



Certificate no.:
TAE000054R

TYPE APPROVAL CERTIFICATE

This is to certify:
that the Category cables

with type designation(s)
FIRE RESISTANT S/FTP 4x2x23AWG CAT 5e, CAT 6, CAT 6A, CAT 7, CAT 7A

issued to
AP MOG Solutions Pte Ltd
Singapore, Singapore

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 **2025-09-25**

This Certificate is valid until **2030-09-24**.

for **DNV**

DNV local unit: **Certification of Materials - Singapore**

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

FIRE RESISTANT S/FTP 4x2x23AWG CAT 5e, CAT 6, CAT 6A, CAT 7, CAT 7A

Conductor:	Solid or stranded bare copper 4x2x23/7 AWG or 4x2x23/1 AWG
Insulation:	PE-foam
Tape:	Fire-resistant Mica Tape
Cabling / Individual screen:	Twisted pairs with aluminum foil-polyester tape
Overall screen:	Solid tinned copper braid
Outer Sheath:	SHF1, SHF2, SHF-MUD
Armour + outer sheath optional:	Tinned or bare copper or galvanized steel wire braiding/Armour + SHF1, SHF2, SHF-MUD

Number of cores x conductor cross-section	Overall diameter
	mm
4 x 2 x 23/7 AWG	OD: 9.8
4 x 2 x 23/1 AWG	OD: 9.5
4 x 2 x 23/7 AWG with Armor + outer sheath	OD: 12.8
4 x 2 x 23/1 AWG with Armor + outer sheath	OD: 12.5

CAT 5e

Frequency MHz	ATT dB/100m Max.	RL dB Min.	NEXT dB Min.	PSNEXT dB Min.	ELFEXT dB Min.	PSELFEXT dB Min.
4	6.0	23.0	56.3	53.3	52.0	49.0
8	8.5	24.5	51.8	48.8	45.9	42.9
10	9.5	25.0	50.3	47.3	44.0	41.0
16	12.1	25.0	47.2	44.2	39.9	36.9
20	13.6	25.0	45.8	42.8	38.0	35.0
25	15.2	24.2	44.3	41.3	36.0	33.0
31.25	17.1	23.3	42.9	39.9	34.1	31.1
62.5	24.8	20.7	38.4	35.4	28.1	25.1
100	32.0	19.0	35.3	32.3	24.0	21.0

CAT 6

Frequency MHz	ATT dB/100m Max.	RL dB Min.	NEXT dB Min.	PSNEXT dB Min.	ELFEXT dB Min.	PSELFEXT dB Min.
4	5.8	23.0	66.3	63.3	56.0	53.0
8	8.1	24.5	61.8	58.8	49.9	46.9
10	9.0	25.0	60.3	57.3	48.0	45.0
16	11.4	25.0	57.2	54.2	43.9	40.9
20	12.8	25.0	55.8	52.8	42.0	39.0
25	14.4	24.2	54.3	51.3	40.0	37.0
31.25	16.1	23.3	52.9	49.9	38.1	35.1
62.5	23.3	20.7	48.4	45.4	32.1	29.1
100	29.9	19.0	45.3	42.3	28.0	25.0
200	43.8	16.4	40.8	37.8	22.0	19.0
250	49.7	15.6	39.3	36.3	20.0	17.0

CAT 6A

Frequency MHz	ATT dB/100m Max.	RL dB Min.	NEXT dB Min.	PSNEXT dB Min.	ELFEXT dB Min.	PSELFEXT dB Min.
4	5.7	23.0	66.3	63.3	56.0	53.0
8	8.0	24.5	61.8	58.8	49.9	46.9
10	8.9	25.0	60.3	57.3	48.0	45.0
16	11.2	25.0	57.2	54.2	43.9	40.9
20	12.6	25.0	55.8	52.8	42.0	39.0
25	14.1	24.2	54.3	51.3	40.0	37.0
31.25	16.1	23.2	52.9	49.9	38.1	35.1
62.5	22.5	20.7	48.4	45.4	32.1	29.1
100	28.7	19.0	45.3	42.3	28.0	25.0
200	41.4	16.4	40.8	37.8	22.0	19.0
250	46.6	15.6	39.3	36.3	20.0	17.0
300	51.4	15.6	38.1	35.1	18.5	15.5
400	60.1	15.6	36.3	33.3	16.0	13.0
500	67.9	15.6	34.8	31.8	14.0	11.0

