DNV·GL

TYPE APPROVAL CERTIFICATE

Certificate No:
E-14121
File No:
827.20
Job Id:
262.1-002361-2

This is to certify:

That the Low Voltage Cable

with type designation(s)
BFOU (i) S3/S7 250 V, BFOU (c) S4/S8 250 V, BFCU(i) & (c) 250V, ,

Issued to
KEI Industries Ltd.
Mumbai DELHI, India

is found to comply with
Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards
IEC 60092-376 (2003-05)
IEC 60331-21 (1999-04)
IEC 60332-3-22 (2009-02)
IEC 60754-1 (2011-11)
IEC 60754-2 (2011-11)
IEC 61034-1/2 (2013-07/2013-09)
NEK TS 606 (2009-05) (S-types only)

Application :

Instrumentation and communication.
Fire resistant. Flame retardant Cat. A. Halogen free. Low smoke. Mud resistant.

Type	Voltage class (V)	Temp. class (°C)
BFOU (i) S3/S7 250 V	250	90
BFOU (c) S4/S8 250 V	250	90
BFCU(i) & (c) 250V	250	90

This Certificate is valid until **2018-12-31**.
Issued at **Høvik** on **2015-03-23**

DNV GL local station: **Mumbai**

Approval Engineer: **Ludovico Gullifa**

for **DNV GL**
Digitally Signed By: Laumann, Marit
Location: DNV GL Høvik, Norway
Signing Date: 2015-03-25

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.

Certificate No: **E-14121**
File No: **827.20**
Job Id: **262.1-002361-2**

Product description

Type: BFOU (c) S4/S8 & BFOU (i) S3/S7 250V
BFCU(i) & (c) 250V

Construction:
Conductors: Tinned stranded copper class 2
Core Insulation: Mica-tape + EPR
Screen: Copper backed polyester tape with tinned copper drain wire.
Inner covering: SHF1
Metal covering: Tinned copper wire braid (O) according to NEK606
Or Galvanized steel wire braid (C)
Outer sheath: SHF2 or SHF2 Mud

NEK 606 specificification is restricted to conductor cross sections of 0,75 mm^2, 1,5 mm^2 and 2,5 mm^2

PAIRS:

Number of cores x conductor cross-section mm^2	Number of cores x conductor cross-section mm^2	Number of cores x conductor cross-section mm^2	Number of cores x conductor cross-section mm^2	Number of cores x conductor cross-section mm^2
1 X 2 X 0.75	22 X 2 x 0.75	8 X 2 X 1.5	32 X 2 x 1.5	15 X 2 x 2.5
2 X 2 X 0.75	23 X 2 x 0.75	9 X 2 X 1.5	37 X 2 x 1.5	16 X 2 x 2.5
3 X 2 X 0.75	24 X 2 x 0.75	10 X 2 X 1.5	40 X 2 x 1.5	17 X 2 x 2.5
4 X 2 X 0.75	25 X 2 x 0.75	11 X 2 x 1.5	44 X 2 x 1.5	18 X 2 x 2.5
5 X 2 X 0.75	26 X 2 x 0.75	12 X 2 x 1.5	48 X 2 x 1.5	19 X 2 x 2.5
6 X 2 X 0.75	27 X 2 x 0.75	13 X 2 x 1.5	50 X 2 x 1.5	20 X 2 x 2.5
7 X 2 X 0.75	30 X 2 x 0.75	14 X 2 x 1.5		21 X 2 x 2.5
8 X 2 X 0.75	32 X 2 x 0.75	15 X 2 x 1.5	1 X 2 X 2.5	22 X 2 x 2.5
9 X 2 X 0.75	37 X 2 x 0.75	16 X 2 x 1.5	2 X 2 X 2.5	23 X 2 x 2.5
10 X 2 X 0.75	40 X 2 x 0.75	17 X 2 x 1.5	3 X 2 X 2.5	24 X 2 x 2.5
11 X 2 x 0.75	44 X 2 x 0.75	18 X 2 x 1.5	4 X 2 X 2.5	25 X 2 x 2.5
12 X 2 x 0.75	48 X 2 x 0.75	19 X 2 x 1.5	5 X 2 X 2.5	26 X 2 x 2.5
13 X 2 x 0.75	50 X 2 x 0.75	20 X 2 x 1.5	6 X 2 X 2.5	27 X 2 x 2.5
14 X 2 x 0.75		21 X 2 x 1.5	7 X 2 X 2.5	30 X 2 x 2.5
15 X 2 x 0.75	1 X 2 X 1.5	22 X 2 x 1.5	8 X 2 X 2.5	32 X 2 x 2.5
16 X 2 x 0.75	2 X 2 X 1.5	23 X 2 x 1.5	9 X 2 X 2.5	37 X 2 x 2.5
17 X 2 x 0.75	3 X 2 X 1.5	24 X 2 x 1.5	10 X 2 X 2.5	40 X 2 x 2.5
18 X 2 x 0.75	4 X 2 X 1.5	25 X 2 x 1.5	11 X 2 x 2.5	44 X 2 x 2.5
19 X 2 x 0.75	5 X 2 X 1.5	26 X 2 x 1.5	12 X 2 x 2.5	48 X 2 x 2.5
20 X 2 x 0.75	6 X 2 X 1.5	27 X 2 x 1.5	13 X 2 x 2.5	50 X 2 x 2.5
21 X 2 x 0.75	7 X 2 X 1.5	30 X 2 x 1.5	14 X 2 x 2.5	

