

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Electric Power Cable**with type designation(s)
LKSM-HF & LKSM-EMC 0,6/1 kV, LKSM-VFD 1,8/3 kV

Issued to

Helkama Bica (Shanghai) Co. Ltd.
Shanghai 020, Chinais found to comply with
Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards**Application :****General power and lighting. Control.**
Flame retardant in bunch Cat A. Halogen free. Low smoke.**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

| Type | Voltage class (kV) | Temp. class (°C) |
|--|--------------------|------------------|
| LKSM-HF & LKSM-EMC 0,6/1 kV | 0,6/1 | 90 |
| LKSM-VFD 1,8/3 kV | 1,8/3 | 90 |

This Certificate is valid until **2019-07-15**.Issued at **Høvik** on **2016-03-08**for **DNV GL**DNV GL local station: **Shanghai**Approval Engineer: **Ivar Bull**.....
Marit Laumann
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.

Job Id: **262.1-001606-4**
Certificate No: **TAE0000068**
Revision No: **2**

Product description

Type: LKSM-HF and LKSM-EMC 0,6/1 kV
LKSM-VFD 1,8/3kV

Construction:

Conductor: Plain stranded copper class 2 or class 5
Core insulation: XLPE
Inner covering: Tape wrapping
Metal covering: Annealed copper wires braid. & Copper tape (EMC + VFD)
Outer sheath: SHF1

LKSM-HF 0,6/1 kV

| No of cores: | Cross sectional area [mm ²] |
|-----------------------------------|---|
| 1 | 1 - 300 |
| 2 | 1 - 95 |
| 3 | 1 - 240 |
| 4 | 1 - 120 |
| 5 | 1 - 25 |
| 7, 10, 12, 14, 16, 19, 24, 27, 37 | 1 1,5 2,5 |

LKSM-EMC 0,6/1 kV

| No of cores: | Cross sectional area [mm ²] |
|--------------|---|
| 3 | 1 - 240 |

LKSM-VFD 1,8/3 kV

| No of cores: | Cross sectional area [mm ²] |
|--------------|---|
| 1 | 16 - 300 |
| 3 | 16 - 240 |
| 3/E | 3x95/3x16 - 3x240/3x50 |

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
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
Technical specification HBKQ 9. SPEC 5 dated 16.6.2011

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
CT07-0310-1 dated 2007-04-09
LKSM-VFD 3x16 SECRI CT4753Y-4 dated 2012-01-18
LKSM-EMC 3x1,5 SECRI CT4753Y-3 dated 2012-01-18

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Tests carried out

| Standard | Release | General description | Limitation |
|----------------|--------------------|--|---|
| IEC 60092-350 | 2014-08 | General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications | |
| IEC 60092-360 | 2014-04 | Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables. | |
| IEC 60092-353 | 2011-08 | Electrical installations in ships - Part 353: Power cables for rated voltages 1 kV and 3 kV | 0,6/1 kV |
| 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 | Bunch test Category A |
| 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 < 10µS/mm |
| IEC 61034-1/2 | 2013-07 2013-09 | Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements | Low smoke Light transmittance ≥60% |

Marking of product

HELKAMA 3 - LKSM-HF or LKSM-EMC - size - 0,6/1 kV – IEC 60332-3-22 – Lot No. or
HELKAMA 3 – LKSM- VFD – size – 1,8/3 kV – 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 is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the Periodical assessment are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Production Sample Tests (PST) and Routine Tests (RT) checked
- (if RT- and PST-test reports are not available, tests according to PST and RT to be carried out)
- Review of type approval documentation
- Review of possible change in design, materials and performance
- Ensure traceability between manufacturer's product type marking and Type Approval Certificate.

Periodical assessment shall be performed at least every second year.

END OF CERTIFICATE