



Certificate No:
TAE00004F0

TYPE APPROVAL CERTIFICATE

This is to certify:

That the High Voltage Cable

with type designation(s)
6/10kV RFOU-HCF [P114], 8.7/15kV RFOU-HCF [P115]

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
NEK TS 606 (2016)

Application :

General power. Hydro carbon fire resistant.

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

Type	Rated voltage (kV)	Temp. class (°C)
6/10kV RFOU-HCF [P114]	6/10	90
8.7/15kV RFOU-HCF [P115]	8.7/15	90

Issued at **Busan** on **2023-02-03**

This Certificate is valid until **2028-02-02**.

for **DNV**

DNV local station: **Seoul**

Approval Engineer: **Dong Ho Park**

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Hanwee Low
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

High voltage cables designed according to IEC 60092-354 and NEK TS 606: 2016.

Types: 6/10kV RFOU-HCF [P114]
8.7/15kV RFOU-HCF [P115]

Construction:

Conductors: Tinned, stranded copper, Class 2
Conductor screen: Semi-conducting tape and Semi-conducting compound
Core insulation: Halogen free EPR
Insulation screen: Semi-conducting tape and Semi-conducting compound
Screen: Tinned, annealed copper wire braid
Inner covering: Halogen-free thermosetting compound
Armour: Tinned, annealed copper wire braid
Outer sheath: Halogen free thermosetting compound, SHF2 or SHF Mud

HCF protection: Extruded fire protection compound with halogen free filler
Tape: Lapped fire-resistant tape
Overall sheath: Halogen free thermoplastic compound, SHF1

No of cores:	Cross sectional area [mm ²]
1	70 – 300

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.

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 60092-360	2021	Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables.	
IEC 60092-354	2020	Electrical installations in ships - Part 354: Single- and three-core power cables with extruded solid insulation for rated voltages 6 kV (Um = 7,2 kV) up to 30 kV (Um = 36 kV)	
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 and including 0,6/1,0 kV	@ 750 °C/ 120 min. test
IEC 60331-1	2018	Tests for electric cables under fire conditions - Circuit integrity - Part 1: 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 exceeding 20 mm	@ 830 °C w/shock (120 min.)
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% Halogen

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: 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 Light transmittance >60% (Overall diameter ≤96.1mm)
NEK TS 606	2016	Cables for offshore installations - halogen-free low smoke flame-retardant / fire-resistant (HFFR-LS). Technical specification. Item 4.7 HCF test	1100°C, 30 minutes.
IEC 61892-4	2019	Mobile and fixed offshore units - Electrical installations - Part 4: Cables	HCF test Annex C 30 minutes
CSA C22.2 No.03	2019	5.12 Abnormal low temperature – impact	Cold impact: -35°C

Marking of product

Manufacturer – Type designation – Size – Voltage rating - Applicable standard – Year of manufacture – Length

Ex) NEXANS KUKDONG RFOU-HCF P114 1C x 70 SQMM 6/10kV IEC60332-3 A HCF(1100/30) 2022 001M

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