Certificate No:
**TAE00004XG**

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the Electric Power Cable**

with type designation(s)
**TIOI(c) or TICI(c) or TIOI(c)-FLEX or TICI(c)-FLEX 0,6/1kV**

Issued to
## Nexans (Suzhou) Cable Solutions Co.,Ltd
**Suzhou, Jiangsu**, **China**

is found to comply with
**DNV rules for classification – Ships, offshore units, and high speed and light craft**

## Application :

**General power and lighting. Control.**
**Products approved by this certificate are accepted for installation on all vessels classed by DNV.**

| | |
|---|---|
| **Rated voltage (kV)** | **0.6/1** |
| **Temp. class (°C)** | **90** |

Issued at **Høvik** on **2024-09-03**
This Certificate is valid until **2029-09-02**.
DNV local unit: **Shanghai**

Approval Engineer: **Ivar Bull**

for **DNV**

**Frederik Tore Elter**
**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.

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 300,000 USD.

## Product description

TIOI(C) or TICI(C) or TIOI(C)-FLEX or TICI(C) -FLEX 0,6/1kV
TIOI(I/C) or TICI(I/C) or TIOI(I/C)-FLEX or TICI(I/C) -FLEX 0,6/1kV
TIOI or TICI or TIOI-FLEX or TICI-FLEX 0,6/1kV
TIOI-EMC or TIOI-EMC FLEX 0,6/1Kv

| | |
|---|---|
| Conductor : | Stranded annealed tinned or bare copper conductor, Class 2 or Class 5 (-FLEX type) |
| Insulation : | XLPE (T) |
| Individual screen : | AL/PET or Cu/PET tape with tinned copper drain wire [(I) and (I/C) type] |
| Collective screen : | AL/PET or Cu/PET tape with tinned copper drain wire [(C) and (I/C) type] |
| Inner sheath : | SHF1 |
| EMC screen: | Cu/PET tape (only for EMC type) |
| Armour : | Copper wire braid (O) or Galvanized steel wire braid (C) |
| Outer sheath : | SHF1 |

| No of elements | **Conductor cross section ($mm^2$)** |
|---|---|
| 1C | 1.0~400 |
| 2C, 3C | 1.0~240 |
| 4C | 1.0~185 |
| 5C | 1.0~150 |
| 2C+E | 2x25+16E, 2x35+25E, 2x50+25E, 2x70+35E, 2x95+50E, 2x120+70E, 2x150+95E, 2x185+95E, 2x240+120E |
| 3C+E | 3x25+16E, 3x35+25E, 3x50+25E, 3x70+35E, 3x95+50E, 3x120+70E, 3x150+95E, 3x185+95E, 3x240+120E |
| 4C+E | 4x25+16E, 4x35+25E, 4x50+25E, 4x70+35E, 4x95+50E, 4x120+70E, 4x150+95E, 4x185+95E |
| 6, 7, 8, 9, 10, 12, 14, 16, 18, 19, 20, 24, 27, 30, 33, 37, 40, 44, 48 | 1.0, 1.5, 2.5 |
| EMC 1C | 10~300 |
| EMC 3C | 1.5~240 |
| EMC 3C+E | 3x2.5+2.5E, 3x4+4E, 3x6+6E, 3x10+10E |
| EMC 3C+3E | 3x1.5+3x0.5E, 3x2.5+3x0.5E, 3x4+3x1.5E, 3x6+3x2.5E, 3x10+3x4E, 3x16+3x6E, 3x25+3x6E, 3x35+3x10E, 3x50+3x10E, 3x70+3x16E, 3x95+3x16E, 3x95+3x25E, 3x120+3x25E, 3X150+3x35E, 3x185+3x35E, 3x240+3x50E |
| (C) or (I/C) 1pair | 1.0, 1.5, 2.5, 4 |
| (C) or (I/C) 2, 3, 4, 5, 7, 8, 10, 12 pairs | 1.0, 1.5, 2.5, 4, 6 |
| (C) or (I/C) 1triple | 1.0, 1.5, 2.5, 4 |

## 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** | **Release** | **General description** | **Limitation** |
|---|---|---|---|
| DNV CP-0399 | 2021-08 | Electric cables. | |
| IEC 60092-350 | 2020-01 | Electrical installations in ships - Part 350: General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications | |
| IEC 60092-360 | 2021-01 | Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables | |
| IEC 60092-353 | 2024-06 | Electrical installations in ships - Part 353: Power cables for rated voltages 1 kV and 3 kV | |

| Standard | Release | General description | Limitation |
|---|---|---|---|
| IEC 60332-3-22 | 2018-07 | 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 | Charred portion of sample does not exceed 2,5m above bottom edge of burner. |
| IEC 60754-1 | 2019-11 | Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content | Low Halogen:<br><0,5% Halogen |
| IEC 60754-2 | 2019-11 | Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity | Halogen free:<br>pH > 4,3<br>Conductivity < 10µS/mm |
| IEC 61034-1/2 | 2019-11 | Measurement of smoke density of cables burning under defined conditions –<br>Part 1: Test apparatus<br>Part 2: Test procedure and requirements | Low smoke<br>Light transmittance >60% |
| UL 1581 | 2020 | UV sunlight resistant | 720hrs |
| 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 |
| Nexans test specification based on test procedure IEC 60811-404 | 2012-03 | Optional Oil resistant test | IRM 902 4hrs at 70°C<br>Max change TS: +40%<br>Max change E@B: +40% |

## Marking of product

Voltage rating – Cable type – Size – Nexans 488 – IEC 60332-3-22 – YYYY – MM – meter mark

## 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, PST and 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