

QFCU (QFCI MUD)

Loose tube, jelly filled

Armoured

SHF2 MUD, UV

DNV

Application

Fiberoptical cable for use in vital communication and emergency systems, which needs to be operational during a fire situation (90 min. 1000°C). The fibers are protected in jelly filled loose tubes stranded around a central strength member to ensure high performance and long endurance. Individual colours for each fiber. 62.5, 50 and 9 µm fibers. MUD resistant jacket.



Construction Fiber

| | |
|------------------------|---|
| Fibertype | MM 62.5 and 50, SM 9 |
| Sub unit sheath | PBTP with jelly |
| Colorcode fiber | TIA 598 1 - Blue 5 - Grey 9 - Yellow 2 - Orange 6 - White 10 - Violet 3 - Green 7 - Red 11 - Pink 4 - Brow 8 - Black 12 - Turquoise |
| Fiber tube | Loose tube Ø = 2.2 [mm], Mica tape on each loose tube |
| Fire resistant barrier | Mica tape |
| Strength member | Centre steel wire |
| Inner jacket | Black SHF1 |
| Armour | Alt. 1 - Galvanised steel wire braid Alt. 2 - Tinned Cu-braid Alt. 3 - Bronze wire braid |
| Jacket | Black SHF2 MUD-resistant |
| Diameter | 16.5 [mm] |
| Weight | 350 [kg/km] |

Specifications

| | |
|------------------------------|--|
| Operating temperature normal | -40 – +70 [°C] |
| Temperature @ installation | -10 to +60 [°C] |
| Tensile strength | 500 acc. to IEC 60794-1-2 |
| Crush test | 3000 [N/10cm] acc. to IEC 60794-1-2 (E3) |
| Impact | 30 [J] acc. to IEC 60794-1-2 (E4) |
| Torsion | ±1 [turn/m] |
| Min. bending radius | 15 [x outer diam] |
| Min. bending radius flexible | 20 [x outer diam] |

Norms

| | |
|--|------------------------------------|
| Halogenfree, max content corrosive and toxic gases | IEC 60754-1 & IEC 60754-2 |
| Material properties, insulation and sheath | IEC 60092-360 (359) |
| Fire resistant | IEC 60331-25 min. 1000°C |
| Ozone resistant | IEC 60811-2-1 |
| Smoke emission | IEC 61034-1 & IEC 61034-2 |
| Oil and fuel resistant | IEC 60811-2-1 EN 60811-404 IRM 903 |
| MUD resistant | NEK TS 606 F5 |
| UV-resistant | ISO 4892-2-A: 720hours |
| Certification | DNV |



Table Fiber

| Number of fibers | Number of fibers per tube | Number of fibers and tubes | Weight [kg/km] | Part no. |
|------------------|---------------------------|----------------------------|----------------|----------|
| 4 - 62,5/125 | 2 | 2 + 4 | 325 | 1091114 |
| 8 - 62,5/125 | 4 | 2 + 4 | 325 | 1091115 |
| 12 - 62,5/125 | 4 | 3 + 3 | 325 | 1091116 |
| 24 - 62,5/125 | 6 | 4 + 2 | 325 | 1091117 |
| 48 - 62,5/125 | 12 | 4 + 2 | 325 | 1091126 |
| 4 - 50/125 OM3 | 2 | 2 + 4 | 325 | 1091125 |
| 8 - 50/125 OM3 | 4 | 2 + 4 | 325 | 1091118 |
| 12 - 50/125 OM3 | 4 | 3 + 3 | 325 | 1091119 |
| 24 - 50/125 OM3 | 6 | 4 + 2 | 325 | 1091124 |
| 48 - 50/125 OM3 | 12 | 4 + 2 | 325 | 1091146 |
| 4 - 50/125 OM2 | 2 | 2 + 4 | 325 | 1042464 |
| 8 - 50/125 OM2 | 4 | 2 + 4 | 325 | 1042465 |
| 12 - 50/125 OM2 | 4 | 3 + 3 | 325 | 1042466 |
| 24 - 50/125 | 6 | 4 + 2 | 325 | 1042467 |
| 48 - 50/125 | 12 | 4 + 2 | 325 | 1091150 |
| 4 - 9/125 | 2 | 2 + 4 | 325 | 1091147 |
| 8 - 9/125 | 4 | 2 + 4 | 325 | 1091191 |
| 12 - 9/125 | 4 | 3 + 3 | 325 | 1091192 |
| 24 - 9/125 | 6 | 4 + 2 | 325 | 1091193 |
| 48 - 9/125 | 12 | 4 + 2 | 325 | 1091194 |

