

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Electric Power Cable**

with type designation(s)

TFOU VFD MUD 1,8/3kV

Issued to

**Helkama Bica Oy
Kaarina, Finland**

is found to comply with

Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards**IEC 60092-353 (2011-08)****IEC 60332-3-22 (2009-02)****IEC 60754-1/2 (2011-11)****IEC 61034-1/2 Ed. 3.1 (2013-06)****Application :****General power and lighting.****Flame retardant in bunch Cat. A. Halogen free. Low smoke.****Mud resistant.****Voltage class (kV) 0,6/1
Temp. class (°C) 90**This Certificate is valid until **2019-06-30**.Issued at **Høvik** on **2015-06-01**DNV GL local station: **Turku**Approval Engineer: **Ivar Bull**for **DNV GL****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.

If any person suffers loss or damage which is proven to have been caused by any negligent act or omission of the Society, then the Society shall pay compensation to such person for his proven direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question. The maximum compensation shall never exceed USD 2 million.

In this provision the "Society" shall mean DNV GL AS as well as all its direct and indirect owners, affiliates, subsidiaries, directors, officers, employees, agents and any other person or entity acting on behalf of DNV GL AS.

Certificate No: **E-14075**
 File No: **827.10**
 Job Id: **262.1-018083-1**

Product description

Type: TFOU VFD MUD 1,8/3kV

Construction:
 Conductors: Tinned stranded copper class 2 (or class 5)
 Earth conductors: 3x distributed earth conductors in interstices
 Core insulation: XLPE
 Inner covering: Halogen free compound
 Common screen:
 Metal covering: Tinned copper wire braid
 Outer sheath: SHF2 or SHF2 MUD

No of cores:	Cross sectional area [mm ²]
1	10 - 300
3	10 - 300

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 sheet: See approval letter
 Test reports: See approval letter

Tests carried out

Standard	Release	General description	Limitation
IEC 60092-350	2008-02	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

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Standard	Release	General description	Limitation
IEC 61034-1/2	2013-07	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance $\geq 60\%$
NEK 606 Ed. 4	2009-05	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test: IRM903 100°C 7d. Calcium Bromide 70°C 56d. <u>Oil based mud:</u> Carbo Sea 70°C 56d or EDC 95/11 70°C 56d

Marking of product

Helkama Bica Oy – TFOU VFD MUD – size – 1,8/3 kV – IEC 60332-3-22 - Month – Year

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 Routines (RT) checked (if 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
- Ensuring traceability between manufacturer's product type marking and Type Approval Certificate.

Periodical assessment to be performed at least every second year.

END OF CERTIFICATE