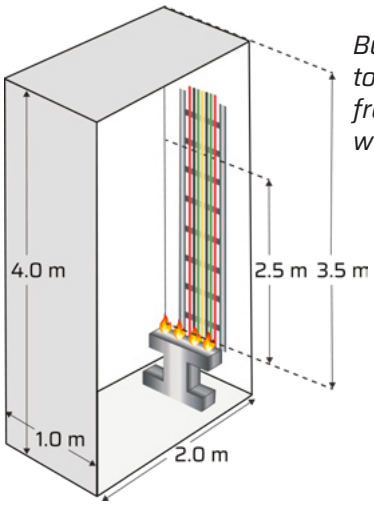
**IEC 60332-1, IEC 60332-3**
Cables must withstand the test specified in IEC standard 60332-3 or IEC 60332-1. Flame-retardant cables do not propagate fire and are self-extinguishing.

**IEC 60332-1**
Test for single cable. Test procedure and requirements according to picture below.




*Min. 50 mm of the cable, measured from the upper support, must remain unburned after the specified time.*

**IEC 60332-3**
Test for bunched cables with three categories - A, B and C. Categories are defined by different limits for flammable material and burning times. Cables must extinguish themselves once the burner has been removed.
Test procedure and requirements according to picture below.




*Burning allowed up to max. 2.5 meters from the burner within a specified time.*

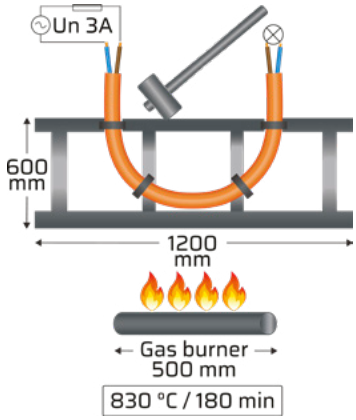
## FIRE-RESISTANT

Helkama fire-resistant cables are also flame-retardant.

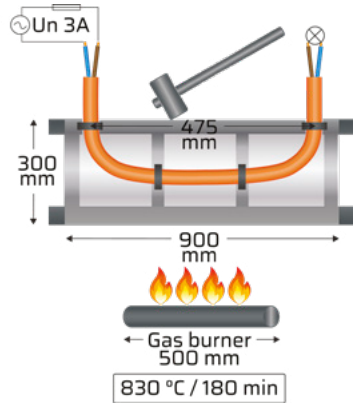
**IEC 60331-21**
Cables must operate for min. 90 minutes while subjected to fire from burner.

**IEC 60331-25**
Cables must operate for min. 180 minutes while subjected to fire from burner.

**IEC 60331-1**
Test method for fire with shock at a temperature of min. 830 °C for 180 minutes for cables with rated voltage up to and including 0.6/1.0 kV, and with Ø > 20 mm.




**IEC 60331-2**
Test method for fire with shock at a temperature of min. 830 °C for 180 minutes for cables with rated voltage up to and including 0.6/1.0 kV, and with Ø < 20 mm.









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