Certificate No:
TAE00004RU

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Category cables

with type designation(s)
CAT5E & CAT6A & CAT7 & CAT7A S/FTP

Issued to
Hyman Marine & Offshore 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 **Høvik** on **2023-04-25**
This Certificate is valid until **2028-04-24**.
DNV local unit: **Shanghai**

for **DNV**

Approval Engineer: **Carsten Hunsalz**

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 & CAT6A & CAT7 & CAT7A S/FTP

Conductor	Stranded Bare Copper，AWG 24 (CAT5E) Solid or Stranded Bare Copper，AWG 23 (CAT6A & CAT7) Solid Bare Copper，AWG 23 (CAT7A)
Insulation	Foam PE
Cabling / Individual screen	Twisted pairs with Al-/polyester tape 100% coverage
Overall screen	Tinned copper wire braid (≥ 55 % coverage)
Inner-sheath (optional)	SHF1 or SHF2
Metallic covering (optional)	Tinned copper wire or galvanized steel wire, braiding density ≥ 90%
Outer Sheath	SHF1 or SHF2 or SHF2 MUD

Cat 5E

Number of cores x conductor cross-section	Overall diameter
	mm
4 x 2 x 24 AWG	OD:8.5±0.5mm OD.:11.3±1.0mm with option

Freq-MHz	Attenuation dB/100m	NEXT dB/100m	RL dB/100m	PS NEXT dB/100m	PS ELFEXT dB/100m	ELFEXT dB/100m	Delay ns/100m	Skew ns/100m
4	4.1	56.3	23.0	53.3	49.0	52.0	552	≤45
8	5.8	51.8	24.5	48.8	42.9	45.9	547	
10	6.5	50.3	25.0	47.3	41.0	44.0	545	
16	8.3	47.2	25.0	44.2	36.9	39.9	543	
20	9.3	45.8	25.0	42.8	35.0	38.0	542	
25	10.4	44.3	24.3	41.3	33.0	36.0	541	
31.25	11.7	42.9	23.6	39.9	31.1	34.1	540	
62.5	17.0	38.4	21.5	35.4	25.1	28.1	539	
100	22.0	35.3	20.1	32.3	21.0	24.0	538	

Cat 6A

Number of cores x conductor cross-section	Overall diameter
	mm
4 x 2 x 23 AWG	OD:8.6±0.5mm OD.:11.4±1.0mm with option

Freq-MHz	Attenuation dB/100m	NEXT dB/100	RL dB/100	PS NEXT dB/100m	PS ELFEXT dB/100m	ELFEXT dB/100m	Delay ns/100m	Skew ns/100m
4	3.8	66.3	23.0	63.3	53.0	56.0	552	
8	5.3	61.8	24.5	58.8	46.9	49.9	547	
10	5.9	60.3	25.0	57.3	45.0	48.0	545	
16	7.5	57.2	25.0	54.2	40.9	43.9	543	
20	8.4	55.8	25.0	52.8	39.0	42.0	542	
25	9.4	54.3	24.3	51.3	37.0	40.0	541	
31.25	10.5	52.9	23.6	49.9	35.1	38.1	540	
62.5	15.0	48.4	21.5	45.4	29.1	32.1	539	≤45
100	19.1	45.3	20.1	42.3	25.0	28.0	538	
200	27.6	40.8	18.0	37.8	19.0	22.0	537	
250	31.1	39.3	17.3	36.3	17.0	20.0	536	
300	34.3	38.1	17.3	35.1	15.5	18.5	536	
400	40.1	36.3	17.3	33.3	13.0	16.0	536	
500	45.3	34.8	17.3	31.8	11.0	14.0	536	

Cat 7

Number of cores x conductor cross-section	Overall diameter
	mm
4 x 2 x 23 AWG	OD:8.6±0.5mm OD.:11.4±1.0mm with option

