



Certificate no.:  
**TAE000054X**

# TYPE APPROVAL CERTIFICATE

**This is to certify:**

**that the Fiber optical cable**

with type designation(s)

**QFAI/U/B-FL or QFCI/U/B-FL or QFOI/U/B-FL or QFNI/U/B-FL Multi loose tube, AFAI/U/B-FL or AFCI/U/B-FL or AFOI/U/B-FL or AFNI/U/B-FL Multi tube tight buffered, AIAI/U/B-FL or AICI/U/B-FL or AIOI/U/B-FL or AINI/U/B-FL tight buffered**

issued to

**Wuhan Hysin Ship Technology Co., Ltd.**  
**Wuhan, Hubei Province, China**

is found to comply with

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

## Application:

**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.**

Issued at **Hamburg** on **2025-09-29**

This Certificate is valid until **2030-09-28**.

for **DNV**

DNV local unit: **Nanjing NB & CMC**

Approval Engineer: **Carsten Hunsalz**

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 USD 300 000.

## Product description

Type: QFAI/U/B-FL or QFCI/U/B-FL or QFOI/U/B-FL or QFNI/U/B-FL Multi loose tube,

Cable construction:

No. of tubes x fibers: up to 96 fibers with 8 tubes in maximum (Fiber in loose tube)

Inner sheath: SHF1 (thickness  $\geq 1.0$  mm)

A= Aramid Strength member of yarn  
C= Galvanized steel wire braiding (GSWB)  
O= Tinned copper wire braiding (TCWB)  
N= Corrugated Steel Tape (CST)

Outer sheath: I=SHF1, U=SHF2, B=SHF-MUD (thickness  $\geq 1$  mm)

Type: AFAI/U/B-FL or AFCI/U/B-FL or AFOI/U/B-FL or AFNI/U/B-FL Multi tube tight buffered

Cable construction:

No. of tubes x fibers: up to 96 fibers with 8 tubes in maximum (Fiber tight buffered)

Inner sheath: SHF1 (thickness  $\geq 1.0$  mm)

A= Aramid Strength member of yarn  
C= Galvanized steel wire braiding (GSWB)  
O= Tinned copper wire braiding (TCWB)  
N= Corrugated Steel Tape (CST)

Outer sheath: I=SHF1, U=SHF2, B=SHF-MUD (thickness  $\geq 1$  mm)

Type: AIAI/U/B-FL or AICI/U/B-FL or AIOI/U/B-FL or AINI/U/B-FL tight buffered

Cable construction:

No. of fibers: up to 24 fibers (tight buffered)

Inner sheath: SHF1 (thickness  $\geq 1.0$  mm)

A= Aramid Strength member of yarn  
C= Galvanized steel wire braiding (GSWB)  
O= Tinned copper wire braiding (TCWB)  
N= Corrugated Steel Tape (CST)

Outer sheath: I=SHF1, U=SHF2, B=SHF-MUD (thickness  $\geq 1$  mm)

Type of fibres:

| Type      | Definition in IEC         | Definition in ISO/IEC 11801-1 | Definition in ITU-T |
|-----------|---------------------------|-------------------------------|---------------------|
| E9/125    | B1.3 IEC 60793-2-50:2025  | OS2                           | G.652D              |
| G62.5/125 | A1b IEC 60793-2-10:2022   | OM1                           | -                   |
| G50/125   | A1a.1 IEC 60793-2-10:2022 | OM2                           | G.651.1             |
| G50/125   | A1a.2 IEC 60793-2-10:2022 | OM3                           | G.651.1             |
| G50/125   | A1a.3 IEC 60793-2-10:2022 | OM4                           | G.651.1             |
| G50/125   | A1a.4 IEC 60793-2-10:2022 | OM5                           | G.651.1             |

## Application/Limitation

These cables are flame-retardant, not fire-resistant.

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

### Fiber optical cable

Flame retardant in bunch Cat. A. Halogen free. Low smoke. MUD resistant. UV resistant

Temperature range: -52°C to +90°C

Other technical data according to manufacturer's instruction and test report.

The cable designation is partly based on the "Table 8 - Cable code designation" of NEK TS 606.

