

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Category cables**

with type designation(s)

4 PAIR S/FTP Cat 5e LSZH, 4 PAIR S/FTP Cat 6/6A LSZH, 4 PAIR S/FTP Cat 7 LSZH

Issued to

**LS Cable & System Vietnam
Dong Nai, Viet Nam**

is found to comply with

DNV GL 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 GL.**Issued at **Hamburg** on **2018-09-14**This Certificate is valid until **2023-09-13**.DNV GL local station: **Vung Tau Station**for **DNV GL**Approval Engineer: **Carsten Hunsalz**

**Arne Schaarmann
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.



Product description

Type:	4 PAIR S/FTP LSZH Cat 5e or 6 or 6A or 7
Conductor	Plain, solid copper class 1 AWG 23
Insulation	PE skin-foam-skin 3 layers
Individual screen	Al backed plastic foil wrapped around each pair
Braid screen:	Tinned copper braid
Sheath	SHF1. Overall diameter 8,0mm

3.1 Electrical Performances

Characteristics	units	Specification
DC Resistance	$\Omega/100m$	≤ 9.5
DC Resistance Unbalance	%	≤ 2.00
Capacitance Unbalance (Pair to Ground)	pF/km (800-1000Hz)	≤ 1600
Insulation Resistance	M Ω -m	≥ 5000
Dielectric Strength	DC kV/sec	2.5 / 2
Impedance (Characteristic mean)	Ω	$100 \pm 5\%$ (at 100MHz)

Transmission properties Cat 5e:

Freq. (MHz)	Attenuation (dB/100m) Max.	NEXT (dB/100m) Min.	PSNEXT (dB/100m) Min.	ELFEXT (dB/100m) Min.	PSELFEXT (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

The cable performance between 1MHz and 4MHz is achieved by design only and it is therefore not necessary to test for this performance below 4MHz. (According to the IEC 61156-5 standard)

Transmission properties Cat 6:

Freq. (MHz)	Attenuation (dB/100m) Max.	NEXT (dB/100m) Min.	PSNEXT (dB/100m) Min.	ELFEXT (dB/100m) Min.	PSELFEXT (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	10.8	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

The cable performance between 1MHz and 4MHz is achieved by design only and it is therefore not necessary to test for this performance below 4MHz. (According to the IEC 61156-5 standard)

Transmission properties Cat 6A:

Freq. (MHz)	Attenuation (dB/100m) Max.	NEXT (dB/100m) Min.	PSNEXT (dB/100m) Min.	ELFEXT (dB/100m) Min.	PSELFEXT (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

The cable performance between 1MHz and 4MHz is achieved by design only and it is therefore not necessary to test for this performance below 4MHz. (According to the IEC 61156-5 standard)

Transmission properties Cat 7:

Freq. (MHz)	Attenuation (dB/100m) Max.	NEXT (dB/100m) Min.	PSNEXT (dB/100m) Min.	ELFEXT (dB/100m) Min.	PSELFEXT (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

The cable performance between 1MHz and 4MHz is achieved by design only and it is therefore not necessary to test for this performance below 4MHz. (According to the IEC 61156-5 standard)

Application/Limitation

Communication cables, category 5e, 6, 6A and 7
Halogen free. Low smoke.

Temperature window:

Operation : -20°C to +60°C
Installation : 0°C to +50°C
Storage/shipping: -20°C to +80°C

Type Approval documentation

Job Id: **262.1-018079-2**
Certificate No: **TAE0000341**

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, 6, 6A, 7
IEC 61156-5	2012-12	Multicore and symmetrical pair/quad cables for digital communications – Part 5: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Horizontal floor wiring – Sectional specification	Reference to requirement for category cable: Cat 5e, 6, 6A and 7
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 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%

Marking of product

0000M LS Cable & System S/FTP PiMF – 100 (For Cat 5e) or 250 (For Cat 6) or 500 (For Cat 6A) or 600 (For Cat 7) - 4PR 23AWG LSZH - Category 5E or 6 or 6A or 7 - ISO/IEC 11801 #####
* #####: Lot No (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