

TYPE APPROVAL CERTIFICATE

Certificate No:
TAE00002E1
Revision No:
3

This is to certify:

That the Electric Power Cable

with type designation(s)

LKSM-EMC 0,6/1kV, LKSM-EMC-SHF2 0,6/1kV, LKSM-VFD 1,8/3kV, LKSM-VFD-SHF2 1,8/3kV

Issued to

Helkama Bica Oy
Kaarina, Finland

is found to comply with

DNV rules for classification – Ships, offshore units, and high speed and light craft

Application :

Armoured Power and control cable.

Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Type	Rated voltage (kV)	Temp. class (°C)
LKSM-EMC 0,6/1kV, LKSM-EMC-SHF2 0,6/1kV	0,6/1	90
LKSM-VFD 1,8/3kV, LKSM-VFD-SHF2 1,8/3kV	1,8/3/3,6 AC or 2,7/4,5 DC	90

Issued at **Høvik** on **2023-01-01**

This Certificate is valid until **2027-12-31**.

DNV local unit: **Finland CMC**

Approval Engineer: **Ivar Bull**

for **DNV**



Digitally Signed By: Elter, Frederik Tore
Location: DNV Høvik, Norway

Frederik Tore Elter
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.

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 300,000 USD.



Product description

Type: LKSM-EMC 0,6/1kV, LKSM-EMC-SHF2 0,6/1kV,
 LKSM-VFD 1,8/3kV, LKSM-VFD-SHF2 1,8/3/3,6 AC or 2,7/4,5 DC

Construction:

Conductor: Plain (optional tinned) stranded copper class 2 or class 5
 Core insulation: XLPE
 Inner covering: Tape wrapping
 EMC Screen: Copper tape 100% coverage
 Metal covering: Plain (optional tinned) copper wires braid
 Outer sheath: SHF1 or SHF2

LKSM-EMC or LKSM-EMC-SHF2 - 0,6/1 kV

No of cores:	Cross sectional area [mm ²]
1, 2, 3, 4, 5	1 – 300
7	1 – 25
10, 12, 14, 16, 19, 24, 27, 30, 37	1 1,5 2,5
3+3E	25-300/6-50

LKSM-VFD or LKSM-VFD-SHF2 1,8/3/3,6 AC or 2,7/4,5 DC

No of cores:	Cross sectional area [mm ²]
1	10 - 400
2, 3, 4	10 - 300
3 + 3E	10-300 / 4-50

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

Data sheets: Specification HBKQ 9.SPEC.5 dated 1998-12-03
 Specification HBKQ 9.SPEC.59/110 dated 28.2.2020
 Specification HBKQ 9.SPEC.61/111 dated 13.10.2020/dk
 Appendix2 for HBKQ 9.SPEC.5 dated 2005-07-13.
 Main drawing, appendix for HBKQ 9.SPEC.5 dated 1998-12-03
 Technical specification dated 2001-09-11, 2000-11-01, 2001-05-23 and 2001-12-12

Test reports: Helkama test document LKSM-HF/STT3x1_5 and
 LKSM-HF/STT3x70 dated 1999-03-24
 Fire tests according to IEC 60332-3A dated 1998-11-24
 FIMKO report No. 2758 dated 1998-12-15
 SP 99R2 3461 dated 1999-01-19
 Helkama report Tdoc_h/TT_LKSM-EMC dated 2008-08-08
 Helkama report Tdoc_h/TT_LKSM-VFD dated 2008-08-08
 Helkama test document LKSM-HF_3X1.5.XLS dated 2014-02-07
 Helkama test document Hot set LKSM-HF 3 X 1,5 dated 2014-02-07

Tests carried out

Standard	Release	General description	Limitation
DNV CP-0399	2021-08	Electric cables.	
IEC 60092-350	2020-01	Electrical installations in ships - Part 350: General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
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	

Standard	Release	General description	Limitation
IEC 60092-353	2016-09	Electrical installations in ships - Part 353: Power cables for rated voltages 1 kV and 3 kV	
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	Low Halogen: <0,5% Halogen
IEC 60754-2	2019-11	Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content	Halogen free: pH > 4,3 Conductivity < 10µS/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, and/or Bromine and/or iodine Clause 45.2 Methods of determination of low levels of fluorine	HCl + HBr + HJ max 0,5% [0,014% can be detected] HF max 0,1% [0,02% can be detected]
IEC 61034-1/2	2019-11	Measurement of smoke density of cables burning under defined conditions – Part 1: Test apparatus Part 2: Test procedure and requirements	Low smoke Light transmittance >60%
IEC 61196-1	2005	Coaxial communication cables - Part 1: Generic specification - General, definitions and requirements	Transfer impedance typical value 26dB over 1mOhm at 100MHz [20mOhm/m]

Marking of product

HELKAMA - LKSM-EMC or LKSM-EMC-SHF2 - 0,6/1 kV – size - IEC 60332-3-22 - Lot No. or
 HELKAMA - LKSM-VFD or LKSM-VFD-SHF2 1,8/3kV – size – 1,8/3/3,6 AC or 2,7/4,5 DC – IEC 60332-3-22 – Lot No.

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