## Type Approval documentation

### Tests carried out

| Standard                                                             | Release                                  | General description                                                                                                                                                                              | Limitation                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DNV-CP-0402                                                          | 2021-09                                  | DNV Type approval program for optical fibre cables                                                                                                                                               |                                                                                                                                                                                                                                                 |
| IEC 60794-1-21<br>IEC 60794-1-22<br>IEC 60794-1-23<br>IEC 60794-1-24 | 2020-03<br>2017-10<br>2020-01<br>2014-05 | Optical fibre cables - Part 1-21/22/23/24:<br>Generic specification - Basic optical cable test procedures                                                                                        | E1 Tensile strength<br>E3 Crush<br>E4 Impact<br>E6 Repeated bending<br>E7 Torsion<br>E10 Kink<br>E11 Cable bend<br>E11 Cold bend<br>F1 Temperature cycling<br>F5 Water penetration<br>G1 Bend test of cable element<br>H3 Electrical continuity |
| IEC 60793-1-40                                                       | 2019-03                                  | Optical fibres - Part 1-40: - Attenuation                                                                                                                                                        |                                                                                                                                                                                                                                                 |
| IEC 60092-360                                                        | 2021-01                                  | Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables.                 | partly                                                                                                                                                                                                                                          |
| IEC 60332-1-2                                                        | 2015-07                                  | Tests on electric and optical fibre cables under fire conditions –<br>Part 1-2: Test for vertical flame propagation for a single insulated wire or cable –<br>Procedure for 1 kW pre-mixed flame |                                                                                                                                                                                                                                                 |
| IEC 60332-3-22                                                       | 2018-07                                  | Tests on electric and optical fibre 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                                                          | 2019-11                                  | Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content                                                                         | Low Halogen:<br><0,5% Halogen                                                                                                                                                                                                                   |
| IEC 60754-2                                                          | 2019-11                                  | Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity                                                         | Halogen free:<br>pH > 4,3<br>Conductivity < 10µS/mm                                                                                                                                                                                             |
| IEC 60684-2                                                          | 2011-08                                  | Clause 45.2 Methods of determination of low levels of fluorine                                                                                                                                   | Fluorine content < 0,1%                                                                                                                                                                                                                         |
| IEC 61034-1/2                                                        | 2019-11                                  | Measurement of smoke density of cables burning under defined conditions –<br>Test apparatus, procedure and requirements                                                                          | Low smoke<br>Light transmittance >60%                                                                                                                                                                                                           |

| Standard      | Release | General description                                                                                                                                                              | Limitation                                                                                                                        |
|---------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| UL 1581       | 2023-11 | UL Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords                                                                                       | SHF1, SHF2, SHF-MUD<br>UV resistant acc.<br>UL 1581 Cl.1200<br>min. 80% after 720h<br>in the tensile strength and elongation      |
| IEC 60092-360 | 2021-01 | Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables. | SHF1 aging in IRM 902 70°C 4h<br><br>SHF2 aging in IRM 902 100°C 24h<br><br>tensile strength and elongation max +/- 40%           |
| NEK TS 606    | 2022    | Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.                                                                                   | SHF-MUD<br>resistance test:<br>IRM902+IRM903<br>100°C 7d.<br>Calcium Bromide<br>70°C 56d.<br>Oil based mud:<br>EDC 95/11 70°C 56d |
| IEC 60079-14  | 2024-08 | Explosive atmospheres - Part 14: Electrical installations design, selection and erection                                                                                         | Test acc. to Annex C                                                                                                              |
| ASTM D2863    | 2023    | Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)                                                 | Oxygen index test for outer sheath ≥30%                                                                                           |
| NES 713       | 2000-04 | Naval Engineering Standard (NES) 713                                                                                                                                             | Toxicity Index ≤5                                                                                                                 |

## Marking of product

Example:

Hysin - MARINE-Cable - QFAI-FL - (No of fibers) - (model of optical fiber) - IEC 60332-3-22 - meter mark - Lot No.

## Place of Production

Building 2, Pharmaceutical Industry Park, Jiangxia Avenue, Jiangxia Economic Development District, Wuhan

## 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) checked (if not available tests according to RT to be carried out)
- Review of type approval documentation
- 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