Certificate No:
**TAE00004SU**

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the Category cables**

with type designation(s)
**CAT5E SF/UTP, CAT5E S/FTP, CAT6A U/FTP, CAT6A F/FTP, CAT6A S/FTP, CAT7 S/FTP, CAT7A S/FTP**

Issued to
**Zhejiang Zhaolong Interconnect Technology Co.,Ltd**
**Deqing, Zhejiang, China**

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

## Application :

**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.**

Issued at **Høvik** on **2023-09-08**
This Certificate is valid until **2028-09-07**.
DNV local unit: **Shanghai**

Approval Engineer: **Carsten Hunsalz**

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

Category cable CAT5E SF/UTP, CAT5E S/FTP, CAT6A U/FTP, CAT6A F/FTP, CAT6A S/FTP, CAT7 S/FTP, CAT7A S/FTP

| | |
|---|---|
| Conductor | Stranded Bare Copper, CAT5E S/FTP<br>Solid or Stranded Bare Copper, CAT6A S/FTP, CAT7 S/FTP, CAT7A S/FTP<br>Solid Bare Copper, CAT5E SF/UTP, CAT6A U/FTP, CAT6A F/FTP |
| Insulation | Foam PE,<br>HDPE (CAT5E SF/UTP) |
| Cabling / Individual screen | Twisted pairs with Al-/polyester tape<br>without (SF/UTP types) |
| Overall screen | Tinned copper wire braid,<br>Al-/polyester tape (F/FTP types)<br>without (U/FTP types)<br>Al-/polyester tape + Tinned copper wire braid (SF/UTP types) |
| Outer / Inner Sheath | SHF1 |
| Metallic covering | Galvanized steel wire, braiding (Armored types) |
| Outer / Inner Sheath | SHF1 (Armored types) |

Marine Cable CAT5E SHF1 SF/UTP / Marine Armored Cable CAT5E SHF1 SF/UTP

| Number of cores x conductor cross-section | Overall diameter |
|---|---|
| 4 x 2 x 24 AWG/1 | OD:7.5±0.4mm |
| 4 x 2 x 24 AWG/1 | OD:10.5±0.5mm |

Marine Cable CAT5E SHF1 S/FTP / Marine Armored Cable CAT5E SHF1 S/FTP

| Number of cores x conductor cross-section | Overall diameter |
|---|---|
| 4 x 2 x 23 AWG/7 | OD:9±0.5mm |
| 4 x 2 x 23 AWG/7 | OD:12.2±0.8mm |

Marine Cable CAT6A SHF1 U/FTP / Marine Armored Cable CAT6A SHF1 U/FTP

| Number of cores x conductor cross-section | Overall diameter |
|---|---|
| 4 x 2 x 23 AWG/1 | OD:8.1±0.5mm |
| 4 x 2 x 23 AWG/1 | OD:11.3±0.6mm |

Marine Cable CAT6A SHF1 F/FTP / Marine Armored Cable CAT6A SHF1 F/FTP

| Number of cores x conductor cross-section | Overall diameter |
|---|---|
| 4 x 2 x 23 AWG/1 | OD:8.2±0.5mm |
| 4 x 2 x 23 AWG/1 | OD:11.2±0.6mm |

Marine Cable CAT6A SHF1 S/FTP / Marine Armored Cable CAT6A SHF1 S/FTP

| Number of cores x conductor cross-section | Overall diameter |
|---|---|
| 4 x 2 x 23 AWG/1 | OD:8.3±0.5mm |
| 4 x 2 x 23 AWG/1 | OD:11.3±0.6mm |

Marine Cable CAT6A SHF1 S/FTP / Marine Armored Cable CAT6A SHF1 S/FTP

| Number of cores x conductor cross-section | Overall diameter |
|---|---|
| 4 x 2 x 23 AWG/7 | OD:9.0±0.5mm |
| 4 x 2 x 23 AWG/7 | OD:12.2±0.8mm |

Marine Cable CAT7 SHF1 S/FTP / Marine Armored Cable CAT7 SHF1 S/FTP

| Number of cores x conductor cross-section | Overall diameter |
|---|---|
| 4 x 2 x 23 AWG/1 | OD:8.3±0.5mm |
| 4 x 2 x 23 AWG/1 | OD:11.3±0.6mm |

Marine Cable CAT7 SHF1 S/FTP / Marine Armored Cable CAT7 SHF1 S/FTP

| Number of cores x conductor cross-section | Overall diameter |
|---|---|
| 4 x 2 x 23 AWG/7 | OD:9.0±0.5mm |
| 4 x 2 x 23 AWG/7 | OD:12.2±0.8mm |

Marine Cable CAT7A SHF1 S/FTP / Marine Armored Cable CAT7A SHF1 S/FTP

| Number of cores x conductor cross-section | Overall diameter |
|---|---|
| 4 x 2 x 23 AWG/1 | OD:8.3±0.5mm |
| 4 x 2 x 23 AWG/1 | OD:11.3±0.6mm |

Marine Cable CAT7A SHF1 S/FTP / Marine Armored Cable CAT7A SHF1 S/FTP

| Number of cores x conductor cross-section | Overall diameter |
|---|---|
| 4 x 2 x 23 AWG/7 | OD:9.0±0.5mm |
| 4 x 2 x 23 AWG/7 | OD:12.2±0.8mm |

## 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.

Due to the low cross section of these cables, extra precautions shall be made during installation. In order to achieve a transmission link compliant with Category 5E, 6A, 7 and 7A, cables shall be installed with suitable termination equipment according to manufacturer's recommendations.

Horizontal cables Cat. 5E, 6A, 7 and 7A
Flame retardant Cat. A and Cat. C. Halogen free. Low smoke.

Temperature window:
Operation: -40°C to +80°C
Installation: -20°C to +60°C

## Type Approval documentation

## Tests carried out

| Standard | Release | General description | Limitation |
|---|---|---|---|
| DNV-CP-0403 | 2021-09 | DNV Type approval program for Data communication cables – category cables | Ref. IEC 61156-5 standard Category 5e, 6, 6A, 7, 7A |
| IEC 61156-5 | 2020-04 | Multicore and symmetrical pair/quad cables for digital communications – Part 5: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Horizontal wiring – Sectional specification | |
| IEC 60332-1-2 | 2015-07 | Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable –Procedure for 1 kW pre-mixed flame | |
| IEC 60332-3-24 | 2018-07 | Tests on electric and optical fibre cables under fire conditions – Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category C | Charred portion of sample does not exceed 2,5m above bottom edge of burner. |

| 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 60684-2 | 2011-08 | Clause 45.2 Methods of determination of low levels of fluorine | Fluorine content < 0,1% |
| IEC 61034-1/2 | 2019-11 | Measurement of smoke density of cables burning under defined conditions –<br>Test apparatus, procedure and requirements | Low smoke<br>Light transmittance >60% |
| UL 1581 | 2020-02 | UL Standard for Safety<br>Reference Standard for Electrical Wires, Cables, and Flexible Cords | SHF1,UV resistant acc. UL 1581 Cl.1200<br>min. 85% after 300h<br>in the tensile<br>strength and elongation |
| IEC 60811-404 | 2021-01 | Electric and optical fibre cables – Test methods for non-metallic materials –<br>Part 404: Miscellaneous tests – Mineral oil immersion tests for sheaths | SHF1 aging in IRM 902<br>70°C 4h<br><br>tensile strength and elongation max +- 40% |

## Marking of product

ZHAOLONG□LONGTRONIC®□Armored□MARINE□Cable□Cable model□Cable shielding type and size□Jacket material□IEC□60332-3-22□IEC□60332-3-24□XXXXXX□****m

Notice: □ represent Space; Armored only for armored cable types; XXXXXX represent batch number; ****m represent meter mark

Example:

ZHAOLONG LONGTRONIC® Armored MARINE Cable CAT7A S/FTP 4x2x23AWG/1 SHF1 IEC 60332-3-22 IEC 60332-3-24 XXXXXX ****m

## Periodical assessment

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

The main elements of the assessment are:

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

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