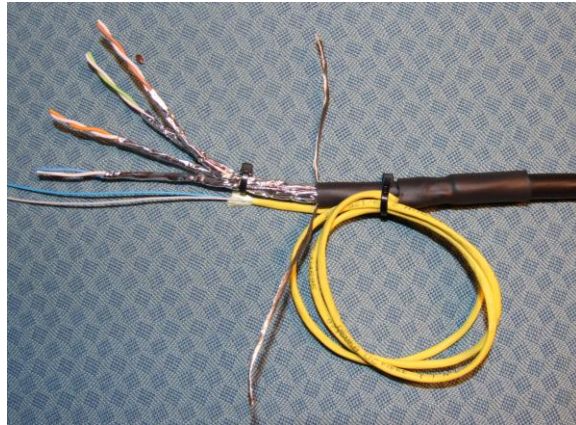
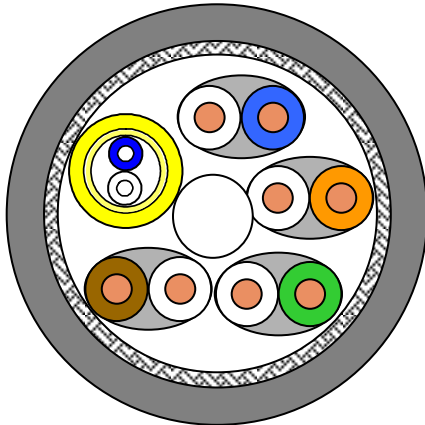


Bergen Cabling DNV GL approved Maritime LAN Hybrid cable S/FTP Cat.7 + 2 OS2 single mode fibres



Application

Generic Data transmission. This cable is a **Cat7 S/FTP** cable meant for use as installation/horizontal cable in tougher electrical and mechanical environment, including ships and offshore units. The cable is tested up to 900 MHz and will give good margin for application like 10 Gigabit Ethernet at a bandwidth up to 500 MHz.

Singlemode fiber 2 fiber cable with aramid yarns strength, fulfills ITU G.657 A2, G.657 B2 as well as G.652.A-B-C and D

Standards

EN 50173-1; EN 50288-4-1
ISO/IEC 11801 Class F and OS2,

IEC 60793-2-50, B6 a and b
IEC 60793-1-xx (See separate datasheet)

Fire rating

LSHF-FR(SHF1) : IEC 60754-2; IEC 61034, IEC 60332-3-24
Fibre cable OS2 LSHF-FR : IEC 60332-3-24 (3C)

Construction copper

| | |
|--------------|--|
| Conductor | Solid copper wire, \varnothing 0.56 mm (AWG 23) |
| Insulation | Foamskin PE, \varnothing 1.4 mm |
| Twisting | 2 cores to the pair |
| Pair screen | Al-laminated plastic foil |
| Cable lay up | 4 pairs (PiMF) to the core |
| | 1 pair OS2 fiber under the braid |
| Screen | Copper braid, tinned |
| Sheath | Oil resistant, Fire retardant and halogen free LSHF-FR (SHF1). |

Chemical resistance

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

Mechanical properties

| | | |
|----------------------------------|---------------------|-----------------|
| Bending radius | Without load | 8 x D |
| | With load | 4 x D |
| Fiber element better than copper | | |
| Temperature range | During operation | -40°C to + 85°C |
| | During installation | -15°C to + 50°C |
| Fire load | 4 pair | 670 MJ/km |
| Maximum tensile load | During operation | No load |
| | During installation | 200 N |

Electrical properties

at 20°C ± 5°C

| | | |
|---------------------------------|---------------------------------------|---|
| Loop resistance | | $\leq 150 \Omega/\text{km}$ |
| Resistance unbalance | | $\leq 2\%$ |
| Insulation resistance | (500 V) | $\geq 5000 \text{ M}\Omega \cdot \text{km}$ |
| Mutual capacitance | at 800 Hz | Nom. 43 nF/km |
| Capacitance unbalance | (pair/ground) | $\leq 1500 \text{ pF}/\text{km}$ |
| Characteristic impedance | (1-100 MHz) | $(100 \pm 5) \Omega$ |
| | (100 - 250) MHz | $(100 \pm 10) \Omega$ |
| | (250 - 600) MHz | $(100 \pm 15) \Omega$ |
| Nominal velocity of propagation | | ca. 79 % |
| Propagation delay | | $\leq 570 \text{ ns}/100\text{m}$ |
| Delay skew | | $\leq 9 \text{ ns}/100\text{m}$ |
| Test voltage | (DC, 1 min) core/core and core/screen | 1000 V |
| Transfer impedance(Grade 1) | at 1 MHz | $\leq 10 \text{ m}\Omega/\text{m}$ |
| | at 10 MHz | $\leq 10 \text{ m}\Omega/\text{m}$ |
| | at 30 MHz | $\leq 10 \text{ m}\Omega/\text{m}$ |
| | at 100MHz | $\leq 20 \text{ m}\Omega/\text{m}$ |
| Coupling attenuation | | $\geq 85 \text{ dB}$ |

