

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Electric Power Cable**

with type designation(s)

TFCI, TFOI, TFBI, TFCI(C), TFOI(C), TFBI(C), TFOI-EMC, TFCI+, TFOI+, TFBI+, TFCI(C)+, TFOI(C)+, TFBI(C)+, TFOI-EMC+

Issued to

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

is found to comply with

DNV GL rules for classification – Ships, offshore units, and high speed and light craft
IEC 60092-353 (2016-09)**Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****Rated voltage (kV) 0.6/1, 1.8/3*)****Temp. class (°C) 90**Issued at **Busan** on **2018-02-12**This Certificate is valid until **2023-02-11**.for **DNV GL**DNV GL local station: **Seoul**Approval Engineer: **Eun Jin Lee**

Michael Jost Auf der Stroth
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.



Job Id: **262.1-026717-1**
Certificate No: **TAE00002MB**

Product description

Type : TFCI, TFOI, TFBI, TFCI(C), TFOI(C), TFBI(C), TFOI-EMC 0.6/1kV
TFCI+, TFOI+, TFBI+, TFCI(C)+, TFOI(C)+, TFBI(C)+, TFOI-EMC+ 0.6/1kV
TFOI-EMC 1.8/3kV *)
TFOI-EMC+ 1.8/3kV*)

Conductor :	Stranded plain or tinned copper, class2
Insulation :	XLPE
Collective screen :	Cu/PS tape with drain wire ((C) type only)
Inner covering :	Halogen free compound
Armour :	Metal wire braid (C : Galvanized steel, O : Copper, B : Bronze) Copper wire braid & Cu/PS tape ("EMC" only)
Outer sheath :	SHF1("I") or SHF1+("I+")

Type	Conductor cross section (mm ²)	No. of cores
TFCI, TFOI, TFBI, TFCI(C), TFOI(C), TFBI(C), TFCI+, TFOI+, TFBI+, TFCI(C)+, TFOI(C)+, TFBI(C)+	1.0~400	1C (except TFCI, TFCI(C), TFCI+, TFCI(C)+)
	1.0~300	2C, 3C, 4C
		2C+E, 3C+E, 4C+E
	1.0, 1.5, 2.5	5C~44C
TFOI-EMC, TFOI-EMC+ 0.6/1kV	2.5~300	3C
	2.5~10	3C + E
	16~300	3C + 3E
TFOI-EMC, TFOI-EMC+ 1.8/3kV*)	10~300	3C
	10	3C+E
	16~300	3C + 3E

Application/Limitation

The requirement 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 measure.

Type Approval documentation

Tests carried out

Standard	Issued	General description	Limitation
IEC 60092-350	2014	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 60332-1	2015	Test for vertical flame propagation for a single insulated wire or cable	
IEC 60332-3-22	2009	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 Cat.A
IEC 60754-1/-2	2011	Test on gases evolved during combustion of materials from cables - Determination of the amount of halogen acid gas - Determination of the 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 60684-2	2011	Flexible insulating sleeving - Part 2:	Fluorine content <0.1%

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		Methods of test.	
IEC 61034	2013	Measurement of smoke density of cables burning under defined conditions–Test apparatus, procedure and requirements	Low smoke >60%
UL 1581	2015	UV sunlight resistant	SHF1 (720hrs) SHF1+ (300hrs)
IEC 60092-360	2014	Oil resistant	Applicable for Advanced SHF1(SHF1+) : 4hrs at 70°C
CSA C22.2 No. 03	2009	5.11 Flexibility at any specified temperature	Cold bend: -40°C
CSA C22.2 No. 03	2009	5.12 Abnormal low temperature – impact	Cold impact: -35°C

Marking of product

0.6/1kV – Type designation – Size – Kukdong – IEC 60332 Cat.A – Year of manufacture – Length
*)1.8/3/1kV – TFOI-EMC – Size – Kukdong – IEC 60332 Cat.A – Year of manufacture – Length

Periodical assessment

The scope of the retention/renewal survey is to verify that the conditions stipulated for the Type Approval Certificate are complied with and that no alterations are made to the design and/or the material of product.

The main elements of the survey are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Check of the results from Production Sample Tests(PST) and Routine Tests(RT) (if not available, PSTand RT are to be carried out)
- Review of type approval documentation
- Review of possible changes in design, material 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