TYPE APPROVAL CERTIFICATE

Certificate No:
TAE00001WM
Revision No:
2

This is to certify:

That the Low Voltage Cable

with type designation(s)
BFOU(i) S3 or S3/S7 or S103, BFOU(c) S4 or S4/S8 or S104

Issued to
Zaklady 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. Fire resistant.
Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.

Type	Rated voltage (V)	Temp. class (°C)
BFOU(i) S3 or S3/S7 or S103	**250**	**90**
BFOU(c) S4 or S4/S8 or S104	**250**	**90**

Issued at **Høvik** on **2020-06-12**

This Certificate is valid until **2024-06-30**.
DNV GL local station: **Katowice CMC**

Approval Engineer: **Ivar Bull**

for **DNV GL**
Digitally Signed By: Alonso Pontes, Marta
Location: DNV GL Høvik, Norway

Marta Alonso Pontes
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.

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Job Id: **262.1-031950-1**
Certificate No: **TAE00001WM**
Revision No: **2**

Product description

Cable Types: BFOU(i) S3 or
BFOU(i) S3/S7 or
BFOU(i) S103

BFOU(c) S4 or
BFOU(c) S4/S8 or
BFOU(c) S104

Construction:
Conductors: Tinned, stranded copper class 2 or class 5
Core insulation: Mica glass tape + 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 cabling 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

This cable is fire resistant according to IEC 60331-21 / IEC 60331-1.

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.

Cables are intended for fixed installation and are mud resistant (NEK TS 606).

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
Test Report No. 341778 Section ZKB 04d dated 2014.11.04
Test Report No. 31/1/2020 IEC 60331-1 dated 02.06.2020

Datasheet NEK 606_Bitner 2015

Tests carried out

Standard	Release	General description	Limitation
IEC 60092-350	2020-01	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 60092-376	2017-05	Electrical installations in ships - Part 376: Cables for control and instrumentation circuits 150/250 V (300 V)	
IEC 60331-1	2018-03	Tests for electric cables under fire conditions - Circuit integrity - Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm	Minimum 120 min+15 min cooling down time
IEC 60331-21	1999-04	Tests for electric cables under fire conditions – Circuit integrity – Part 21: Procedures and requirements – Cables of rated voltage up to and including 0,6/1,0 kV	Minimum 120 min + 15 min cooling down time
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 $\geq$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%

Marking of product

Zaklady Kablowe BITNER – BFOU(i) S3 or S3/S7 or S103, Voltage, No. of cabling elements x No. cores x size, Year, Metre mark, IEC 60332-3-22 Cat. A, IEC 60331-21/1 or

Zaklady Kablowe BITNER BFOU(c) S4 or S4/S8 or S104, Voltage, No. of cabling elements x No. cores x size, Year, Metre mark, IEC 60332-3-22 Cat. A, IEC 60331-21/1

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