Certificate No:
TAE000049N

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Electric Power Cable

with type designation(s)
SIOI, SIOI(C), SIBI, SIBI(C), SICI, SICI(C), SINI, SINI(C)

Issued to
LS Cable & System Ltd (Donghae Plant)
Donghae-si, Gangwon-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 **2021-05-28**
This Certificate is valid until **2025-06-04**.
DNV local station: **Seoul**

Approval Engineer: **Eun Jin Lee**

for **DNV**

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 designation :
Cable type letter 1 : 0.6/1kV SIOI, SIOI(C), SIBI, SIBI(C), SICI, SICI(C), SINI, SINI(C)
Cable type letter 2 : FRT-SCOCBO, FRT-SCOBBO, FRT-SCOTBO, FRT-DCOCO, FRT-DCOCO(C), FRT-DCOCBO, FRT-DCOCBO(C), FRT-DCOBBO, FRT-DCOBBO(C), FRT-DCOTBO, FRT-DCOTBO(C), FRT-TCOCO, FRT-TCOCO(C), FRT-TCOCBO, FRT-TCOCBO(C), FRT-TCOBBO, FRT-TCOBBO(C), FRT-TCOTBO, FRT-TCOTBO(C), FRT-FCOCO, FRT-FCOCO(C), FRT-FCOCBO, FRT-FCOCBO(C), FRT-FCOBBO, FRT-FCOBBO(C), FRT-FCOTBO, FRT-FCOTBO(C), FRT-DCOCOE, FRT-DCOCBOE, FRT-DCOBBOE, FRT-DCOTBOE, FRT-TCOCOE, FRT-TCOCBOE, FRT-TCOBBOE, FRT-TCOTBOE, FRT-FCOCOE, FRT-FCOCBOE, FRT-FCOBBOE, FRT-FCOTBOE, FRT-MCOCO, FRT-MCOCO(C), FRT-MCOCBO, FRT-MCOCBO(C), FRT-MCOBBO, FRT-MCOBBO(C), FRT-MCOTBO, FRT-MCOTBO(C), FRT-MCOCOE, FRT-MCOCOE(C), FRT-MCOCBOE, FRT-MCOCBOE(C), FRT-MCOBBOE, FRT-MCOBBOE(C), FRT-MCOTBOE, FRT-MCOTBOE(C)

Conductor :	Stranded annealed copper conductor, Class 2
Insulation :	XLPE + Mica tape
Overall screen :	Aluminum/[polyester tape w/drain wire ('-(C)' type only)
Inner sheath :	SHF1
Armor :	Galvanized steel wire(C)[Note 1)] /Copper wire(CB or O)/Copper alloy wire(BB or B)/Tinned annealed copper wire(TB or N)
Outer sheath :	SHF1

[Note 1)] : Not applied to the single core

No. of Core	Conductor size(mm^2)
1 (except '–(C)' type)	1.5~630
2	1.5~300
3	1.5~300
4	1.5~300
2+E	1.5~300
3+E	1.5~300
4+E	1.5~300
2~48	1~2.5
2~12	4
2+E ~ 48+E	1~2.5

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 60092-353	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 60331-21	1999	Fire with shock-Electric cables under fire conditions-Circuit integrity	@750˚C (90min)
IEC 60331-1/-2	2018	Fire with shock-Electric cables under fire conditions	@830˚C(120min) with shock
IEC 60332-3-22	2018	Test for vertical flame spread of vertically mounted bunched wires or cables	Cat. A
IEC 60754-1/2	2019	Determination of the amount of halogen acid gas/ Determination of acidity (by pH measurement) and conductivity	Low Halogen <0,5% Halogen free ≥4,3pH, ≤10µS/mm
IEC 60684-2	2011	Determination of low levels of fluorine	fluorine content <0.1%

Standard	Release	General description	Limitation
IEC 61034-1/2	2019	Measurement of smoke density of cables burning under defined conditions	Low smoke >60%
UL 1581	2020	Sunlight(UV) resistance	720hrs
IEC60092-350 Annex E	2020	Additional test at low temperature	Bending -40°C
		Additional test at low temperature	Impact -35°C

Marking of product

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