Certificate no.:
TAE000052D

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Flexible cable

with type designation(s)
0.6/1kV MI-RFOU-FLEX, 1.8/3kV MI-RFOU-EMC(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:

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

Issued at **Busan** on **2025-09-18**
This Certificate is valid until **2030-09-17**.
DNV local unit: **Seoul, CMC Korea**

for **DNV**

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 USD 300 000.

Job ID: **262.1-039506-1**
Certificate no.: **TAE000052D**

Product description

Type designation : 0.6/1kV MI-RFOU-FLEX, 1.8/3kV MI-RFOU-EMC(FLEX)

Conductor :	Stranded tinned annealed copper wires, Class 5
Insulation :	EPR
Inner covering :	Halogen free compound
Armour	Tinned copper wire braid (Cu/PS tape for '-EMC' type)
Sheath :	SHF2

No. of cores x conductor cross-section			
0.6/1kV MI-RFOU-FLEX	1 x 70	2 x 70	3 x 70
1 x 1.5	1 x 95	2 x 95	3 x 95
1 x 2.5	1 x 120	2 x 120	3 x 120
1 x 4			
1 x 6	2 x 1.5	3 x 1.5	1.8/3kV MI-RFOU-EMC(FLEX)
1 x 10	2 x 2.5	3 x 2.5	3 x 25 + 3E
1 x 16	2 x 4	3 x 4	3 x 35 + 3E
1 x 25	2 x 6	3 x 6	3 x 50 + 3E
1 x 35	2 x 10	3 x 10	3 x 70 + 3E
1 x 50	2 x 16	3 x 16	3 x 95 + 3E
	2 x 25	3 x 25	3 x 120 + 3E
	2 x 35	3 x 35	
	2 x 50	3 x 50	

Declaration of properties

Bending	
Dynamic bending radius	6 x D (for 0.6/1kV MI-RFOU-FLEX) 8 x D (for 1.8/3kV MI-RFOU-EMC(FLEX))
Maximum speed	0.1 m/s
No. of bending cycles at +20°C	1,000
Suitable for torsion	Yes
Maximum torsion [Degrees/m]	40 degrees/m
No. of cycles with maximum torsion at +20°C	10,000
Suitable for combined bending and torsion	Yes
No. of cycles with maximum torsion at +20°C	1000
Resistance to tensile load (IEC 61238-1-1)	20 N/mm2
Crush resistant (UL 1277)	9.8 kN
Impact resistant at +20°C (CSA C22.2 No.38)	

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
DNV-CP-0417	2021	DNV Class programme – Flexible electric cables	Declaration of properties
IEC 60092-350	2020	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
IEC 60092-353	2016	Power cables for rated voltages 1kV and 3kV	
IEC 60092-360	2021	Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation, telecommunication cables	
IEC 60332-1	2015	Test for vertical flame propagation for a single insulated wire or cable - Apparatus	
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 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%

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 ≥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 >70%
UL 1581	2015	Sunlight resistance	720 hrs
CSA C22.2 No. 03	2019	5.11 Flexibility at any specified temperature	Cold bend: -40°C
CSA C22.2 No. 03	2019	5.12 Abnormal low temperature – impact	Cold impact: -35°C

Marking of product

Kukdong – MI-RFOU-FLEX – 0.6/1kV – Size – IEC 60332-3 Cat.A –Year of manufacture – Length
Kukdong – MI-RFOU-EMC(FLEX) – 1.8/3kV – Size – IEC 60332-3 Cat.A – Year of manufacture – 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.