Technical Data

| Description | Variant | Colour | Outer diameter (D) mm | Delivery form | Weight kg/km | BC No. |
|---|---------------|--------|-----------------------|---------------|-----------------|--------|
| Maritime LAN Cat.7 S/FTP 4x2/0.56 + 2 OS2 fibres | LSHF-FR(SHF1) | Black | 9,2 | Reel 500m | 92 | 10-003 |

Certification

DNV GL approved for Maritime and Offshore. Certificate NO: TAE000000A

Electrical data (nominal)

acc. to Cat.7 (at 20°C)

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

Specification of the 2 single mode fibres in the hybrid cable

Enhanced bend insensitive, low water peak fibre; G.657.A2 and G.657.B2

General and application

This enhanced low macro bending sensitive, low water peak fibre, gives unsurpassed bending performance. The preferred use of the BendBright^{XS} fibre is in office installations, for patch cords, interconnection cables and for Fibre-to-the-Home networks. The BendBright^{XS} offers reduced bending radii for many cables types. The fibre fulfils the new ITU G.657 A2 and G.657 B2 specification (edition 2009), as well as G.652.D. The low macro bending sensitivity further guarantees that the 1625 nm window (L-band) will be available for future use in this bandwidth hungry environment

Standards and Norms

| | |
|--|-------------------------------------|
| IEC 60793-2-50 Category B6_a and B6_b | EN 50 173-1:2007, cat. OS2 |
| EN 60793-2-50: Class B6_a and B6_b | ISO/IEC 11801:2002, cat. OS2 |
| ITU Recommendation G.657.A2 and G.657.B2 (2009) | ISO/IEC 24702:2006 cat. OS2 and OS1 |
| ITU Recommendation G.652 designations A, B, C and D (2009) | IEEE 802.3 – 2002 incl. 802.3ae |

Attenuation (cabled fibre)

IEC 60793-1-40

| | |
|--|----------------|
| 1310 nm | ≤ 0.38 dB/km |
| 1383 nm * | ≤ 0.38 dB/km |
| 1550 nm | ≤ 0.23 dB/km |
| 1625 nm | ≤ 0.25 dB/km |
| Inhomogeneity of OTDR trace for any two 1000 metre fibre lengths | Max. 0.1 dB/km |

* Including H2-ageing according to IEC 60793-2-50, type B.1.3, @1383nm

Group index of refraction

IEC 60793-1-22

| | |
|--|-------|
| Group index of refraction at 1310 nm and 1550 nm | 1.467 |
| Group index of refraction at 1625 nm | 1.468 |

Other properties

IEC 60793-1-xx

| | | | |
|--|-------------------|---------------------------|---|
| Cladding diameter | IEC/EN 60793-1-20 | µm | 125.0 ± 0.7 |
| Cladding non-circularity | IEC/EN 60793-1-20 | % | ≤ 0.7 |
| Core (MDF) -cladding concentricity error | IEC/EN 60793-1-20 | µm | ≤ 0.5 |
| Primary coating diameter – ColorLock ^{XS} and natural | IEC/EN 60793-1-21 | µm | 242 ± 7 |
| Primary coating non-circularity | IEC/EN 60793-1-21 | % | ≤ 5 |
| Primary coating-cladding concentricity error | IEC/EN 60793-1-21 | µm | ≤ 12 |
| Proof stress level | IEC/EN 60793-1-30 | GPa | ≥ 0.7 (≈ 1 %) |
| Strip force (peak) | IEC/EN 60793-1-32 | N | 1.2 ≤ F _{peak,strip} ≤ 8.9 |
| Static fatigue, aged n _s | | - | >23 |
| Chromatic dispersion coefficient: In the interval 1285 nm – 1330 nm | IEC/EN 60793-1-42 | ps/km • nm | ≤ 3.7 |
| At 1550 nm | | | ≤ 18.5 |
| At 1625 nm | | | ≤ 23.0 |
| Zero dispersion wavelength, λ ₀ | | nm | 1300 - 1324 |
| Zero dispersion slope | | ps/(nm ² • km) | ≤ 0.092 |
| Cut-off wavelength | IEC/EN 60793-1-44 | λ _{cc} nm | ≤ 1260 * |
| Mode field diameter at 1310 nm | IEC/EN 60793-1-45 | µm | 8.8 ± 0.4 |
| Mode field diameter at 1550 nm | | µm | 9.8 ± 0.5 |
| Macro bending loss 10 turns on a mandrel R = 15 mm, @1550nm 10 turns on a mandrel R = 15 mm, @1625nm 1 turn on a mandrel R = 10 mm, @1550nm 1 turn on a mandrel R = 10 mm, @1625nm 1 turn on a mandrel R = 7.5 mm, @1550nm 1 turn on a mandrel R = 7.5 mm, @1625nm | IEC/EN 60793-1-47 | dB | ≤ 0.03 ≤ 0.1 ≤ 0.1 ≤ 0.2 ≤ 0.5 ≤ 1.0 |
| Polarisation mode dispersion (PMD) coefficient, cabled | IEC/EN 60793-1-48 | ps/√km | ≤ 0.1 |
| PMD ₀ Link Design Value** | IEC/EN 60794-3 | ps/√km | ≤ 0.06 |

* guaranteed value according to the ITU-T (ATM G650) method

** according to IEC 60794-3, Ed3 (Q=0.01%)

All measurements in accordance with ITU-T G650 recommendations.