TYPE APPROVAL CERTIFICATE

Certificate No:
TAE00004D2
Revision No:
1

This is to certify:

That the Data transmission cables and systems

with type designation(s)
AICI, AIOI, AICU, AIOU

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

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

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

Approval Engineer: **Nenad Dadic**

for **DNV**

Trond Sjåvåg
Head of Section

Product description

Name of manufacturer
DNV ID: 10011886

NEK TS606 type: Type AICI (steel wire braid) Outer sheath: SHF1
Type AIOI (copper wire braid). Outer sheath: SHF1
Type AICU (steel wire braid) or AIOU (copper wire braid). Outer sheath: SHF2 or SHF2 MUD

Optical fibres

TYPE OF FIBRES			Single Mode 9/125	Multimode 62.5/125	Multimode 50/125
Fibre Code (000)			009	062	050
ITU-T type			G.652B/D	-	G.651
Mode Field Diameter (MFD)	at 1310 nm	µm	9.2 ± 0.4	–	–
	at 1550 nm	µm	10.3 ± 0.5	–	–
Core Diameter		µm	–	62.5 ± 2.5	50 ± 2.5
Cladding Diameter		µm	125.0 ± 1.0	125.0 ± 1.0	125.0 ± 1.0
Coating Diameter		µm	242 ± 7.0	242 ± 7.0	242 ± 7.0
Numerical Aperture			0.14	0.275 ± 0.015	0.200 ± 0.015
Attenuation	at 850 nm	dB/km (max)	–	≤ 3.5	≤ 2.8
	at 1300 nm	dB/km (max)	–	≤ 1.0	≤ 1.0
	at 1310 nm	dB/km (max)	≤ 0.40	–	–
	at 1550 nm	dB/km (max)	≤ 0.22	–	–
	at 1625 nm	dB/km (max)	–	–	–
Bandwidth	at 850 nm	MHz x km	–	160 to > 300	400 to > 1000
	at 1300 nm	MHz x km	–	500 to > 1000	400 to > 1500
Chromatic Dispersion	at 1285 ÷ 1330 nm	ps/nm x km	≤ 3.0	–	–
	at 1550 nm	ps/nm x km	≤ 18	–	–
	at 1530 ÷ 1565 nm	ps/nm x km	–	–	–
	at 1565 ÷ 1625 nm	ps/nm x km	–	–	–

Other fiber type and qualities are available on request.

Minimum bending diameter of cable (Static): 10 x outer diameter
Minimum bending diameter of cable (Dynamic): 20 x outer diameter

Application/Limitation

Temperature window
Operation: -40°C to +70°C (SHF1) / -40°C to +90°C (SHF2 / Mud)
Installation: -10°C to +70°C
Storage: -40°C to +70°C

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

Tests carried out

DNVGL CP-0402	2016-02	Class program for Optical fiber 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.	
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	2009-02	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	2011-11	Test on gases evolved during combustion of materials from cables – Determination of the amount of halogen acid gas	Low Halogen: <0,5% Halogen
IEC 60754-2	2011-11	Test on gases evolved during combustion of materials from cables – Determination of the degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity	Halogen free: pH > 4,3 Conductivity < 10µS
IEC 61034-1/2	2013-07/09	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke
NEK 606 Ed. 4	2009-05	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test: IRM903 100°C 7d. Calcium Bromide 70°C 56d. <u>Oil based mud:</u> Carbo Sea 70°C 56d or EDC 95/11 70°C 56d

Marking of product

APS Finland – month/year - AICI or AIOI - FIBER OPTIC CABLE – Fibre count + type - IEC 60332-2-22/24 - Batch No.- Meter marking or

APS Finland – month/year - AICU or AIOU - FIBER OPTIC CABLE - Fibre count + type - IEC 60332-2-22/24 - Batch No. .-Meter marking

APS Finland – month/year - AICU or AIOU MUD-RESISTANT - FIBER OPTIC CABLE - Fibre count + type - IEC 60332-2-22/24 - Batch No. .-Meter marking

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