DNV·GL

Certificate No:
TAE00002B7

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Data transmission cables and systems

with type designation(s)
AIBI, AICI and AIOI

Issued to
TMC Co., Ltd
Cheonan-si Chungcheongnam-do, Korea

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft
NEK TS 606 (2016)

Application :

Flame retardant fiber optic cable. Halogen free. Low smoke. Cold bend(-40°C) Cold impact(-35°C)

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

Issued at **Busan** on **2017-12-06**
This Certificate is valid until **2022-06-30**.
DNV GL local station: **Seoul**

Approval Engineer: **Eun Jin Lee**

for **DNV GL**

Michael Jost Auf der Stroth
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.

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Job Id: **262.1-006399-4**
Certificate No: **TAE00002B7**

Product description

Type : AICI, AIBI, AIOI

Type	Fiber	Description		
AIBI AICI AIOI		Fiber Core: 2C~24C. Tight Buffer type, Aramid Yarn strength member, Bronze wire Armored (AIBI) Galvanized steel wire Armored (AICI) Tinned copper (AIOI) and Low Smoke Halogen free, SHF1 sheathed Flame-Retardant Cables	Outer Dia(㎜)	
	SM-G.652		2C	12.3
	SM-G.657		4C	12.3
	MM-62.5-OM1		6C	13.3
	MM-50-OM2		8C	14.5
	MM-50-OM3		12C	17.0
	MM-50-OM4		16C	18.0
			24C	20.2

Optical Fiber in accordance with IEC 60793

Fiber type		Core Dia. (㎛)	Clad Dia. (㎛)	Coat. Dia. (㎛)	Dispersion (㎰/㎞.㎚)		Attenuation (㏈/㎞)		Bandwidth (㎒-㎞)		Link Dist. (m)	
					1290 1330 (㎚)	1550 (㎚)	850 1310 (㎚)	1300 1550 (㎚)	850 (㎚)	1300 (㎚)	850 (㎚)	1300 (㎚)
SM	G.652	9.2	125	245	3.0↓	18↓	0.4	0.3	N/A	N/A	2000	2000
SM	G.657	8.6	125	245	3.0↓	17.5↓	0.4	0.3	N/A	N/A	2000	2000
MM	62.5-OM1	62.5	125	245	N/A	N/A	3.5	1.5	200	500	275 (1G)	550 (1G)
MM	50-OM2	50	125	245	N/A	N/A	3.5	1.5	500	500	550 (1G)	550 (1G)
MM	50-OM3	50	125	245	N/A	N/A	3.5	1.5	1500	500	300 (10G)	300 (10G)
MM	50-OM4	50	125	245	N/A	N/A	3.5	1.5	3500	500	550 (10G)	300 (10G)

Application/Limitation

Temperature window

Operation : -40°C ~ 70°C
Installation : -10°C ~ 60°C
Storage : -40°C ~ 70°C

Minimum Bend Radius

Installation : 15 x Outer diameter
Operation : 10 x Outer diameter

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

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
IEC 60092-350	2014	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
IEC 60092-360	2014	Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation, telecommunication cables	
IEC 60793-1-40	2001	Optical fibres – Part 1-40: Measurement methods and test procedures – Attenuation	
IEC 60794-1-1/-2	2015 2017	Optical fibre cables – Generic specification - Part 1-1: General Part 1-2: Basic optical cable test procedures	
IEC 60332-3-22	2009	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	Bunch test Category A
IEC 60754-1	2011	Test on gases evolved during combustion of materials from cables – Determination of the amount of halogen acid gas	Low Halogen <0,5%
IEC 60754-2	2011	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 condctivity	Halogen free ≥4,3pH, ≤10µS/mm
IEC 60684-2	2011	Flexible insulating sleeving – Part 2: Methods of test.	Fluorine content <0,1%
IEC 60811-404	2012	Electric and optical fibre cables – Test methods for non-metallic materials – Part 404: Miscellaneous tests – Mineral oil immersion tests for sheaths	IRM 902(70°C, 4hrs)
IEC 61034-1/-2	2005	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke >60%
UL 1581	2017	Sunlight resistant -Section 1200	720hrs
CSA C22.2 No. 03	2009	5.11 Flexibility at any specified temperature	Cold bend: -40°C
CSA C22.2 No. 03	2009	5.12 Abnormal low temperature – impact	Cold impact: -35°C

Marking of product

TMC – Type designation - Fiber type – Diameter of Fiber count – Date – Length – Serial no.

Periodical assessment

The scope of the retention/renewal survey is to verify that the conditions stipulated for the Type approval is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the survey are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Production Sample Tests (PST) and Routines (RT) checked (if not available, tests according to PST and 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