

# TYPE APPROVAL CERTIFICATE

**This is to certify:****That the High Voltage Cable**with type designation(s)  
**As listed on page 2**

Issued to

**TMC Co., Ltd**  
**CHUNGNAM, 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**  
**IEC60092-354 (2014-08)**  
**IEC 60092-360 (2014-04)**  
**IEC 60332-3-22 (2009-02)**  
**IEC 60754-1/2 (2011-11)**  
**IEC 61034-1/2 Ed. 3.1 (2013-06)****Application :****High voltage. Halogen free. Low smoke. Flame retardant Cat.A, Cold bend (-40 °C)/ Cold impact(-35°C)****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****Voltage (kV) 8.7/15, 6/10, 3.6/6**  
**Temp. class (°C) 90**This Certificate is valid until **2021-06-30**.Issued at **Busan** on **2016-07-01**DNV GL local station: **Seoul**Approval Engineer: **Jong Yun Kim**for **DNV GL**

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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 : FA-SPICBI & FA-SPIOI & FA-TPICI & FA-TPIOI & FA-TPIOI(VFD) 3,6/6 kV  
FA-SPICBI & FA-SPIOI & FA-TPICI & FA-TPIOI & FA-TPIOI(VFD) 6/10 kV  
FA-SPICBI & FA-SPIOI & FA-TPICI & FA-TPIOI 8,7/15 kV

Conductors: Tinned stranded copper class 2  
Core insulation: HEPR  
Inner sheath: SHF1  
Screen (Only VFD type) Cu/PS tape  
Metal covering: Braid of copper alloy wire(CB), Tinned annealed copper wire braid(O), Galvanized steel wire braid(C)  
Outer sheath: SHF1

### 3,6/6 kV

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| <b>FA-SPICBI<br/>&amp; FA-SPIOI</b>                                   |
| 1 x 10                                                                |
| 1 x 16                                                                |
| 1 x 25                                                                |
| 1 x 35                                                                |
| 1 x 50                                                                |
| 1 x 70                                                                |
| 1 x 95                                                                |
| 1 x 120                                                               |
| 1 x 150                                                               |
| 1 x 185                                                               |
| 1 x 240                                                               |
| 1 x 300                                                               |
| 1 x 400                                                               |

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| 1 x 500                                                               |
| 1 x 630                                                               |
| <b>FA-TPICI &amp;<br/>FA-TPIOI</b>                                    |
| 3 x 10                                                                |
| 3 x 16                                                                |
| 3 x 25                                                                |
| 3 x 35                                                                |
| 3 x 50                                                                |
| 3 x 70                                                                |
| 3 x 95                                                                |
| 3 x 120                                                               |
| 3 x 150                                                               |
| 3 x 185                                                               |

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| 3 x 240                                                               |
| <b>FA-<br/>TPIOI(VFD)</b>                                             |
| 3 x 25 + 3E                                                           |
| 3 x 35 + 3E                                                           |
| 3 x 50 + 3E                                                           |
| 3 x 70 + 3E                                                           |
| 3 x 95 + 3E                                                           |
| 3 x 120 + 3E                                                          |
| 3 x 150 + 3E                                                          |
| 3 x 185 + 3E                                                          |
| 3 x 240 + 3E                                                          |

### 6/10 kV

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| <b>FA-SPICBI<br/>&amp; FA-SPIOI</b>                                   |
| 1 x 16                                                                |
| 1 x 25                                                                |
| 1 x 35                                                                |
| 1 x 50                                                                |
| 1 x 70                                                                |
| 1 x 95                                                                |

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| 1 x 120                                                               |
| 1 x 150                                                               |
| 1 x 185                                                               |
| 1 x 240                                                               |
| 1 x 300                                                               |
| 1 x 400                                                               |
| 1 x 500                                                               |
| 1 x 630                                                               |

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| <b>FA-TPICI &amp;<br/>FA-TPIOI</b>                                    |
| 3 x 16                                                                |
| 3 x 25                                                                |
| 3 x 35                                                                |
| 3 x 50                                                                |
| 3 x 70                                                                |

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| 3 x 95                                                                |
| 3 x 120                                                               |
| 3 x 150                                                               |
| 3 x 185                                                               |
| 3 x 240                                                               |
|                                                                       |

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| <b>FA-<br/>TPIOI(VFD)</b>                                             |
| 3 x 25 + 3E                                                           |
| 3 x 35 + 3E                                                           |
| 3 x 50 + 3E                                                           |

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| 3 x 70 + 3E                                                           |
| 3 x 95 + 3E                                                           |
| 3 x 120 + 3E                                                          |
| 3 x 150 + 3E                                                          |
| 3 x 185 + 3E                                                          |
| 3 x 240 + 3E                                                          |

### 8,7/15 kV

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| <b>FA-SPICBI<br/>&amp; FA-SPIOI</b>                                   |
| 1 x 25                                                                |
| 1 x 35                                                                |
| 1 x 50                                                                |
| 1 x 70                                                                |
| 1 x 95                                                                |
| 1 x 120                                                               |
| 1 x 150                                                               |

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| 1 x 185                                                               |
| 1 x 240                                                               |
| 1 x 300                                                               |
| 1 x 400                                                               |
| 1 x 500                                                               |
| 1 x 630                                                               |
| <b>FA-TPICI &amp;<br/>FA-TPIOI</b>                                    |

| Number of<br>cores x<br>conductor<br>cross-section<br>mm <sup>2</sup> |
|-----------------------------------------------------------------------|
| 3 x 25                                                                |
| 3 x 35                                                                |
| 3 x 50                                                                |
| 3 x 70                                                                |
| 3 x 95                                                                |
| 3 x 120                                                               |
| 3 x 150                                                               |
| 3 x 185                                                               |
| 3 x 240                                                               |

### 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 measures.

### Type Approval documentation

## Tests carried out

| Standard       | Issued | Limitation                                        |
|----------------|--------|---------------------------------------------------|
| IEC 60092-350  | 2014   |                                                   |
| IEC 60092-354  | 2014   |                                                   |
| IEC 60092-360  | 2014   |                                                   |
| IEC 60332-3-22 | 2009   | Bunch test Cat.A                                  |
| IEC 60754-1    | 2011   | Low Halogen :<br>< 0.5% halogen                   |
| IEC 60754-2    | 2011   | Halogen free :<br>pH > 4.3<br>Conductivity < 10µS |
| IEC 60684-2    | 2003   | Max. 0,1 %                                        |
| IEC 61034-2    | 2005   | Low smoke<br>(Min.60%)                            |
| CSA C22.2      | 2010   | Cold bend (-40 °C)<br>Cold impact(-35°C)          |

## Marking of product

Voltage rating – Type designation – Size – IEC 60332 Cat.A – TMC – 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

Survey is to be performed at least every second year.

END OF CERTIFICATE