

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Low Voltage Cable**

with type designation(s)

FR-RCOP(IS) & FR-RCOP(IS)(C) & FR-RCOP(OS) & FR-RCOP(OS)(C) 250 V

Issued to

TMC Co., Ltd**Cheonan-si Chungcheongnam-do, Republic of Korea**

is found to comply with

Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards**Application :****Instrumentation and communication. Low temperature.****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

Voltage class (V)	250
Temp. class (°C)	90

This Certificate is valid until **2021-06-30**.Issued at **Busan** on **2016-07-01**DNV GL local station: **Seoul**for **DNV GL**Approval Engineer: **Hee Jin Song**

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Baeg Soon Choi
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.

Product description

Type: FR-RCOP(IS)&FR-RCOP(IS)(C)&FR-RCOP(OS)&FR-RCOP(OS)(C) 250V

Construction:
Conductors: Tinned stranded copper class 2
Core insulation: Mica tape + EPR
Screen: AL/PS tape + tinned copper drain wire
Inner Sheath: SE1
Metal covering: Plain copper wire braid
Outer Sheath : ST2

FR-RCOP(IS) & FR-RCOP(IS)(C)	FR-RCOP(OS) & FR-RCOP(OS)(C)
Number of cores x conductor cross-section	Number of cores x conductor cross-section
mm2	mm2
1 x 2 x 1,0	1 x 4 x 1,0
2 x 2 x 1,0	2 x 2 x 1,0
4 x 2 x 1,0	4 x 2 x 1,0
5 x 2 x 1,0	5 x 2 x 1,0
6 x 2 x 1,0	6 x 2 x 1,0
7 x 2 x 1,0	7 x 2 x 1,0
8 x 2 x 1,0	8 x 2 x 1,0
10 x 2 x 1,0	10 x 2 x 1,0
12 x 2 x 1,0	12 x 2 x 1,0
14 x 2 x 1,0	14 x 2 x 1,0
16 x 2 x 1,0	16 x 2 x 1,0
19 x 2 x 1,0	19 x 2 x 1,0
20 x 2 x 1,0	20 x 2 x 1,0
24 x 2 x 1,0	24 x 2 x 1,0
30 x 2 x 1,0	30 x 2 x 1,0
37 x 2 x 1,0	37 x 2 x 1,0
1 x 3 x 1,0	2 x 3 x 1,0
2 x 3 x 1,0	4 x 3 x 1,0
4 x 3 x 1,0	5 x 3 x 1,0
5 x 3 x 1,0	6 x 3 x 1,0
6 x 3 x 1,0	7 x 3 x 1,0
7 x 3 x 1,0	8 x 3 x 1,0
8 x 3 x 1,0	10 x 3 x 1,0
10 x 3 x 1,0	12 x 3 x 1,0
12 x 3 x 1,0	14 x 3 x 1,0
14 x 3 x 1,0	16 x 3 x 1,0
16 x 3 x 1,0	19 x 3 x 1,0
19 x 3 x 1,0	20 x 3 x 1,0
20 x 3 x 1,0	24 x 3 x 1,0
24 x 3 x 1,0	30 x 3 x 1,0
30 x 3 x 1,0	37 x 3 x 1,0
37 x 3 x 1,0	

Application/Limitation

This type of cable is fire resistant in accordance with IEC Publication 60331.

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	2014-08	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
IEC 60092-360	2014-04	Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables.	
IEC 60092-376	2003-05	Cables for control and instrumentation circuits 150/250V (300V)	
IEC 60331-1/-2	2009	Tests for electric cables under fire conditions - Circuit integrity - Part 1/2	
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	
IEC 60332-3-22	2009-02	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
CSA C22.2 No. 03/38		Cold bend(-40°C) / Cold impact(-35°C)	

Marking of product

Voltage rating – Type – Size – Application Standard – TMC – Year of manufacture – Length

Job Id: **262.1-004155-3**
Certificate No: **TAE000019S**

Periodical assessment

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

The main elements of the survey are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Production Sample Tests (PST) and Routines (RT) checked (if not available tests according to PST and RT to 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.

Survey to be performed at least every second year.

END OF CERTIFICATE