Certificate no.:
TAE000052T

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Data transmission cables and systems

with type designation(s)
RF Low loss Super Flexible 1/2” 50 Coaxial Cable, RF Low Loss Flexible 1/2” 50 Coaxial Cable, RF Low Loss Flexible 7/8” 50 Coaxial Cable

issued to
Hyman Marine & Offshore (Shanghai) 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 **Hamburg** on **2025-06-02**
This Certificate is valid until **2030-06-01**.
DNV local unit: **Shanghai**

for **DNV**

Approval Engineer: **Carsten Hunsalz**

Product description

Halogen free, SHF1 or SHF2 sheathed radio frequency coaxial cable.

Type: RF Low loss Super Flexible 1/2” 50 Coaxial Cable,
RF Low Loss Flexible 1/2” 50 Coaxial Cable,
RF Low Loss Flexible 7/8” 50 Coaxial Cable

Construction/ Characteristics	**Super Flexible 1/2” 50**	**Flexible 1/2” 50**	**Flexible 7/8” 50**
Impedance	50 Ohm	50 Ohm	50 Ohm
Inner Conductor type	Copper Clad Aluminum wire	Copper Clad Aluminum wire	Copper tube
Conductor construction	Ø 3.55±0.04 mm	Ø 4.80±0.10 mm	Ø 9.4 ± 0.10 mm
Insulation material	Foam PE	Foam PE	Foam PE
Insulation construction	Ø 9.90±0.20 mm	Ø 12.30±0.20 mm	Ø 23.2 ± 0.5 mm
Outer conductor	Helical corrugated copper tube	Annular corrugated copper tube	Annular corrugated copper tube
Outer conductor construction	Ø 12.0±0.30mm	Ø 13.80±0.20mm	Ø 25.4 ± 0.5 mm
Jacket / sheath material	SHF1 or SHF2	SHF1 or SHF2	SHF1 or SHF2
Jacket/sheath diameter	Ø 13.30 ±0.50mm	Ø 15.70 ±0.50mm	Ø 27.6 ± 0.5mm
Relative Velocity of Propagation	76%	87%	87%
Capacitance	83 pF/m	74 pF/m	75 pF/m
Maximum Operating Frequency	10.2 GHz	8.8 GHz	5.0 GHz
Peak Power Rating	15.6 kW	40.0 kW	91.0 kW
Shielding Attenuation	≥ 120dB	≥ 120dB	≥ 120dB

Attenuation dB/100m

RF Low loss Super Flexible 1/2” 50 Coaxial Cable

Frequency (MHz):	150	450	800	900	1800	2000	2200	2400	2500	2700	3000	5800		
Attenuation dB/100m (Nom.)	≤ 4.35	≤ 7.83	≤ 10.74	≤ 11.47	≤ 17.02	≤ 18.10	≤ 19.14	≤ 20.15	≤ 20.64	≤ 21.60	≤ 23.01	≤ 34.25		

RF Low Loss Flexible 1/2” 50 Coaxial Cable

Frequency (MHz):	100	450	690	800	900	1000	1800	2000	2200	2400	2500	2600	2700	3000
Attenuation dB/100m (Nom.)	≤ 2.28	≤ 4.99	≤ 6.27	≤ 6.78	≤ 7.19	≤ 7.64	≤ 10.61	≤ 11.24	≤ 11.80	≤ 12.37	≤ 12.66	≤ 12.96	≤ 13.24	≤ 14.07

RF Low Loss Flexible 7/8” 50 Coaxial Cable

Frequency (MHz):	10	200	450	800	900	960	1000	1500	1800	2000	2200	2500	3000	
Attenuation dB/100m (Nom.)	≤ 0.38	≤ 1.75	≤ 2.68	≤ 3.65	≤ 3.89	≤ 4.03	≤ 4.13	≤ 5.16	≤ 5.71	≤ 6.06	≤ 6.39	≤ 6.88	≤ 7.63	

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.

Radio frequency coaxial cable
Flame retardant Cat. A. Halogen free. Low smoke.

Temperature range:
Installation: -25°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	2012-10	Radio frequency cables – Part 0-1: Guidelines to the design of detail specifications – Coaxial cables	
IEC 61196-1	2005-06	Coaxial communication cables – Part 1: Generic specification – General, definitions and requirements	
IEC 61196-11		Coaxial communication cables – Part 11: Sectional specification for semi-rigid cables with polyethylene (PE) dielectric	
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.	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 1kW 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	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	Halogen free: pH > 4,3 Conductivity < 10µS/mm
IEC 60684-2	2011-08	Item 45.2 Determination of low levels of fluorine	Fluorine content, maximum 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	2023-11	UL Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords	SHF1 sheath UV resistant acc. UL 1581 Cl.1200 min. 80% after 720h in the tensile strength and elongation

Marking of product

Example:

FORLLER CABLE RF Low Loss Flexible 1/2”- 50 Coaxial Cable SHF1 or SHF2 - IEC 60332-3-22 - <batch no.> - <meter marking>

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