Freq-MHz	Attenuation dB/100m	NEXT dB/100m	RL dB/100 m	PS NEXT dB/100m	PS ELFEXT dB/100m	ELFEXT dB/100m	Delay ns/100m	Skew ns/100 m
4	3.7	78.0	23.0	75.0	75.0	78.0	552	
10	5.9	78.0	25.0	75.0	72.3	75.3	545	
16	7.4	78.0	25.0	75.0	68.2	71.2	543	
31.25	10.4	78.0	23.6	75.0	62.4	65.4	540	
62.5	14.9	75.5	21.5	72.5	56.4	59.4	539	
100	19.0	72.4	20.1	69.4	52.3	55.3	538	
200	27.5	67.9	18.0	64.9	46.3	49.3	537	≤25
250	31.0	66.4	17.3	63.4	44.3	47.3	536	
300	34.2	65.2	17.3	62.2	42.8	45.8	536	
400	40.0	63.4	17.3	60.4	40.3	43.3	536	
500	45.3	61.9	17.3	58.9	38.3	41.3	536	
600	50.1	60.7	17.3	57.7	36.7	39.7	535	

Cat 7A

Number of cores x conductor cross-section	Overall diameter
	mm
4 x 2 x 23 AWG	OD:8.6±0.5mm OD.:11.4±1.0mm with option

Freq-MHz	Attenuation dB/100m	NEXT dB/100m	RL dB/100 m	PS NEXT dB/100m	PS ELFEXT dB/100m	ELFEXT dB/100m	Delay ns/100m	Skew ns/100 m
4	3.7	78.0	23.0	75.0	75.0	78.0	552	
8	5.2	78.0	24.5	75.0	74.2	77.2	547	
10	5.8	78.0	25.0	75.0	72.3	75.3	545	
16	7.3	78.0	25.0	75.0	68.2	71.2	543	
20	8.2	78.0	25.0	75.0	66.3	69.3	542	
25	9.2	78.0	24.3	75.0	64.3	67.3	541	
31.25	10.3	78.0	23.6	75.0	62.4	65.4	540	≤25
62.5	14.6	78.0	21.5	75.0	56.4	59.4	539	
100	18.5	75.4	20.1	72.4	52.3	55.3	538	
200	26.5	70.9	18.0	67.9	46.3	49.3	537	
250	29.7	69.4	17.3	66.4	44.3	47.3	536	
300	32.7	68.2	17.3	65.2	42.8	45.8	536	
400	38.0	66.4	17.3	63.4	40.3	43.3	536	
500	42.8	64.9	17.3	61.9	38.3	41.3	536	
600	47.1	63.7	17.3	60.7	36.7	39.7	535	
1000	61.9	60.4	15.1	57.4	32.3	35.3	535	

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 5, 6 and 7, cables shall be installed with suitable termination equipment according to manufacturer's recommendations.

Horizontal cables Cat. 5E, 6A, 7 and 7A
Flame retardant in bunch; cat A. Low smoke
Outer sheath SHF1 or SHF2 or SHF2 MUD according to NEK TS 606

Temperature window:
Operation : -40°C to +85°C
Installation : -15°C to +50°C

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
DNVGL-CP-0403	2015-12	DNV GL Type approval program for Data communication cables – category cables	Ref. IEC 61156-5 standard Category 5E, 6A, 7 and 7A.
IEC 61156-5	2009-05	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	Reference to requirement for category cable: 5E (100MHz), 6A (500MHz), 7 (600MHz), 7 (1000MHz),
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 60754-1	2011-11	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	2011-11	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 61034-1/2	2013-06	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance >60%
NEK TS 606	2016	Cables for offshore installations.	Mud resistance test for cable types with SHF2 MUD sheath: IRM 902 + 903 100°C 7d. Calcium Bromide 70°C 56d. EDC 95-11 70°C 56d.

Marking of product

Example:

Forller Cable Cat.7 S/FTP 4×2×23/1 AWG Solid IEC60332-3-22 SHF1 or SHF2 or SHF2 MUD DNV GL \<BATCH NO.> \<Meter Marking>

Place of Production

DNV id: 10129143

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