Certificate no.:
TAE00004ZR

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Data transmission cables and systems

with type designation(s)
Unarmoured or Armoured coaxial cables RG6, RG11, RG59, RG58, RG213, RG214

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 **2024-11-22**
This Certificate is valid until **2029-11-21**.
DNV local unit: **Certification of Materials - Singapore**

Approval Engineer: **Carsten Hunsalz**

for **DNV**

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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

Coaxial cables, unarmoured:

Construction / Characteristics	RG6	RG11	RG59	RG58	RG213	RG214
Impedance (nominal)	75 Ohm	75 Ohm	75 Ohm	50 Ohm	50 Ohm	50 Ohm
Inner Conductor type	Bare Copper	Bare Copper	Bare Copper	Tinned Copper	Tinned Copper	Silver plated copper
Conductor construction	Ø 1,02mm	Ø 1,63mm	Ø 0,81mm	19x0,18mm	7x0,75mm	7x0,75mm
Insulation material	Foamed PE	Foamed PE	Foamed PE	Solid PE	Solid PE	Solid PE
Insulation diameter (nominal)	OD 4,57±0,1mm	OD 7,11±0,15mm	OD 3,7±0,1mm	OD 2,95±0,1mm	OD 7,25±0,15mm	OD 7,25±0,15mm
Shield	AL + polyester tape + AL	AL + polyester tape + AL	AL + polyester tape + AL	-	-	Silver-coated copper wire
Shield/Braid conductor	Tinned Cu-braid, coverage≥96%	Tinned Cu-braid, coverage≥96%	Tinned Cu-braid, coverage≥96%	Tinned Cu-braid, coverage≥96%	Tinned Cu-braid, coverage≥96%	Tinned Cu-braid, coverage≥96%
Jacket / sheath material	SHF1/SHF2/ SHF2-MUD	SHF1/SHF2/ SHF2-MUD	SHF1/SHF2/ SHF2-MUD	SHF1/SHF2/ SHF2-MUD	SHF1/SHF2/ SHF2-MUD	SHF1/SHF2/ SHF2-MUD
Jacket/sheath diameter (nominal)	7,3±0,3mm	10,3±0,2mm	6,2±0,2mm	5,0±0,2mm	10,3±0,2mm	11,3±0,2mm

Coaxial cables, armoured:

Construction / Characteristics	RG6	RG11	RG59	RG58	RG213	RG214
Impedance (nominal)	75 Ohm	75 Ohm	75 Ohm	50 Ohm	50 Ohm	50 Ohm
Inner Conductor type	Bare Copper	Bare Copper	Bare Copper	Tinned Copper	Tinned Copper	Silver plated copper
Conductor construction	Ø 1,02mm	Ø 1,63mm	Ø 0,81mm	19x0,18mm	7x0,75mm	7x0,75mm
Insulation material	Foamed PE	Foamed PE	Foamed PE	Solid PE	Solid PE	Solid PE
Insulation diameter (nominal)	OD 4,57±0,1mm	OD 7,11±0,15mm	OD 3,7±0,1mm	OD 2,95±0,1mm	OD 7,25±0,15mm	OD 7,25±0,15mm
Shield	AL + polyester tape + AL	AL + polyester tape + AL	AL + polyester tape + AL	-	-	Silver-coated copper wire
Shield/Braid conductor	Tinned Cu-braid, coverage≥96%	Tinned Cu-braid, coverage≥96%	Tinned Cu-braid, coverage≥96%	Tinned Cu-braid, coverage≥96%	Tinned Cu-braid, coverage≥96%	Tinned Cu-braid, coverage≥96%
Jacket / sheath material	SHF1	SHF1	SHF1	SHF1	SHF1	SHF1
Jacket/sheath diameter (nominal)	7,3±0,3mm	10,3±0,2mm	6,2±0,2mm	5,0±0,2mm	10,3±0,2mm	11,3±0,2mm
Armor (See below)	Tinned Cu-braid, coverage≥85%	Tinned Cu-braid, coverage≥85%	Tinned Cu-braid, coverage≥85%	Tinned Cu-braid, coverage≥85%	Tinned Cu-braid, coverage≥85%	Tinned Cu-braid, coverage≥85%
Jacket/sheath material	SHF1/SHF2/ SHF2-MUD	SHF1/SHF2/ SHF2-MUD	SHF1/SHF2/ SHF2-MUD	SHF1/SHF2/ SHF2-MUD	SHF1/SHF2/ SHF2-MUD	SHF1/SHF2/ SHF2-MUD
Outer Jacket diameter (nominal)	10,0±0,2mm	13,5±0,2mm	9,2±0,2mm	7,5±0,2mm	13,5±0,2mm	16,0±0,2mm

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.

Temperature range:
Installation: -20°C to +60 °C
Operation: -40°C to +80 °C

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
IEC 60096-0-1	2012	Radio frequency cables part 0-1: Guide to design of detail specifications – Coaxial cables	
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.	
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	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%

Marking of product

APS FINLAND MOG □WW/YY□Armored□M82□Cable□Cable model□Cable shielding type and size□Jacket material□IEC□60332-3-22□IEC□60332-3-24□XXXXXX□****m

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

Example:

APS FINLAND MOG 08/24 Armored M82 Cable RG58 SHF1 IEC 60332-3-22 XXXXXX ****m

Place of Production

DNV id: 10630537

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