TRIADS:

Number of cores x conductor cross-section mm^2	Number of cores x conductor cross-section mm^2	Number of cores x conductor cross-section mm^2	Number of cores x conductor cross-section mm^2	Number of cores x conductor cross-section mm^2
1 X 3 X 0.75	22 X 3 x 0.75	8 X 3 X 1.5	32 X 3 x 1.5	15 X 3 x 2.5
2 X 3 X 0.75	23 X 3 x 0.75	9 X 3 X 1.5	37 X 3 x 1.5	16 X 3 x 2.5
3 X 3 X 0.75	24 X 3 x 0.75	10 X 3 X 1.5	40 X 3 x 1.5	17 X 3 x 2.5
4 X 3 X 0.75	25 X 3 x 0.75	11 X 3 x 1.5	44 X 3 x 1.5	18 X 3 x 2.5
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7 X 3 X 0.75	30 X 3 x 0.75	14 X 3 x 1.5		21 X 3 x 2.5
8 X 3 X 0.75	32 X 3 x 0.75	15 X 3 x 1.5	1 X 3 X 2.5	22 X 3 x 2.5
9 X 3 X 0.75	37 X 3 x 0.75	16 X 3 x 1.5	2 X 3 X 2.5	23 X 3 x 2.5
10 X 3 X 0.75	40 X 3 x 0.75	17 X 3 x 1.5	3 X 3 X 2.5	24 X 3 x 2.5
11 X 3 x 0.75	44 X 3 x 0.75	18 X 3 x 1.5	4 X 3 X 2.5	25 X 3 x 2.5
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14 X 3 x 0.75		21 X 3 x 1.5	7 X 3 X 2.5	30 X 3 x 2.5
15 X 3 x 0.75	1 X 3 X 1.5	22 X 3 x 1.5	8 X 3 X 2.5	32 X 3 x 2.5
16 X 3 x 0.75	2 X 3 X 1.5	23 X 3 x 1.5	9 X 3 X 2.5	37 X 3 x 2.5
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20 X 3 x 0.75	6 X 3 X 1.5	27 X 3 x 1.5	13 X 3 x 2.5	50 X 3 x 2.5
21 X 3 x 0.75	7 X 3 X 1.5	30 X 3 x 1.5	14 X 3 x 2.5	

Application/Limitation

This type of cable is fire resistant in accordance with IEC Publication 60331.

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:

KEI BFOU (c) S4/S8 dated 2009-12-29
KEI BFOU (i) S3/S7 dated 2009-12-29

Test reports: KEI dated 2010-06-02
KEI dated 2010-06-02

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.	

Standard	Release	General description	Limitation
IEC 60092-376	2003-05	Cables for control and instrumentation circuits 150/250 V (300 V)	
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%
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 90 min + 15 min cooling down time
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	Charred portion of sample does not exceed 2,5m above bottom edge of burner.
NEK 606 Ed. 4	2009-05	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test: IRM903 100°C 7days. Calcium Bromide 70°C 56days. Carbo Sea 70°C 56days.

Marking of product

KEI - BFOU (i) S3/S7 or BFOU (c) S4/S8 or BFCU(c) or BFCU(i) - size - 250 V – IEC 60331-21– Lot. No – IEC 60332-3-22 Cat A, Date.

Periodical assessment

The scope of the 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 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.

Assessment to be performed at least every second year.

END OF CERTIFICATE