DNV·GL

Certificate No:
TAE00003MX

TYPE APPROVAL CERTIFICATE

This is to certify:

That the High Voltage Cable

with type designation(s)
As listed on next page

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

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft
IEC 60092-354 (2014-08)
IEC 60332-3-22 (2009-02)
IEC 60754-1/2 (2011-11)
IEC 61034-2 Ed. 3.1 (2013-06)
NEK TS 606 (2016)

Application :

Power. Flame retardant Cat.A. Halogen free. Low smoke. Mud resistant.
Cold bending (-40°C) Cold impact (-35°C)

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.
Rated voltage (kV) **3.6/6 & 6/10 & 8.7/15 & 12/20**
Temp. class (°C) **90**

Issued at **Busan** on **2019-12-26**
This Certificate is valid until **2023-12-31**.
DNV GL local station: **Seoul**

for **DNV GL**

Approval Engineer: **Dong Ho Park**

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.

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Job Id: **262.1-001237-6**
Certificate No: **TAE00003MX**

Product description

Type: RFOU [P102], RFCU 3.6/6 kV
RFOU [P103], RFCU 6/10 kV
RFOU [P104], RFCU 8.7/15 kV
RFOU [P112], RFCU 12/20 kV

Conductors: Tinned stranded copper
Conductor screen: Semi-conducting tape and/or Semi-conducting compound
Insulation: EPR
Insulation screen: Semi-conducting compound and Semi-conducting tape
Metallic screen: Copper(annealed or tinned) wires braid
Inner sheath: SHF2
Braid armor: RFOU : Copper wires braid
RFCU : Galv. Steel wire braid(except single core cable)
Outer sheath: SHF2
Sheath code
no marking: Minimum requirement
E: Enhanced oil resistant – category b
M: Enhanced oil resistant – category b & mud resistant – category c
H: Enhanced oil resistant – category b & hydraulic/gear oil resistant – category d
H-M: Enhanced Oil resistant – category b & c & d

RFOU [P102], RFCU 3.6/6 kV

Number of cores x conductor cross-section	Number of cores x conductor cross-section	Number of cores x conductor cross-section	Number of cores x conductor cross-section
mm²	mm²	mm²	mm²
1 x 16/4	1 x 300/29	3 x 95/50	3 x 70 + E
1 x 25/9	1 x 400/29	3 x 120	3 x 95 + E
1 x 35/9	1 x 500/33	3 x 150	3 x 120 + E
1 x 50/10	1 x 630/33	3 x 185	3 x 150 + E
1 x 70/10		3 x 240	3 x 120/60*
1 x 95/12	3 x 16/16	3 x 300	3 x 150/75*
1 x 120/13	3 x 25/16		3 x 185/95*
1 x 150/16	3 x 35/16	3 x 25 + E	3 x 240/120*
1 x 185/16	3 x 50 /25	3 x 35 + E	
1 x 240/16	3 x 70/35	3 x 50 + E	

RFOU [P103], RFCU 6/10 kV

Number of cores x conductor cross-section	Number of cores x conductor cross-section	Number of cores x conductor cross-section	Number of cores x conductor cross-section
mm²	mm²	mm²	mm²
1 x 16/4	1 x 300/29	3 x 95/50	3 x 70 + E
1 x 25/9	1 x 400/29	3 x 120	3 x 95 + E
1 x 35/9	1 x 500/33	3 x 150	3 x 120 + E
1 x 50/10	1 x 630/33	3 x 185	3 x 150 + E
1 x 70/10		3 x 240	3 x 120/60*
1 x 95/12	3 x 16/16	3 x 300	3 x 150/75*
1 x 120/13	3 x 25/16		3 x 185/95*
1 x 150/16	3 x 35/16	3 x 25 + E	3 x 240/120*
1 x 185/16	3 x 50/25	3 x 35 + E	
1 x 240/18	3 x 70/35	3 x 50 + E	

RFOU [P104], RFCU 8.7/15 kV

Number of cores x conductor cross-section	mm²
	1 x 25/9
	1 x 35/9

Number of cores x conductor cross-section mm²
1 x 50/10
1 x 70/10
1 x 95/12
1 x 120/13
1 x 150/16
1 x 185/16
1 x 240/18
1 x 300/29
1 x 400/29

Number of cores x conductor cross-section mm²
1 x 500/33
1 x 630/33
3 x 25/16
3 x 35/16
3 x 50/25
3 x 70/35
3 x 95/50
3 x 120

Number of cores x conductor cross-section mm²
3 x 150
3 x 185
3 x 240
3 x 300
3 x 25 + E
3 x 35 + E
3 x 50 + E
3 x 70 + E

Number of cores x conductor cross-section mm²
3 x 95 ± E
3 x 120 +E
3 x 150 + E
3 x 120/60*
3 x 150/75*
3 x 185/95*
3 x 240/120*

RFOU [P112], RFCU 12/20 kV

Number of cores x conductor cross-section mm²
1 x 35/9
1 x 50/10
1 x 70/10
1 x 95/12
1 x 120/13
1 x 150/16
1 x 185/16
1 x 240/18
1 x 300/29

Number of cores x conductor cross-section mm²
3 x 35/16
3 x 50/25
3 x 70/35
3 x 95/50
3 x 120
3 x 150
3 x 185

Number of cores x conductor cross-section mm²
3 x 240
3 x 300
3 x 120/60*
3 x 150/75*
3 x 185/95*
3 x 240/120*
3 x 35 + 3E
3 x 50 + 3E

Number of cores x conductor cross-section mm²
3 x 70 + 3E
3 x 95 + 3E
3 x 120 +3E
3 x 150 + 3E
3 x 185 + 3E
3 x 240 + 3E
3 x 300 + 3E

*Double braided type

Application/Limitation

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 60092-354	2014-08	Single and three core power cables for extruded solid insulation for rated voltage 6kV up to 30kV	
IEC 60092-360	2014-04	Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation, telecommunication cables	
IEC 60332-1	2004-07	Test for vertical flame propagation for a single insulated wire or cable	
IEC 60332-3-22	2009-02	Flame retardance in bunch	Cat. A
IEC 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test.	Fluorine content <0.1%
IEC 60754-1/2	2011-11	Determination of the amount of halogen acid gas/ Determination of degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity	Low Halogen <0.5% Halogen free ≥4.3pH, ≤10µS/mm
IEC 61034-2	2013-06	Measurement of smoke density of cables	Low smoke

Standard	Release	General description	Limitation
		during under conditions	>60%
NEK 606	2016	Mud resistance	
CSA C22.2 No. 03	2009	4.12 Flexibility at any specified temperature	Cold bend: -40°C
CSA C22.2 No. 03	2009	4.13 Abnormal low temperature – impact	Cold impact: -35°C
UL1581	2008	UV resistance	

Marking of product

NEXANS KUKDONG - Type – Size – Sheath code - Voltage rating - IEC 60332-3 A – Year/Month - Length

- Type : RFOU [P102], RFOU [P103], RFOU [P104], RFOU [P112], RFCU
- Sheath code : no marking, E, M, H, H-M
- Voltage rating : 3.6/6 kV, 6/10 kV, 8.7/15 kV, 12/20 kV

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