

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Fiber optical cable**with type designation(s)
**QFCI Fibre Optic Cable,
F103 QFCU and QFCU M**

Issued to

**Belcom Cables Ltd.
Elsenham, Essex, United Kingdom**

is found to comply with

DNV GL rules for classification – Ships, offshore units, and high speed and light craft**Application :****Fibre Optical Cable for use in Marine and Offshore installations. Fire Resistant – Armoured Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.**Issued at **Høvik** on **2020-11-17**for **DNV GL**This Certificate is valid until **2025-10-05**.DNV GL local station: **London**Approval Engineer: **Ivar Bull**

**Marta Alonso Pontes
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 GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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.



Job Id: **262.1-020354-2**
 Certificate No: **TAE00000JG**
 Revision No: **1**

Name & Place of manufacturer

DNV Id: 10096273

Product description

QFCI Fibre Optic Cable,
 F103 QFCU and QFCU M

Multi loose tube steel wire braided fire resistant marine fiber optic cable

Construction	PBT loose-tubes [max 24 fibers per tube]
Central strength member	Steel
Peripheral strength member	Glass yarn
Inner sheath	SHF1
Metallic covering	Galvanized Steel Wires
Outer sheath	SHF1(QFCI), or SHF2 (F103 QFCU) or SHF2 MUD (F103 QFCU M), single or double layer

Fiber code	Units	3	4	5	6	7	8	9	10
Standard designation		Multimode				Singlemode			
ISO/IEC 11801		OM4	OM3	OM2	OM1	-	-	OS2	-
ANSI TIA/EIA		AAAD	AAAC	AAAB	AAAA	-	-	-	-
IEC 60793-2-10		A1a.3	A1a.2	A1a.1	A1b	-	-	-	-
ITU-T		-	-	-	-	G657.A2	G655	G652.D	G657.A1
IEC 60793-2-50		-	-	-	-	B6_a2	B4	B1.3	B6_a1
Operating wavelength	nm	850 1300				1310 1550 1625	1550 1625	1310 1550 1625	
Core diameter	µm	50±2,5	50±2,5	50±2,5	62,5±3				
MFD @1310 nm	µm	-	-	-	-	8,6±0,4	-	9,2±0,4	8,6±0,4
MFD @1550 nm	µm	-	-	-	-	9,6±0,6	9,6±0,6	10,4±0,6	9,8±0,5
Cladding	µm	125±1			125±2	125±0,7			
Coating	µm	245±10				245±5			
Max attenuation Tight buffer	dB/km	3,5 @ 850 nm 1,2@1300 nm			3,5 @ 850 nm 1,5@1300 nm	0,4 @ 1310 nm 0,3 @ 1550 nm	-	0,4 @ 1310 nm 0,3 @ 1550 nm	
Max attenuation Loose tube	µm	2,8 @ 850 nm 0,9 @ 1300 nm			3,2 @ 850 nm 1,0@1300 nm	0,37 @ 1310 nm 0,22 @ 1550 nm 0,25 @ 1625 nm	0,22 @ 1550 nm 0,26 @ 1625 nm	0,37 @ 1310 nm 0,22 @ 1550 nm 0,25 @ 1625 nm	

For more details please see datasheet.

Application/Limitation

Temperature window :
 Min. Installation temperature: -30°C

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Operation temperature: -40°C to + 80°C
 Storage temperature: -40°C to + 80°C

This cable is fire resistant in accordance with IEC 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.

Type Approval documentation

Data sheets: See approval letter
 Test reports: See approval letter

Tests carried out

Standard	Release	General description	Limitation
IEC 60793-2-10	2011-03	Optical fibres - Part 2-10: Product specifications - Sectional specification for category A1 multimode fibres	
IEC 60793-2-50	2008-05	Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres	
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.	
IEC 60331-25	1999-04	Tests for electric cables under fire conditions - Circuit integrity - Part 25: Procedures and requirements - Optical fibre cables	Minimum 90 min
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 60332-3-24	2018-07	Tests on electric and optical fibre cables under fire conditions - Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables - Category C	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	2013-07 2013-09	Measurement of smoke density of cables burning under defined conditions - Test apparatus, procedure and requirements	Low smoke Light transmittance >60%

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Marking of product

Armada QFCI or F103 QFCU or F103 QFCU M - No. of fibres - Type of Fibres - IEC60331-25 - IEC60332-3-22/24 - SHF-1 or SHF2 or SHF2 MUD - YoM - BATCH

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
- 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