CAT 7

Frequency MHz	ATT dB/100m Max.	RL dB Min.	NEXT dB Min.	PSNEXT dB Min.	ELFEXT dB Min.	PSELFEXT dB Min.
4	5.6	23.0	78.0	75.0	78.0	75.0
8	7.9	24.5	78.0	75.0	77.2	74.2
10	8.8	25.0	78.0	75.0	75.3	72.3
16	11.1	25.0	78.0	75.0	71.2	68.2
20	12.4	25.0	78.0	75.0	69.3	66.3
25	13.9	24.2	78.0	75.0	67.3	64.3
31.25	15.6	23.3	78.0	75.0	65.4	62.4
62.5	22.3	20.7	75.5	72.5	59.4	56.4
100	28.5	19.0	72.4	69.4	55.3	52.3
200	41.2	16.4	67.9	64.9	51.5	48.5
250	46.5	15.6	66.4	63.4	49.3	46.3
300	51.3	15.6	65.2	62.2	45.8	42.8
400	60.0	15.6	63.4	60.4	43.3	40.3
500	67.9	15.6	61.9	58.9	41.3	38.3
600	75.1	15.6	60.7	57.7	39.7	36.7

CAT 7A

Frequency MHz	ATT dB/100m Max.	RL dB Min.	NEXT dB Min.	PSNEXT dB Min.	ELFEXT dB Min.	PSELFEXT dB Min.
4	5.6	23.0	78.0	75.0	78.0	75.0
8	7.8	24.5	78.0	75.0	75.9	72.9
10	8.7	25.0	78.0	75.0	74.0	71.0
16	11.0	25.0	78.0	75.0	69.9	66.9
20	12.3	25.0	78.0	75.0	68.0	65.0
25	13.8	24.2	78.0	75.0	66.0	63.0
31.25	15.4	23.3	78.0	75.0	64.1	61.1
62.5	21.9	20.7	75.5	72.5	58.1	55.1
100	27.8	19.0	72.4	69.4	54.0	51.0
200	39.7	16.4	67.9	64.9	48.0	45.0
250	44.6	15.6	66.4	63.4	46.0	43.0
300	49.0	15.6	65.2	62.2	44.5	41.5
500	64.1	15.6	61.9	58.9	40.0	37.0
600	70.7	15.6	60.7	57.7	38.4	35.4

800	82.4	14.5	58.9	55.9	35.9	32.9
1000	92.9	13.7	57.4	54.4	34.0	31.0

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 60331-23, 750°C, 180 min. 15 min. cooling down. With insulation and functional integrity of Ethernet (category) cables acc. to IEC 60092-379.

-IEC 60331-2, 830°C, 60 min. only insulation integrity.

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.

Work area cables S/FTP 4x2x23AWG CAT 5e, CAT 6, CAT 6A, CAT 7, CAT 7A

Fire Resistant. Flame retardant Cat. A. Halogen free. Low smoke.

Install at: -20°C to +60 °C

Operate at: -52°C to +90 °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 61156-6	2020-04	Multicore and symmetrical pair/quad cables for digital communications – Part 6: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Work area wiring – Sectional specification	
IEC 60092-350	2020-01	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	Partly used
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 60331-23	1999-04	Tests for electric cables under fire conditions - Circuit integrity - Part 23: Procedures and requirements – Electric data cables	750°C, 180 min. 15 min. cooling down. With insulation and functional integrity of Ethernet (category) cables acc. to IEC 60092-379

Standard	Release	General description	Limitation
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, 60 min. only insulation integrity
IEC 60754-1	2019-11	Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content	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	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	Sheath only 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%
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
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
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.	SHF1 aging in IRM 902 70°C 4h SHF2 aging in IRM 902 100°C 24h tensile strength and elongation max +/- 40%
EN 50288-1	2013-05	Multi-element metallic cables used in analogue and digital communication and control - Part 1: Generic specification	5.3.1 Cold bend performance

Marking of product

APS □FINLAND□MOG□WW/YY □Armored □M82 □Cable □Cable model□Cable shielding type and size□Jacket material□IEC60332-3-22□FIRECA□FIRE□RESISTANT IEC60331-23□DNV□XXXXXX□**** m

Notice: □ represent Space; Armored only for armored cable types; XXXXXX represent batch number; **** m represent meter mark

Example:

APS FINLAND MOG 08/25 Armored M82 Cable Cat7 S/FTP 4PR 23AWG/7 SHF1 IEC 60332-3-22 FIRECA FIRE RESISTANT IEC60331-23 DNV XXXXXX **** m

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