

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Data transmission cables and systems**

with type designation(s)

SLO-000--M1-A1-WB-FR**

Issued to

Cavicel S.p.A.
Pioltello MI, Italy

is found to comply with

DNV GL 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 GL.**Issued at **Høvik** on **2021-01-05**for **DNV GL**This Certificate is valid until **2026-01-04**.DNV GL local station: **Milan**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.



Product description

Single loose tube fiber optic cable with metallic armour

SLO-000-**-M1-A1-WB-FR Outer sheath SHF1 or
 SLO-000-**-M1-A1-WB-FR Outer sheath SHF2 or SHF2 MUD

Construction:

1 - Fibre	250 μ m 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 - Armour	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 μ m	< 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 Bunches 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

Datasheets and Test reports: See approval letter M-SA-CE/IVABU/262.1-034379-J-4 dated 2020-12-15

IMQ test report CN15S0447511-01 dated 2015/07/14. Test for Oil based drilling fluid EDC 95/11

IMQ test report CN15S0523325-01/1 dated 2015/10/08. Test for IRM902 and IRM903.

IMQ test report CN15S0523325-01/2 dated 2015/11/13. Test for CALCIUM BROMIDE BRINE.

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 2013-09	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke 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: Required Max variations ±: IRM902 & 903 100°C 7d. TS & E@B, weight & vol.: ±30% Calc. Bromide 70°C 56d. TS & E@B: ±25%, weight: ±15%, vol.: ±20%

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Certificate No: **TAE000047T**

			Oil based mud: EDC 95/11 70□C 56d TS & E@B ±30%, weight & vol.: ±25%
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Marking of product

CAVICEL - FIBRE OPTIC CABLE - SLO-000-**-M1-A1-WB-FR - IEC 60331-25 - EN 50200 Annex E - IEC 60332-3-22 Cat. A - BATCH *****/year of manufacture - MADE IN ITALY + meter

000 = Type of fibres
** = n° of fibres

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