DNV·GL

Certificate No:
TAE00002Y1

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Lightweight Electric Cable

with type designation(s)
RADOX MFH-S B

Issued to
Huber+Suhner AG
Pfäffikon, ZH, Switzerland

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

General power and lighting.

Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.
Rated voltage (kV) 0,6/1
Temp. class (°C) 90

Issued at **Høvik** on **2018-07-12**
This Certificate is valid until **2022-12-31**.
DNV GL local station: **Augsburg**

Approval Engineer: **Ivar Bull**

for **DNV GL**

Andreas Kristoffersen
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.

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Job Id: **262.1-013930-5**
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Product description

Type: RADOX MFH-S B

Conductor:	Tinned, stranded copper
Core insulation:	RADOX EI 301, dual wall high tech polymers
Electrostatic screen (if any)	Plastic laminated Al-tape with tinned copper drain wire
Fillers (optional)	Halogen free compound
Inner covering	Tape
Braid screen:	Tinned copper wire braid. Coverage ≥ 90%
Outer sheath:	RADOX Elastomer S FH (SHF2 or SHF MUD)

Multicore cables:

No of cores:	Cross sectional area [mm²]
3, 4, 6	0,5 mm²
1, 3, 4, 5, 6, 7, 7G, 8, 12, 12G, 14, 16, 18G, 19, 24, 25, 25G, 27, 30, 37, 50	0,75 mm²
8, 24, 37	1 mm²
3, 3G, 4, 4G, 5, 7, 7G, 12, 12G, 4x3, 19, 24	1,5 mm²
3, 3G, 4, 4G, 5G, 7, 12, 19, 27	2,5 mm²
3, 4G	4 mm²
3, 4, 4G, 5	6 mm²
4 / 1Pair	1,5 mm² / 0,75 mm²
8 / 1 Pair	2,5 mm² / 0,75 mm²
8 / 24Pair	2,5 mm² / 0,75 mm²

Multipair cables

No of pairs:	Cross sectional area [mm2]
1, 2, 4, 5, 7, 10, 14, 21, 45	0,5 mm²
1, 2, 3, 4, 8, 10, 12, 16, 19	0,75 mm²
5	1 mm²
1, 4	1,5 mm²
1, 2	2,5 mm²
1	4 mm²
1	6 mm²

Multipair cables, Individually screened (i)

No of pairs:	Cross sectional area [mm²]
2, 7, 12, 14, 19	0,5 mm²
1, 2, 3, 4, 5, 8, 12, 16	0,75 mm²
1, 2, 3, 4, 5, 6, 8, 12, 16	1,5 mm²
1, 2	2,5 mm²

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.

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
DNVGL-CP-0400	2015-12	Class programme, type approval, lightweight electric cables	
IEC 60092-350	2014-08	Electrical installations in ships - Part 350: General	Annex E.1.2:

Standard	Release	General description	Limitation
		construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	Cold bend -40°C Annex E.2: Cold impact -35°C
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 insulatedwire or cable - Procedure for 1 kW pre-mixed flame	50 < L ≤ 540mm
IEC 60332-3-22	2009-02	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 2,5 m above bottom edge of burner.
IEC 60754-1	2011-11	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	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 ≤ 10 µS/mm
IEC 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test. Clause 45.1 Methods of determination of low levels of chlorine, ans/or Bromine and/or iodine Clause 45.2 Methods of determination of low levels of fluorine	HCl + HBr + HJ ≤ 0,5 % [0,014 % can be detected] HF ≤ 0,1 % [0,02 % can be detected]
IEC 61034-1/2	2013-06	Measurement of smoke density of cables burning under defined conditions	Low smoke: Light transmittance ≥ 70 %

Marking of product

HUBER+SUHNER RADOX MFH-S B 0.6/1 KV cable type - SHF MUD 90C IEC 60332-1-2 - IEC 60332-3-22 (part no.) – (batch no.) (date of manufacture) (production place)

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) and selected type tests (ref. to applicable class programs) checked (if not available these tests shall 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