Certificate no.:
TAE00004XJ

TYPE APPROVAL CERTIFICATE

This is to certify:

that the High Voltage Cable

with type designation(s)
AMP Cable(EPR/TPU)

issued to
LS Cable & System Ltd (Donghae Plant)
Donghae-si, Gangwon-do, Korea, Republic of

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

Application:

Cables for High voltage shore connection system

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

Rated voltage (kV)	**6/10**
Temp. class (°C)	**90**

Issued at **Busan** on **2024-10-30**

This Certificate is valid until **2029-10-29**.

for **DNV**

DNV local unit: **Gimhae Station**

Approval Engineer: **Eun Jin Lee**

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 : 6/10kV AMP CABLE(EPR/TPU)

3C phase conductor x 185sqmm + 2C Earth conductor x 50sqmm + 10C signal x 2.5sqmm + 12FO

Conductor :	Tinned annealed copper conductor, Class 5
Conductor screen :	Semi-conductive tape plus compound
Insulation :	EPR
Insulation screen :	Semi-conductive compound
Earth core :	Tinned annealed copper, Class 5 with semi-conductive tape and compound
Optical fiber :	Multi mode 12 fibers(62.5/125μm)
Sheath :	Thermo Plastic Polyurethane(TPU) with aramid yarn

Application/Limitation

Cable according to IEC/IEEE 80005-1(2019)
: Dynamic bending test(5000 cycles) / Sunlight resistance test(720 hrs) / Abrasion test / Flame propagation test / Behaviour of completed cable at low temperature(-40°C) / Resistance between earth conductor and semi-conductive layer(max. 500 ohm)

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
IEC/IEEE 80005-1	2019	Utility connections in port – Part 1 : High voltage shore connection(HVSC) system – General requirements	
60092-350	2020	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
60092-354	2020	Single- and three-core power cables with extruded solid insulation for rated voltages 6kV(U_m=7.2kV) up to 30kV(U_m=36kV)	
60092-360	2021	Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation, telecommunication cables	
IEC 60793-2-10	2019	Optical fibres – Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres	
IEC 60332-1	2015	Test for vertical flame propagation for a single insulated wire or cable - Apparatus	
EN 50363-10-2	2005	Insulating, sheathing and covering materials for low voltage energy cables Part 10-2 : Miscellaneous sheathing compounds – Thermoplastic polyurethane	

Marking of product

6/10kV – AMP CABLE(EPR/TPU) – 3Cx185sqmm+2Cx50sqmm+10Cx2.5sqmm+12FO – LS Cable – Year of manufacture – IEC/IEEE 80005-1 – 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)
- 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