



Certificate No:
TAE00004MT

TYPE APPROVAL CERTIFICATE

This is to certify:

That the **Category cables**

with type designation(s)
S/FTP Cat 5E, Cat 6, Cat 6A, Cat 7 cables

Issued to

LS Cable & System Vietnam
Dong Nai, Viet Nam

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 **2023-01-11**

This Certificate is valid until **2028-01-10**.

for **DNV**

DNV local unit: **Vung Tau Station**

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.



Form code: TA 251

Revision: 2022-12

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Product description

Category cables S/FTP Cat 5E, Cat 6, Cat 6A, Cat 7

Conductor:	Solid, annealed and bare copper with a diameter of AWG 23
Insulation:	Skin-foam-skin 3 layers with polyethylene HDPE
Cabling / Individual screen:	Twisted pairs with Al-/polyester tape
Overall screen:	Tinned copper wire braid
Outer Sheath:	SHF1

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

S/FTP Cat 5E

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

S/FTP Cat 6

Freq. (MHz)	Attenuation (dB/100m) Max.	NEXT (dB/100m) Min.	PS NEXT (dB/100m) Min.	ACRF (dB/100m) Min.	PS ACRF (dB/100m) Min.	RL (dB/100m) Min.	P.Delay (ns/100m) Max.
4	3.8	66.3	63.3	56.0	53.0	23.0	552
8	5.4	61.8	58.8	49.9	46.9	24.5	547
10	6.0	60.3	57.3	48.0	45.0	25.0	545
16	7.6	57.2	54.2	43.9	40.9	25.0	543
20	8.5	55.8	52.8	42.0	39.0	25.0	542
25	9.6	54.3	51.3	40.0	37.0	24.3	541
31.25	10.7	52.9	49.9	38.1	35.1	23.6	540
62.5	15.5	48.4	45.4	32.1	29.1	21.5	539
100	19.9	45.3	42.3	28.0	25.0	20.1	538
200	29.1	40.8	37.8	22.0	19.0	18.0	537
250	33.0	39.3	36.3	20.0	17.0	17.3	536

S/FTP Cat 6A

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

S/FTP Cat 7

Freq. (MHz)	Attenuation (dB/100m) Max.	NEXT (dB/100m) Min.	PS NEXT (dB/100m) Min.	ACRF (dB/100m) Min.	PS ACRF (dB/100m) Min.	RL (dB/100m) Min.	P.Delay (ns/100m) Max.
4	3.7	78.0	75.0	78.0*	75.0*	23.0	552
8	5.2	78.0	75.0	75.9	72.9	24.5	547
10	5.9	78.0	75.0	74.0	71.0	25.0	545
16	7.4	78.0	75.0	69.9	66.9	25.0	543
20	8.3	78.0	75.0	68.0	65.0	25.0	542
25	9.3	78.0	75.0	66.0	63.0	24.3	541
31.25	10.4	78.0	75.0	64.1	61.1	23.6	540
62.5	14.9	75.5	72.5	58.1	55.1	21.5	539
100	19.0	72.4	69.4	54.0	51.0	20.1	538
200	27.5	67.9	64.9	48.0	45.0	18.0	537
400	40.0	63.4	60.4	42.0	39.0	17.3	536
600	50.1	60.7	57.7	38.4	35.4	17.3	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 Bundles 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 Cat 5E, Cat 6, Cat 6A, Cat 7, cables shall be installed with suitable termination equipment according to manufacturer's recommendations.

Horizontal cables S/FTP Cat 5E, Cat 6, Cat 6A, Cat 7
Flame retardant Cat. A. Low smoke.

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
DNV-CP-0403	2021-09	DNV GL Type approval program for Data communication cables – category cables	Ref. IEC 61156-5 standard Category 5E, 6, 6A, 7
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 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 SHF 1 outer sheath
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	2019-11	Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content	SHF 1 outer sheath only 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	SHF 1 outer sheath only 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 UV resistant acc. UL 1581 Cl.1200 min. 85% after 300h / 80% after 720h in the tensile strength and elongation

Marking of product

Example:

0000M LS Cable & System S/FTP PiMF 600 4PR 23AWG LSZH SHF1 Category 7
ISO/IEC 11801 #####

* 0000ML Sequential meter length marking

* #####: Production lot tracking information (machine/year/month/date)

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