Certificate No:
TAE00004RK

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Fiber optical cable

with type designation(s)
QFCI & QFOI, QFAI

Issued to
Hyman Marine & Offshore Co., Ltd.
Shanghai, **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 **Høvik** on **2023-04-25**
This Certificate is valid until **2028-04-24**.
DNV local unit: **Shanghai**

Approval Engineer: **Carsten Hunsalz**

for **DNV**

Frederik Tore Elter
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.

Product description

QFCI & QFOI

Construction:	PTB loose-tubes (up to 12 or 24 fibres per tube)
Loose Tube	Gel Filled
Fire resistant layer	Mica tape around each tube
Central strength element	Galvanized steel wire (with polymer over-coat if necessary)
Water Blocking Yarn	Water Blocking Yarn around the CSM
Inner Sheath	SHF1
Armour	Galvanized steel wire braid or tinned copper wire braid
Outer Sheath	SHF1

QFAI

Construction:	PTB loose-tube (up to 24 fibres)
Loose Tube	Gel filled
Fire resistant layer	Mica tape around the tube
Strength element	Tear rope (option)
Armour/Screen	Strength member of yarn
Outer Sheath	SHF1

Type of fibres:

Type	Definition in IEC	Definition in ISO 11801	Definition ITU-T
E9/125	60793-2-50 B1.3	OS2	G.652D
G50/125	60793-2-10 A1a.1	OM2	G.651.1
G50/125	60793-2-10 A1a.2	OM3	G.651.1
G50/125	60793-2-10 A1a.3	OM4	G.651.1
G62.5/125	60793-2-10 A1b	OM1	without

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 Bunches of Cables or Wires) are fulfilled without any additional measures.

Fiber optical cable
Fire resistant. Flame retardant in bunch Cat. A. Halogen free. Low smoke.

Temperature range: -40°C to 90°C

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
DNV-CP-0402	2021-09	DNV Type approval program for optical fiber cables	
IEC 60794-1-21	2015-04	Optical fiber cables - Part 1-21: Generic specification - Basic optical cable test procedures - Mechanical tests methods	E1 Tensile strength E3 Crush E4 Impact E7 Torsion E10 Kink E11 Cable bend E11 Cold bend
IEC 60793-1-40	2019-03	Optical fibers - Part 1-40: Measurement methods and test procedures - 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.	
IEC 60331-25	1999-04	Tests for electric cables under fire conditions – Circuit integrity – Part 25: Procedures and requirements – Optical fibre cables	950°C – 1000°C Minimum 180 min. During the course of the test, the maximum increase in attenuation shall not exceed the value stated in the relevant specification (1,5 dB per fibre).
IEC 60332-1-2	2016-09	Tests on electric cables under fire conditions. Test for vertical flame propagation for a single insulated wire or cable.	
IEC 60332-3-22	2018-03	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	
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: <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: pH > 4,3 Conductivity < 10µS/mm
IEC 61034-1/2	2019-11	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance >60%
NEK TS 606	2022-03	Cables for offshore installations	Cable types F101 QFCI and F103 QFCB.

Marking of product

Example:

Forller Cable– QFCI or QFOI or QFAI or QFNB or QFNI MUD - FIBER OPTIC CABLE - No of fibers - Fibre type - IEC 60331-25 - IEC 60332-3-22 - (Lot. No)- (meter marking)

Place of Production

DNV id: 10129143

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