



Certificate No:
TAE00004HB

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Electric Power Cable

with type designation(s)
KUKDONG 0,6/1 kV PCI/AL SEC(FLEX)

Issued to

Kukdong Electric Wire Co., Ltd.
Jincheon-gun, Chungcheongbuk-do, Korea, Republic of

is found to comply with

DNV rules for classification – Ships, offshore units, and high speed and light craft

Application :

Power cables with aluminum conductor. Armoured. Halogen free.

Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Rated voltage (kV) 0,6/1

Temp. class (°C) 90

Issued at **Høvik** on **2022-09-16**

This Certificate is valid until **2027-09-15**.

for **DNV**

DNV local station: **Seoul**

Approval Engineer: **Ivar Bull**

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Marta Alonso Pontes
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.



Form code: TA 251

Revision: 2021-03

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Product description

Type: KUKDONG 0,6/1 kV PCI/AL SEC(FLEX)

No of cores:	Cross sectional area [mm ²]
3	70, 95, 120, 150, 185, 240

Construction:

Conductors: Annealed aluminum as per ISO 6722-2, structure B and Nexans specification
Core insulation: HEPR
Inner covering: If any
Armour: Galvanized steel wire braid
Outer sheath: SHF 1

Application/Limitation

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.

Special for cables with aluminum conductors:

- Cable shall be terminated with DNV type approved ALU-FLEX terminations designed for aluminium conductors, ref. DNV TA certificate TAE00004H9 issued to NEXANS network solutions NV.
- Installation to be performed by trained personnel according to Nexans installation Instructions. Press to be performed with approved press tool and correct die sizes.
- To prevent ingress of moisture, heat shrink tubing with melt glue shall be installed over pressed termination and overlap cable sheath minimum 50mm.

DNV Rules Part 4 Chapter 8 Section 9 [1.1.3] states: "The design of all electrical cables installed shall comply with the requirements of applicable IEC Publications.". Further, Section 1 Service Description [1.1.4] states: "The Society will consider the use of alternative standards if they are found to represent an overall safety concept equivalent to that of the rules."

Based on passed tests in DNV Class program CP-0409, DNV considers the aluminum cables and terminations listed in this certificate to represent an equivalent safety level as traditional copper cables.

At termination points, marking signs shall inform: *Service and repair on cables and terminations shall be done by trained workers only, using approved equipment and tools to maintain the safety level of aluminum cable system*

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
DNV CP-0399	2021-08	Electric cables.	
DNV-CP-0409	2021-09	Class Programme for terminal lugs for LV power cables with aluminium conductors	
IEC 60092-350	2020-01	Electrical installations in ships - Part 350: General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
IEC 60092-360	2021-01	Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables	
IEC 60092-353	2016-09	Electrical installations in ships - Part 353: Power cables for rated voltages 1 kV and 3 kV	

Standard	Release	General description	Limitation
IEC 60332-3-22	2018-07	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	Charred portion of sample does not exceed 2,5m above bottom edge of burner.
IEC 60754-1	2019-11	Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content	Low Halogen: <0,5% Halogen
IEC 60754-2	2019-11	Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content	Halogen free: pH > 4,3 Conductivity < 10µS/mm
IEC 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test Clause 45.1 Methods of determination of low levels of chlorine, and/or Bromine and/or iodine Clause 45.2 Methods of determination of low levels of fluorine	HCl + HBr + HJ max 0,5% [0,014% can be detected] HF max 0,1% [0,02% can be detected]
IEC 61034-1/2	2019-11	Measurement of smoke density of cables burning under defined conditions – Part 1: Test apparatus Part 2: Test procedure and requirements	Low smoke Light transmittance >60%
IEC 60092-350	2020-01	Annex E: Cold bend test and impact test for low temperature behaviour	For halogen free cable: Cold bend: -40°C Cold impact: -35°C
UL 1581		Sunlight resistance test	For halogen free cable: 720 hr

Marking of product

0.6/1KV PCI/AL-SEC(FLEX) "s" SQMM X 3C KUKDONG - IEC 60332-3 A - YEAR - Length marking – DNV certificates TAE00004HB and TAE00004H9

"s"=conductor cross section area

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