Certificate No:
TAE00004EZ

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Electric Power Cable

with type designation(s)
LKSM-BWTS,
LKSM-BWTS-SHF2

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 :

Special high voltage cable for UV-lamps for Ballast Water Treatment Systems.
Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Type	Rated voltage (kV)	Temp. class (°C)
LKSM-BWTS	1,8/3 (3,6kV)	90
LKSM-BWTS-SHF2	1,8/3 (3,6kV)	90

Issued at **Høvik** on **2022-01-17**
This Certificate is valid until **2027-01-16**.
DNV local station: **Turku**

Approval Engineer: **Ivar Bull**

for **DNV**

Trond Sjåvåg
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

LKSM-BWTS,
LKSM-BWTS-SHF2

Construction:

Conductor:	Plain (optional tinned), stranded copper class 2 or class 5
Core insulation:	XLPE
Inner covering:	Tape
Screen:	Cu tape
Metal covering:	Plain (optional tinned) copper wire braid
Sheath:	SHF1 or SHF2

No of cores:	Cross sectional area [mm^{2}]
1, 2, 3, 4, 5, 7	2,5 4 6
10	2,5

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.

LKSM-BWTS 1,8/3kV cable is designed for specific use for power cable for UV lamps for Ballast Water Treatment Systems. Onboard DNV classed vessels these special cables shall only be used as BWTS UV cable.

DNV GL rules and IEC 60092-353 requires minimum cross sectional area 10mm^2 for 1,8/3kV cables.
These special constructions with 2,5mm^2, 4 mm^2 and 6 mm^2 conductors are accepted as special cable for UV lamps.

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
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	
IEC 60092-353	2016-09	Electrical installations in ships - Part 353: Power cables for rated voltages 1 kV and 3 kV	
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 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%

Marking of product

HELKAMA LOT ##### LKSM-BWTS "number of core" x "size of conductor" mm² 1,8/3 kV +90°C
IEC 60092-353, 60332-3-22 HELKAMA "month-year" and "length marking" or

HELKAMA LOT ##### LKSM-BWTS SHF2 "number of core" x "size of conductor" mm² 1,8/3 kV +90°C
IEC 60092-353, 60332-3-22 HELKAMA "month-year" and "length marking" or

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