



Certificate No:  
**TAE00004D4**

# TYPE APPROVAL CERTIFICATE

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## This is to certify:

**That the Data transmission cables and systems**

with type designation(s)  
**SLO-000-\*\*-M1-A1-WB-FR**

Issued to

**AP MOG Solutions Pte Ltd**  
**Singapore, Singapore**

is found to comply with

**DNV rules for classification – Ships, offshore units, and high speed and light craft**

## Application :

**Fire resistant fibre optic cable.**

**Products approved by this certificate are accepted for installation on all vessels classed by DNV.**

Issued at **Høvik** on **2021-12-06**

This Certificate is valid until **2026-12-05**.

for **DNV**

DNV local station: **Certification of Materials - Singapore**

Approval Engineer: **Nenad Dadic**

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**Trond Sjøvåg**  
**Head of Section**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.  
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Form code: TA 251

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## Product description

Manufacturer name

DNV ID: 10011886

Single loose tube fiber optic cable with metallic armor

QFCI-UNI Outer sheath SHF1 or

QFCU-UNI Outer sheath SHF2 or SHF2 MUD

Construction:

|                       |                                          |
|-----------------------|------------------------------------------|
| 1 - Fiber             | 250 µm diameter                          |
| 2 - Loose tube        | Thermoplastic material PBT, jelly filled |
| 3 - Strength elements | Swellable glass yarns                    |
| 4 - Wrapping          | Fire resistant glass tape                |
| 5 - Inner sheath      | LSZH thermoplastic compound              |
| 6 - Armor             | Galvanized steel wire braid              |
| 7 - Outer sheath      | LSZH thermoplastic compound              |

No of Fibers per tube: 2 - 24

Fiber types:

| Single mode          | Attenuation at 1310nm | Attenuation at 1550nm |
|----------------------|-----------------------|-----------------------|
| 009 (G.652D)         | < 0.40 dB/Km          | < 0.25 dB/Km          |
| 009/G.657A1          | < 0.40 dB/Km          | < 0.25 dB/Km          |
| 009/G.657A1 - 200 µm | < 0.40 dB/Km          | < 0.25 dB/Km          |
| 009/G.657A2          | < 0.40 dB/Km          | < 0.25 dB/Km          |
| NZD (G.655/G.656)    | < 0.40 dB/Km          | < 0.25 dB/Km          |

| Multimode          | Attenuation at 850nm | Attenuation at 1300nm |
|--------------------|----------------------|-----------------------|
| 062 OM1            | < 3.5 dB/Km          | < 1 dB/Km             |
| 050 OM2/2+ (G.651) | < 2.8 dB/Km          | < 1 dB/Km             |
| 050 OM3 (G.651)    | < 2.8 dB/Km          | < 1 dB/Km             |
| 050 OM4 (G.651)    | < 2.8 dB/Km          | < 1 dB/Km             |
| 050 OM5 (G.651)    | < 2.8 dB/Km          | < 1 dB/Km             |

Minimum bending diameter of cable( Static ) : 10 x outer diameter  
Minimum bending diameter of cable( Dynamic ) : 20 x outer diameter  
Flex/installation tensile strength : 1500 N  
Crush : 3000 N/100 mm for 15 min.  
Impact : 5 impacts, 5J J

## Application/Limitation

This type of cable is fire resistant in accordance with IEC Publication 60331-25.

The requirements of SOLAS Amendments Chapter II-1, Part D, Reg. 45, 5.2 (provision to be taken to limit Fire Propagation along Bundles of Cables or Wires) are fulfilled without any additional measures.

Temperature window

Operation: -20°C to +80°C

Installation: -5°C to +65°C

## Type Approval documentation

### Tests carried out

|               |         |                                                                  |  |
|---------------|---------|------------------------------------------------------------------|--|
| DNVGL CP-0402 | 2016-02 | Optical fibre cables                                             |  |
| IEC 60794-1-1 | 2015-11 | Optical fibre cables – Part 1-1: Generic specification – General |  |

|                                              |                    |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                    |
|----------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IEC 60794-1-2                                | 2013-09            | Optical fibre cables - Part 1-2: Generic specification - Cross reference table for optical cable test procedures                                                                        |                                                                                                                                                                                                                                                                    |
| IEC 60092-360                                | 2014-04            | Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables.        |                                                                                                                                                                                                                                                                    |
| EN50200                                      | 2016-01            | Method of test for resistance to fire of unprotected small cables for use in emergency circuits. Annex E: Guidance for using optional water spray protocol. Cable outer diameter <20mm. | Cable OD<20mm                                                                                                                                                                                                                                                      |
| IEC 60331-25                                 | 1999-04            | Tests for electric cables under fire conditions – Circuit integrity – Part 25: Procedures and requirements – Optical fibre cables                                                       | 120 min + 15 min cooling down period                                                                                                                                                                                                                               |
| IEC 60332-3-22                               | 2018-07            | Tests on electric cables under fire conditions - Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables - Category A                                   | Charred portion of sample does not exceed 2,5m above bottom edge of burner.                                                                                                                                                                                        |
| IEC 60754-1:2011 +AMD1:2019 CSV              | 2019-11            | Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content                                                                | Low Halogen:                                                                                                                                                                                                                                                       |
| IEC 60754-2:2011 +AMD1:2019 CSV              | 2019-11            | Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity                                                | Halogen free:                                                                                                                                                                                                                                                      |
| IEC 61034-1&2:2005 +AMD1:2013 +AMD2:2019 CSV | 2013-07<br>2013-09 | Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements                                                                    | Low smoke<br>Light transmittance >60%                                                                                                                                                                                                                              |
| NEK TS606 Ed5                                | 2016               | Cables for offshore installations - halogen-free low smoke flame-retardant / fire-resistant (HFFR-LS). Technical specification.                                                         | Mud resistance test:<br>Required Max variations ±:<br>IRM902 & 903 100°C 7d.<br>TS & E@B, weight & vol.: ±30%<br>Calc. Bromide 70°C 56d.<br>TS & E@B: ±25%, weight: ±15%, vol.: ±20%<br>Oil based mud:<br>EDC 95/11 70°C 56d<br>TS & E@B ±30%, weight & vol.: ±25% |

## Marking of product

APS Finland – month/year - FIBRE OPTIC CABLE – QFCI-UNI FIBER COUNT + TYPE - IEC 60331-25 - EN 50200 Annex E – IEC 60332-3-22 Cat. A - BATCH \*\*\*\*\* + meter

APS Finland – month/year - FIBRE OPTIC CABLE – QFCU-UNI FIBER COUNT + TYPE - IEC 60331-25 - EN 50200 Annex E – IEC 60332-3-22 Cat. A - BATCH \*\*\*\*\* + meter

APS Finland – month/year - FIBRE OPTIC CABLE – QFCU-UNI FIBER COUNT + TYPE – MUD RESISTANT - IEC 60331-25 - EN 50200 Annex E – IEC 60332-3-22 Cat. A - BATCH \*\*\*\*\* + meter

## Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the Type approval are complied with and that no alterations are made to the product design or choice of materials.

The main elements of the assessment are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Routine tests (RT) and selected type tests (ref. to applicable class programs) checked (if not available these tests shall be carried out)
- Review of type approval documentation



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- Review of possible change in design, materials and performance
- Ensuring traceability between manufacturer's product type marking and Type Approval Certificate.

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE