Certificate No:
TAE00004C6

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Electric Power Cable

with type designation(s)
AMP Shore Connection Cable 3,6/6kV,
AMP Shore Connection Cable 6/10kV,
AMP Shore Connection Cable 8,7/15kV,
AMP Shore Connection Cable 12/20kV,
AMP Shore Connection Cable 18/30kV

Issued to
Zhongtian Technology Industrial Wire & Cable System Co.,Ltd.
Nantong, **China**

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

Application :

High Voltage Shore Connection cable for HVSC systems.
Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Type	Rated voltage (kV)	Temp. class (°C)
AMP Shore Connection Cable 3,6/6kV	3,6/6	90
AMP Shore Connection Cable 6/10kV	6/10	90
AMP Shore Connection Cable 8,7/15kV	8,7/15	90
AMP Shore Connection Cable 12/20kV	12/20	90
AMP Shore Connection Cable 18/30kV	18/30	90

Issued at **Høvik** on **2021-09-29**
This Certificate is valid until **2026-09-28**.
DNV local station: **Nantong**

Approval Engineer: **Ivar Bull**

for **DNV**

Marta Alonso Pontes
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

AMP Shore Connection Cable 3,6/6kV,
AMP Shore Connection Cable 6/10kV,
AMP Shore Connection Cable 8,7/15kV,
AMP Shore Connection Cable 12/20kV,
AMP Shore Connection Cable 18/30kV

Please note that IEC/IEEE 80005.1 (2019) states **6/10(12) kV as standard voltage** for ship to shore connection cables.

Construction:

Power conductors:	Plain or tinned copper Class 5
Conductor screen	Semi conducting tape and compound
Core insulation:	EPR
Insulation screen:	Semi conducting compound
Fillers	Central filler
Earth cores (1,2 or 3)	Plain or tinned copper Class 5
Conductor screen (if any)	Semi conducting tape and compound
Pilot element (150/250V)	Plain or tinned copper Class 5 sizes 1,5-6mm^2
Core Insulation	EPR
Optical fibers	Fibre-elements(optional) 6 optical fibres 62.5/125 in tube
Screen around pilot and fibre elements	Copper wire braid
Inner sheath:	Thermoplastic compound
Strength layer (optional)	Ripcord braid
Outer sheath:	Polyurethane TPU according to EN-50363-10-2

Variants	Cross section area Phase conductor	Cross sectional area Earth conductor
3xPhase conductors / 1x Earth conductor	25	16
3xPhase conductors / 1x Earth conductor	35	16
3xPhase conductors / 1x Earth conductor	50 - 240	25 -120
3xPhase conductors / 2x Earth conductors	25	16 (2x8)
3xPhase conductors / 2x Earth conductors	35	16 (2x8)
3xPhase conductors / 2x Earth conductors	50 - 240	25 -120 (2x 12-70)
3xPhase conductors / 3x Earth conductors	25	16 (3x6)
3xPhase conductors / 3x Earth conductors	35	16 (3x6)
3xPhase conductors / 3x Earth conductors	50 - 240	25 -120 (3x 8-50)

Application/Limitation

Cable is tested according to IEC/IEEE 80005.1 (2019).
Minimum dynamic bending radius: 10x OD (OD = cable outer diameter)
Conductor resistance after dynamic test is not measured ref. DNV-CP-0417 Flexible cables.
Attenuation of optic fibres before and after dynamic test are not measured.
Cable is not tested for diesel oil IRM903.

Type Approval documentation

Tests carried out

Type tests: see test plan.
Dynamic tests: 5000 dynamic cycles at room temperature with bending diameter 10D where D is outer diameter of cable. Tension 1700kg.
Acceptance criteria:

- Max 20% broken conductor strands.
- No broken optical fibres.
- PD at 1.73U0 after test shall be maximum 10pC.

TPU sheath is tested for IRM 902 mineral oil 168h @100C. TS: 22,8 N/mm2. Var max ±30%. E@B: 300% Var max ±30%.
Flame retardant IEC 60332-1-2.
Sunlight resistance test 720h, ISO 4892-2:2013, test method A.
Abrasion test on outer sheath, ISO 4649:2010, test method A.

Routine tests:

- Conductor resistance
- Copper braid resistance
- Insulation resistance
- HV test 5 minutes @3,5 x U_0

Marking of product

ZTT AMP Shore Connection Cable – Size - Voltage [kV] - IEC/IEEE 80005.1 (2019) - IEC 60332-1 - <Lot N°> - Minimum bend radius 10 x OD - SHORE CONNECTION CABLE. DANGER! ⚡ HIGH VOLTAGE

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) 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
- 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