Certificate no.:
TAE0000541

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Category cables

with type designation(s)
FIRE RESISTANT CAT5E F/UTP, CAT6 F/UTP, CAT6A S/FTP, CAT7 S/FTP, CAT7A S/FTP cables

issued to
Yanger (Shanghai) Marine Technology Co., Ltd
SHANGHAI, 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 **Hamburg** on **2025-09-17**
This Certificate is valid until **2030-09-16**.
DNV local unit: **Shanghai**

for **DNV**

Approval Engineer: **Carsten Hunsalz**

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 USD 300 000.

Product description

CAT5E and CAT6 4x2x24/1 AWG Solid F/UTP LSZH Fire Resistant
CAT5E and CAT6 4x2x24/1 AWG Solid F/UTP LSZH ARMOUR Fire Resistant

Conductor:	Solid, annealed and bare copper
Insulation:	HDPE + Mica Tape
Cabling:	Twisted pairs
Overall screen:	Aluminum foil-polyester tape
Outer/Inner Sheath:	SHF1 or SHF2 or SHF2 MUD
Armour (optional):	GSWB, TCWB
Outer Sheath (optional):	SHF1 or SHF2 or SHF2 MUD

Number of cores x conductor cross-section	Overall diameter	With optional armour + outer sheath
	mm	mm
4 x 2 x 24/1 AWG	OD: 7.8 ±0.5mm CAT5E	OD: 11.2 ±1mm CAT5E
4 x 2 x 24/1 AWG	OD: 8.2 ±0.5mm CAT6	OD: 11.4 ±1mm CAT6

CAT5E 4x2x24/1 AWG

Frequency (MHz):	1	4	8	10	16	20	25	31.25	62.5	100
Attenuation dB/100m (Max.)	—	4.1	5.8	6.5	8.2	9.3	10.4	11.7	17	22
NEXT dB (Min.)	65.3	56.3	51.8	50.3	47.2	45.8	44.3	42.9	38.4	35.3
PS- NEXT (Min.)	62.3	53.3	48.8	47.3	44.2	42.8	41.3	39.9	35.4	32.3
ELFEXT dB (Min.)	64	52	45.9	44	39.9	38	36	34.1	28.1	24
Return Loss dB (Min.)	20	23	24.5	25	25	25	24.3	23.6	21.5	20.1
PSELFEXT dB(Min.)	61	49	42.9	41	36.9	35	33	31.1	25.1	21

CAT6 4x2x24/1 AWG

Frequency (MHz):	1	4	10	16	20	31,25	62,5	100	200	250
Attenuation dB/100m (Max.)	—	3.8	5.9	7.5	8.4	10.5	15.0	19.1	27.6	31.1
NEXT dB (Min.)	74.3	65.3	59.3	56.2	54.8	51.9	47.4	44.3	39.8	38.3
PS- NEXT (Min.)	72.3	63.3	57.3	54.2	52.8	49.9	45.4	42.3	37.8	36.3
ELFEXT dB (Min.)	67.8	55.8	47.8	43.7	41.8	37.9	31.9	27.8	21.8	19.8
Return Loss dB (Min.)	20.0	23.0	25.0	25.0	25.0	23.6	21.5	20.1	18.0	17.3
PSELFEXT (Min.)	64.8	52.8	44.8	40.7	38.8	34.9	28.9	24.8	18.8	16.8

CAT6A 4x2x23/1 AWG Solid S/FTP LSZH Fire Resistant
CAT6A 4x2x23/1 AWG Solid S/FTP LSZH ARMOUR Fire Resistant

Conductor:	Solid, annealed and bare copper 4x2x23/1 AWG
Insulation:	PE-foam / skin-PE + Mica Tape
Cabling / Individual screen:	Twisted pairs with aluminum foil-polyester tape
Overall screen:	Solid tinned copper braid
Outer/Inner Sheath:	SHF1 or SHF2 or SHF2 MUD
Armour (optional):	GSWB, TCWB
Outer Sheath (optional):	SHF1 or SHF2 or SHF2 MUD

Number of cores x conductor cross-section	Overall diameter	With optional armour + outer sheath
	mm	mm
4 x 2 x 23/1 AWG	OD: .9.0 ±0.5mm CAT6A	OD: 13.2 ±1.5mm CAT6A

CAT6A 4x2x23/1 AWG

Frequency (MHz):	1	4	10	16	20	31.25	62,5	100	200	250	400	500
Attenuation dB/100m (Max.)	—	3.8	5.9	7.5	8.4	10.5	15.0	19.1	27.6	31.1	40.1	45.3
NEXT dB (Min.)	74.3	65.3	59.3	56.2	54.8	51.9	47.4	44.3	39.8	38.3	35.3	33.8
PS- NEXT (Min.)	72.3	63.3	57.3	54.2	52.8	49.9	45.4	42.3	37.8	36.3	33.3	31.8
ELFEXT dB (Min.)	67.8	55.8	47.8	43.7	41.8	37.9	31.9	27.8	21.8	19.8	15.8	13.8
Return Loss dB (Min.)	20.0	23.0	25.0	25.0	25.0	23.6	21.5	20.1	18.0	17.3	15.9	15.2
PSELFEXT (Min.)	64.8	52.8	44.8	40.7	38.8	34.9	28.9	24.8	18.8	16.8	12.8	10.8

CAT7 4x2x23/1 AWG Solid S/FTP LSZH Fire Resistant
CAT7 4x2x23/1 AWG solid S/FTP LSZH ARMOUR Fire Resistant

