

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Low Voltage Cable**

with type designation(s)

RFOU(i) S1 or S1/S5 or S101, RFOU(c) S2 or S2/S6 or S102

Issued to

**Zakłady Kablowe BITNER Sp. z o.o.
Kraków, Malopolskie, Poland**

is found to comply with

DNV GL rules for classification – Ships, offshore units, and high speed and light craft**Application :****Control. Instrumentation and Communication.****Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.**

Type	Rated voltage (V)	Temp. class (°C)
RFOU(i) S1 or S1/S5 or S101	250	90
RFOU(c) S2 or S2/S6 or S102	250	90

Issued at **Høvik** on **2019-12-02**for **DNV GL**This Certificate is valid until **2024-06-30**.DNV GL local station: **Katowice CMC**Approval Engineer: **Ivar Bull****Trond Sjøvåg**
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: **262.1-031950-1**
Certificate No: **TAE00001WK**
Revision No: **1**

Product description

Cable Types: RFOU(i) S1 or
RFOU S1/S5 or
RFOU S101

RFOU(c) S2 or
RFOU S2/S6 or
RFOU S102

Construction:

Conductors: Tinned, stranded copper class 2 or class 5
Core insulation: HEPR
I. & C. screen: Copper backed mylar tape
Drain wire: Tinned copper covered by pet foil tape
Inner covering: HF compound + polyester tape
Braid armour: Tinned copper wire braid + polyester tape
Outer sheath: SHF2 or SHF2 MUD

No of elements:	Cross sectional area [mm ²]
1, 2, 4, 7, 8, 12, 16, 19, 24, 32 pairs	0,75 & 1,0 1,5
1, 2, 4, 7, 8, 12, 16, 19, 24, 32 triples	0,75 & 1,0 1,5

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.

This cable intended for fixed installation, flame (IEC 60332) retardant and mud (NEK TS 606) resistant.
Operating temperature, fixed : -40°C to 90°C. Min installation temperature : -20°C.

Type Approval documentation

Test Report No. TR-nr 16 ZBK 04b dated 2014.12.16
Test Report No. 00428B-1-2014 Section ZKB 04c dated 2014.10.29
Test Report No. 00428B-2-2014 Section ZKB 04c dated 2014.11.03
Test Report No. 00428B-3-2014 Section ZKB 04c dated 2014.11.07
Test Report No. 00428B-4-2014 Section ZKB 04c dated 2014.11.07
Datasheet NEK 606_Bitner 2015

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.	

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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 60092-376	2017-05	Electrical installations in ships - Part 376: Cables for control and instrumentation circuits 150/250 V (300 V)	
IEC 60332-1-2	2004-07	Tests on electric and optical fibre cables under fire conditions – Part 1-1: Test for vertical flame propagation for a single insulated wire or cable – Apparatus	Flame retardant small scale. Distance between the lower edge of the top support and the onset of charring > 50 mm AND Charring not to extend downwards > 540 mm from the lower edge of the top support.
IEC 60332-3-22	2018-07	Tests on electric 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 60754-2	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%
NEK TS606 Ed5	2016	Cables for offshore installations - halogen-free low smoke flame-retardant / fire-resistant (HFFR-LS). Technical specification.	Mud resistance test: Required Max variations ±: IRM902 & 903 100°C 7d. TS & E@B, weight & vol.: ±30% Calc. Bromide 70°C 56d. TS & E@B: ±25%, weight: ±15%, vol.: ±20% Oil based mud: EDC 95/11 70°C 56d TS & E@B ±30%, weight & vol.: ±25%

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Marking of product

Zakłady Kablowe BITNER – RFOU(i) S1 or S1/S5 or S101, Voltage, No. of cabling elements x No. cores x size, Year, Metre mark, IEC 60332-3-22 Cat. A. or

Zakłady Kablowe BITNER – RFOU(c) S2 or S2/S6 or S102, Voltage, No. of cabling elements x No. cores x size, Year, Metre mark, IEC 60332-3-22 Cat. A. 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