Fiber data

| Properties | MM 62.5 OM1 | MM 50 OM2 | MM 50 OM3 | MM 50 OM4 |
|---|------------------|------------------|------------------|------------------|
| Core Diameter | 62.5 ± 2.5 µm | 50 ± 2.5 µm | 50 ± 2.5 µm | 50 ± 2.5 µm |
| Core non-circularity | < 5% | < 5% | < 5% | < 5% |
| Cladding diameter | 125 ± 1.0 µm | 125 ± 1.0 µm | 125 ± 1.0 µm | 125 ± 1.0 µm |
| Coating diameter | 242 ± 5 µm | 242 ± 5 µm | 242 ± 5 µm | 242 ± 5 µm |
| Cladding non-circularity | <0.7% | <0.7% | <0.7% | <0.7% |
| Core/Cladding concentricity error | <1 µm | <1 µm | <1 µm | <1 µm |
| Coating/cladding concentricity error | <10 µm | <6 µm | <6 µm | <6 µm |
| Numerical Aperture | 0.275 ± 0.015 µm | 0.200 ± 0.015 µm | 0.200 ± 0.015 µm | 0.200 ± 0.015 µm |
| Attenuation @ 850 nm | <3.50 dB/km | <2.89 dB/km | <2.89 dB/km | <2.89 dB/km |
| Attenuation @1300 nm | <1.00 dB/km | <0.80 dB/km | <0.80 dB/km | <0.80 dB/km |
| Bandwidth @ 850 nm | >200 MHz*km | >500 MHz*km | >1500 MHz*km | >3500 MHz*km |
| Bandwidth @ 1300 nm | >500 MHz*km | >500 MHz*km | >500 MHz*km | >500 MHz*km |
| Effective Modal Bandwidth (EMB)@ 850 nm | | | >2000 MHz*km | >4700 MHz*km |
| Fibre capacity 10GBase-SR | 33 m | 83 m | 300 m | 550 m |
| Fibre capacity 1GBase-SR | 274 m | 600 m | 1000 m | 1100 m |
| Fibre cap. 40GBase-SR4/100Base-RS10 | 274 m | 600 m | 1000 m | 1100 m |
| Fibre cap. 40GBase-SR4/100Base-RS10 | | | 140 m | 1740 m |
| Proof test | >100kpsi | >100kpsi | >100kpsi | >100kpsi |

| Properties | SMR ITU-T G652D | SMR ITU-T G657A | SMR ITU-T G657B / - B2 | SMR NZD ITU-T G655.E |
|--|-----------------------------------|-----------------------------------|-----------------------------------|-------------------------|
| Mode field Diameter @ 1310 nm | 9,0±0,4 μm | 9,0±0,4 μm | 8,9±0,5 μm | - |
| Mode field Diameter @ 1550 nm | 10,1±0,5μm | 10,1±0,5μm | 9,9 ± 0,5 μm | 9,2 ± 0,5 μm |
| Cladding diameter | 125±0,7 μm | 125±0,7 μm | 125±0,7 μm | 125±01,0 μm |
| Coating diameter | 242±7 μm | 242±7 μm | 242±7 μm | 242±7 μm |
| Cladding non-circularity | ≤ 0,7 % | ≤ 0,7 % | ≤ 0,7 % | ≤ 1,0 % |
| Core/Cladding concentricity error | ≤ 0,5 μm | ≤ 0,5 μm | ≤ 0,5 μm | ≤ 0,6 μm |
| Coating/cladding concentricity error | ≤ 12 μm | ≤ 12 μm | ≤ 12 μm | ≤ 12 μm |
| Cable Cut off wavelength | ≤ 1260 nm | ≤ 1260 nm | ≤ 1260 nm | ≤ 1300 nm |
| Zero dispersion wavelength (λ ₀) | 1300-1322 μm | 1300-1322 μm | 1300-1322 μm | 1440 μm |
| Dispersion slope (S ₀) @ (λ ₀) | ≤ 0,090 ps/(nm ² * km) | ≤ 0,090 ps/(nm ² * km) | ≤ 0,092 ps/(nm ² * km) | - |
| Chromatic dispersion @ 1285-1330 nm | ≤ 3,5 ps/(nm * km) | ≤ 3,5 ps/(nm * km) | - | - |
| Chromatic dispersion @ 1550 nm | ≤ 18 ps/(nm * km) | ≤ 18 ps/(nm * km) | - | - |
| Chromatic dispersion @ 1625 nm | ≤ 22 ps/(nm * km) | ≤ 22 ps/(nm * km) | - | - |
| Chromatic dispersion @ 1530-1565 nm | - | - | - | 5,5 - 10 ps/(nm * km) |
| Chromatic dispersion @ 1565-1625 nm | - | - | - | 7,5 - 13,8 ps/(nm * km) |
| PMD @ 1550 nm | ≤ 0,1 ps/√ km | ≤ 0,1 ps/√ km | ≤ 0,1 ps/√ km | ≤ 0,2 ps/√ km |
| Attenuation @ 1310 nm | ≤ 0,35 dB/km | ≤ 0,35 dB/km | ≤ 0,35 dB/km | ≤ 0,40 dB/km |
| Attenuation @ 1383nm | ≤ 0,35 dB/km | ≤ 0,35 dB/km | ≤ 0,35 dB/km | ≤ 1,0 dB/km |
| Attenuation @ 1550 nm | ≤ 0,25 dB/km | ≤ 0,25 dB/km | ≤ 0,25 dB/km | ≤ 0,25 dB/km |
| Attenuation with bending: | | | | |
| Mandreal Radius 15mm @1550 10 turns | - | ≤ 0,25 dB | ≤ 0,03 dB | - |
| Mandreal Radius 15mm @1625 10 turns | - | ≤ 1,0 dB | ≤ 0,1 dB | - |
| Mandreal Radius 10mm @1550 1 turn | - | ≤ 0,75 dB | ≤ 0,1 dB | - |
| Mandreal Radius 10mm @1625 1 turn | - | ≤ 1,5 dB | ≤ 0,2 dB | - |
| Mandreal Radius 7,5mm @1550 1 turn | - | - | ≤ 0,5 dB | - |
| Mandreal Radius 7,5mm @1625 1 turn | - | - | ≤ 1,0 dB | - |
| Proof test | ≥ 100 kpsi | ≥ 100 kpsi | ≥ 100 kpsi | ≥ 100 kpsi |

Updated

| Date | Rev. | Description |
|------------|------|--------------------------------------|
| 16.03.2015 | 1 | Armour |
| 28.12.2015 | 2 | Revision of part. no. |
| 23.01.2017 | 3 | Fiber data |
| 06.06.2019 | 4 | Colour code |
| 4.12.2019 | 5 | Updated construction (double jacket) |
| 01.03.2023 | 6 | Colour code to TIA 598 |
| 13.12.2024 | 7 | Additional info |