Certificate No:
TAE00004B2

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Electric Power Cable

with type designation(s)
(FX-)BI, (FX-)BI(c)

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

is found to comply with
DNV GL 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.

Rated voltage (kV)	**0.6/1**
Temp. class (°C)	**90**

Issued at **Busan** on **2021-07-22**
This Certificate is valid until **2026-07-21**.
DNV local station: **Seoul**

for **DNV**

Approval Engineer: **Eun Jin Lee**

Andreas Kristoffersen
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

Type : 0.6/1kV (FX-)BI, (FX-)BI(c)

Conductor :	Stranded plain or tinned annealed copper wires Class2 or Class 5(FX- type)
Insulation :	XLPE + Mica tape
Collective screen :	CU/PS or AL/PS tape with tinned copper drain wire ('-(c)' type only)
Outer sheath :	SHF1

Type	No. of core	Conductor size (mm^2)
(FX-)BI	1C	1.5 ~ 630
	2C, 3C, 4C, 5C	1.5 ~ 300
	2C~48C	1.0~2.5
	2C~37C	4
	2C+E, 3C+E, 4C+E	1.5~240 + 1.5~120
(FX-)BI(c)	2C, 3C	1.5 ~ 300
	2C~48C	1.0~2.5

Application/Limitation

This cable is fire resistant according to IEC 60331.

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	2020	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
IEC 60092-353	2016	Power cables for rated voltages 1kV and 3kV	
IEC 60092-360	2014	Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation, telecommunication cables	
IEC 60332-1	2015	Test for vertical flame propagation for a single insulated wire or cable - Apparatus	
IEC 60332-3-22	2018	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 60331-21	1999	Tests for electric cables under fire conditions – Circuit integrity – Part 21: Procedures and requirements – Cables of rated voltage up to 0,6/1,0 kV	@ 750˚C/90 min. test
IEC 60331-1	2018	Fire resistance / Circuit integrity – Test method for fire *with shock* at temperature of at least 830ºC for cables rated up to and including 0,6/1 kV	@ 830 ˚C w/shock (120)
IEC 60331-2	2018	Tests for electric cables under fire conditions - Circuit integrity - Part 2: Test method for fire with shock at a temperature of at least 830°C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter not exceeding 20mm	@ 830 ˚C w/shock (120)
IEC 60754-1	2019	Test on gases evolved during combustion of materials from cables – Determination of the amount of halogen acid gas	Low Halogen <0,5%

Standard	Release	General description	Limitation
IEC 60754-2	2019	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 ≥4,3pH, ≤10µS/mm
IEC 61034-1/2	2019	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke >60%
CSA C22.2 No. 2556	2015	Cold bend test and impact test for low temperature behaviour	Bend (-40°C) Impact (-40°C)

Marking of product

Voltage rating – Cable type – Size – IEC 60331-1(or-2)(120) – IEC 60332-3 Cat.A – TMC – Year of manufacture – Length

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