

**TYPE APPROVAL CERTIFICATE****This is to certify:****That the Low Voltage Cable**

with type designation(s)

**TFOI (I), TFOI (C), TFCI (C), TFOI (I&C)**

Issued to

**2 M Kablo Sanayi ve Ticaret A.S**  
**Istanbul, Turkey**

is found to comply with

**DNV GL rules for classification – Ships and offshore units****DNV GL class programme DNVGL-CP-0399 – Type approval – Electric cables****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

Type	Voltage class (V)	Temp. class (°C)
<b>TFOI (I)</b>	<b>250V</b>	<b>90</b>
<b>TFOI (C), TFCI (C)</b>	<b>250V</b>	<b>90</b>
<b>TFOI (I&amp;C)</b>	<b>250V</b>	<b>90</b>

This Certificate is valid until **2021-07-03**.Issued at **Høvik** on **2016-07-04**DNV GL local station: **Istanbul**Approval Engineer: **Georgy Abramenko**for **DNV GL**

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**Marit Laumann**  
**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: **262.1-017524-2**  
 Certificate No: **TAE000015K**

## Product description

TFOI (I) / TFOI (C), TFCI (C) / TFOI (I&C) 250 V

Construction:

Conductors:	Plain annealed stranded copper class 2 or tinned copper class 5
Core insulation:	XLPE
Individual separator and shielding (for (I) and (I&C) types):	Polyester tape + AL-PES tape (with tinned copper drain wire)
Overall separator and shielding (for (C) and (I&C) types):	Polyester tape + AL-PES tape (with tinned copper drain wire)
Inner sheath/ separator:	Halogen free filler or polyester tape
Screen/ Armour:	Copper wire braid and drain wire or galvanized steel braid
Outer sheath:	SHF1

	No of Elements:	Cross sectional area [mm <sup>2</sup> ]
Pairs	1 2 3 4 5 7 10 12 16 19 24 27 37	0,5 0,75 1 1,5 2,5
Triads	1 2 3 4 5 7 10	0,5 0,75 1 1,5 2,5
Quads	1 2 3 4 5 7	0,5 0,75 1 1,5 2,5

## 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

Data sheet: 2M Kablo datasheet ref. no. 0247-15, date 15.05.2015

Test reports: 2M Kablo test reports, ref. techdocs 24-32, received 03.06.2016.

## Tests carried out

Standard	Issued	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 150/250 V (300 V)	
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
IEC 60332-1-2	2006-07	Tests on electric cables under fire conditions. Test for vertical flame propagation for a single insulated wire or cable.	
IEC 60754-1	2011-11	Test on gases evolved during combustion of materials from cables – Determination of the amount of halogen acid gas	Low Halogen: <0,5% Halogen
IEC 60754-2	2011-11	Test on gases evolved during combustion of	Halogen free:

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Standard	Issued	General description	Limitation
		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	pH > 4,3 Conductivity < 10µS
IEC 61034-1/2	2013-07/09	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke

### Marking of product

2M Kablo IEC 60092-376 – TFOI (I) – 150/250 V – IEC 60332-3-22 – meters – year, or:  
2M Kablo IEC 60092-376 - TFOI (C) – 150/250 V – IEC 60332-3-22 – meters – year, or:  
2M Kablo IEC 60092-376 - TFCI (C) – 150/250 V – IEC 60332-3-22 – meters – year, or  
2M Kablo IEC 60092-376 - TFOI (I&C) – 150/250 V – IEC 60332-3-22 – meters – year.

### Periodical assessment

The scope of the Periodical assessment 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 Periodical 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
- Ensure traceability between manufacturer's product type marking and Type Approval Certificate.

Periodical assessment shall be performed at least every second year.

END OF CERTIFICATE