Certificate no.:
TAE000055G

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Data transmission cables and systems

with type designation(s)
RF-LLX 1/2" 50 Leaky Cable, RF-LLX 7/8" 50 Leaky 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 **2026-01-12**
This Certificate is valid until **2031-01-11**.
DNV local unit: **Shanghai**

for **DNV**

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

Halogen free, SHF1 or SHF2 sheathed radiating coaxial cable.

Type: RF-LLX 1/2" 50 Leaky Cable, RF-LLX 7/8" 50 Leaky Cable

Construction/ Characteristics	**RF-LLX 1/2" 50**	**RF-LLX 7/8" 50**
Impedance	50 Ohm	50 Ohm
Inner Conductor type	Copper Clad Aluminum	Copper tube
Conductor construction	Ø 4.80±0.15 mm	Ø 9.0 ± 0.20 mm
Insulation material	Foam PE	Foam PE
Insulation construction	Ø 12.20±0.30 mm	Ø 22.5 ± 0.3 mm
Outer conductor	Overlapping slotted copper foil	Overlapping slotted copper foil
Outer conductor construction	Ø 13.20±0.50mm	Ø 25.0 ± 0.5 mm
Jacket / sheath material	SHF1 or SHF2	SHF1 or SHF2
Jacket/sheath diameter	Ø 15.70 ±0.50mm	Ø 27.0 ± 0.8mm
Propagation Velocity	88%	88%
Capacitance	76 pF/m	76 pF/m

RF-LLX 1/2" 50 Leaky Cable

Attenuation dB/100m

Frequency (MHz):	700	800	900	1800	1900	2000	2200	2400	2600	2700
Attenuation dB/100m (Nom.)	≤ 7.50	≤ 8.07	≤ 8.71	≤ 13.46	≤ 13.73	≤ 14.53	≤ 15.84	≤ 17,66	≤ 19.84	≤ 19.90

Coupling loss (50% / 95%) dB

Frequency (MHz):	700	800	900	1800	1900	2000	2200	2400	2600	2700
Attenuation dB/100m (Nom.)	70/ 80	70/ 80	71/ 82	77/ 88	71/ 82	73/ 84	76/ 85	77/ 87	73/ 84	71/ 82

RF-LLX 7/8" 50 Leaky Cable

Attenuation dB/100m

Frequency (MHz):	700	900	1700	1800	1900	2000	2200	2400	2600	2700
Attenuation dB/100m (Nom.)	≤ 4.66	≤ 4.80	≤ 7.37	≤ 7.71	≤ 8.26	≤ 8.79	≤ 9.55	≤ 10.68	≤ 11.60	≤ 12.18

Coupling loss (50% / 95%) dB

Frequency (MHz):	700	900	1700	1800	1900	2000	2200	2400	2600	2700
Attenuation dB/100m (Nom.)	72/ 86	72/ 86	73/ 85	75/ 85	72/ 83	72/ 83	73/ 83	74/ 84	71/ 82	71/ 82

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.

Radiating 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 61196-4	2022-09	Coaxial communication cables – Part 4: Sectional specification for radiating 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.	Partly used
IEC 60332-1-2	2025-06	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	2025-05	Item 47.2 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-LLX 1/2" 50 Leaky Cable SHF1 or SHF2 - IEC 60332-3-22 - <batch no.> - <meter marking>

Place of Production

DNV id: 10743629

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