Conductor:	Solid, annealed and bare copper 4x2x23/1 AWG
Insulation:	PE-foam / skin-PE + Mica Tape
Cabling / Individual screen:	Twisted pairs with aluminum foil-polyester tape
Overall screen:	Solid tinned copper braid
Outer/Inner Sheath:	SHF1 or SHF2 or SHF2 MUD
Armour (optional):	GSWB, TCWB
Outer Sheath (optional):	SHF1 or SHF2 or SHF2 MUD

Number of cores x conductor cross-section	Overall diameter	With optional armour + outer sheath
	mm	mm
4 x 2 x 23/1 AWG	OD: .9.0 ±0.5mm CAT7	OD: 13.2 ±1.5mm CAT7

CAT7 4x2x23/1 AWG

Frequency (MHz):	1	4	10	16	20	31,25	62,5	100	200	250	300	600
Attenuation dB/100m (Max.)	_	3.7	5.9	7.4	8.3	10.4	14.9	19.0	27.5	31.0	34.2	50.1
NEXT dB (Min.)	78.0	78.0	78.0	78.0	78.0	78.0	75.5	72.4	67.9	66.4	65.2	60.7
PS- NEXT (Min.)	75.0	75.0	75.0	75.0	75.0	75.0	72.5	69.4	64.9	63.4	62.2	57.7
ELFEXT dB (Min.)	78.0	78.0	75.3	71.2	69.3	65.4	59.4	55.3	49.3	47.3	45.8	38.4
Return Loss dB (Min.)	20.0	23.0	25.0	25.0	25.0	23.6	21.5	20.1	18.0	17.3	17.3	17.3
PSELFEXT (Min.)	75.0	75	72.3	68.2	66.3	62.4	56.4	52.3	46.3	44.3	42.8	35.4

CAT7A 4x2x23/1 AWG Solid S/FTP LSZH Fire Resistant
CAT7A 4x2x23/1 AWG solid S/FTP LSZH ARMOUR Fire Resistant

Conductor:	Solid, annealed and bare copper 4x2x23/1 AWG
Insulation:	PE-foam + Mica Tape
Cabling / Individual screen:	Twisted pairs with aluminum foil-polyester tape
Overall screen:	Solid tinned copper braid
Outer/Inner Sheath:	SHF1 or SHF2 or SHF2 MUD
Armour (optional):	GSWB, TCWB
Outer Sheath (optional):	SHF1 or SHF2 or SHF2 MUD

Number of cores x conductor cross-section	Overall diameter	With optional armour + outer sheath
	mm	mm
4 x 2 x 23/1 AWG	OD: .9.4 ±0.5mm CAT7A	OD: 13.6 ±1.5mm CAT7A

CAT7A 4x2x23/1 AWG

Frequency (MHz):	1	4	10	16	20	31.25	62.5	100	200	250	300	500	600	1000
Attenuation dB/100m (Max.)	_	3.7	5.8	7.3	8.2	10.3	14.6	18.5	26.5	29.7	32.7	42.8	47.1	61.9
NEXT dB (Min.)	78.0	78.0	78.0	78.0	78.0	78.0	78.0	75.4	70.9	69.4	68.2	64.9	63.7	60.4
PS- NEXT (Min.)	75.0	75.0	75.0	75.0	75.0	75.0	75.0	72.4	67.9	66.4	65.2	61.9	60.7	57.4
Return Loss dB (Min.)	20.0	23.0	25.0	25.0	25.0	23.6	21.5	20.1	18.0	17.3	17.3	17.3	17.3	15.1

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.

This type of cable is fire resistant in accordance with IEC Publication 60331.

Fire resistant test carried out according to:

IEC 60331-2, 830°C, 180 min., with insulation and functional integrity of Ethernet (category) cables acc. to IEC 60092-379.

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 CAT5E, CAT6, CAT6A, CAT7, CAT7A, cables shall be installed with suitable termination equipment according to manufacturer's recommendations.

Horizontal cables CAT5E F/UTP, CAT6 F/UTP, CAT6A S/FTP, CAT7 S/FTP, CAT7A S/FTP
Flame retardant Cat. A. Halogen free. Low smoke.

Install at:	0°C to +60 °C
Operate at:	-40°C to +75 °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	

Standard	Release	General description	Limitation
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 60332-3-22	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 60331-2	2018-03	Tests for electric cables under fire conditions - Circuit integrity - Part 2: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV	830°C, 180 min. With insulation and functional integrity of Ethernet (category) cables acc. to IEC 60092-379
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: <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: pH > 4,3 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 – Test apparatus, procedure and requirements	Low smoke Light transmittance >60%
UL 1581	2020-02	UL Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords	SHF1, SHF2, SHF-MUD UV resistant acc. UL 1581 Cl.1200 min. 85% after 300h in the tensile strength and elongation
NEK TS 606	2022	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	SHF2-MUD resistance test: IRM902+IRM903 100°C 7d. Calcium Bromide 70°C 56d. Oil based mud: EDC 95/11 70°C 56d
IEC 60092-350	2020-01	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	partly
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.	For SHF1, SHF2 and SHF2 MUD sheath

Marking of product

Example:

YANGER® FIRE RESISTANT CAT5E 4x2x24/1 AWG Solid F/UTP LSZH-SHF1 IEC 60332-3-22 - IEC 60331-2 – IEC 61156-5 <batch no.> <meter marking>

Place of Production

DNV id: 10781141

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