DNV·GL

Certificate No:
TAE0000304

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Low Voltage Cable

with type designation(s)
250V BFOU(c)/BFOU(i)/BFOU(i/c)/BFCU(c)/BFCU(i)/BFCU(i/c)/BFBU(c)/BFBU(i)/BFBU(i/c)

Issued to
LS Cable & System Ltd (Donghae Plant)
Donghae-si, Gangwon-do, Republic of Korea

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft
IEC 60092-376 (2017-05)
NEK TS 606 (2016)

Application :

Instrumentation and communication.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.
Rated voltage (V) 250
Temp. class (°C) 90

Issued at **Busan** on **2019-02-12**
This Certificate is valid until **2022-12-31**.
DNV GL local station: **Seoul**

Approval Engineer: **Eun Jin Lee**

for **DNV GL**

Andreas Kristoffersen
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: **262.1-011415-3**
Certificate No: **TAE0000304**

Product description

Type: 250 V BFOU (c) & BFOU(i) & BFOU(i/c)
250 V BFCU (c) & BFCU (i) & BFCU (i/c)
250 V BFBU (c) & BFBU (i) & BFBU (i/c)

Conductors:	Tinned stranded copper class 2
Core insulation:	Mica-tape + EPR
Inner covering:	Halogen free compound
Metal covering:	Tinned copper wire braid (O) or galvanized steel wire (C) or bronze wire braid (B)
Screeen:	Copper/polyester or Aluminium/polyester tape with drain wire
Outer sheath:	SHF2

BFOU (c) & BFOU(i) & BFOU(i/c)

Number of cores x conductor cross-section mm²	Number of cores x conductor cross-section mm²	Number of cores x conductor cross-section mm²	Number of cores x conductor cross-section mm²
2 x 1,0	30 x 1,0	19 x 1,5	7 x 2,5
3 x 1,0	33 x 1,0	23 x 1,5	9 x 2,5
4 x 1,0	37 x 1,0	24 x 1,5	12 x 2,5
5 x 1,0	44 x 1,0	27 x 1,5	14 x 2,5
7 x 1,0	2 x 1,5	30 x 1,5	16 x 2,5
9 x 1,0	3 x 1,5	33 x 1,5	19 x 2,5
12 x 1,0	4 x 1,5	37 x 1,5	23 x 2,5
14 x 1,0	5 x 1,5	44 x 1,5	24 x 2,5
16 x 1,0	7 x 1,5	2 x 2,5	27 x 2,5
19 x 1,0	9 x 1,5	3 x 2,5	30 x 2,5
23 x 1,0	12 x 1,5	4 x 2,5	33 x 2,5
24 x 1,0	14 x 1,5	5 x 2,5	37 x 2,5
27 x 1,0	16 x 1,5		44 x 2,5

BFOU (c) & BFOU(i) & BFOU(i/c)
BFCU (c) & BFCU(i) & BFCU(i/c)
BFBU (c) & BFBU(i) & BFBU(i/c)

Number of cores x conductor cross-section mm²	Number of cores x conductor cross-section mm²	Number of cores x conductor cross-section mm²	Number of cores x conductor cross-section mm²
1 x 2 x 0,75	32 x 2 x 0,75	2 x 4 x 0,75	10 x 2 x 1,0
2 x 2 x 0,75	1 x 3 x 0,75	3 x 4 x 0,75	12 x 2 x 1,0
3 x 2 x 0,75	2 x 3 x 0,75	4 x 4 x 0,75	14 x 2 x 1,0
4 x 2 x 0,75	3 x 3 x 0,75	7 x 4 x 0,75	16 x 2 x 1,0
5 x 2 x 0,75	4 x 3 x 0,75	8 x 4 x 0,75	19 x 2 x 1,0
6 x 2 x 0,75	5 x 3 x 0,75	12 x 4 x 0,75	20 x 2 x 1,0
7 x 2 x 0,75	7 x 3 x 0,75	15 x 4 x 0,75	24 x 2 x 1,0
8 x 2 x 0,75	8 x 3 x 0,75	1 x 2 x 1,0	32 x 2 x 1,0
10 x 2 x 0,75	12 x 3 x 0,75	2 x 2 x 1,0	1 x 3 x 1,0
12 x 2 x 0,75	14 x 3 x 0,75	3 x 2 x 1,0	2 x 3 x 1,0
14 x 2 x 0,75	16 x 3 x 0,75	4 x 2 x 1,0	3 x 3 x 1,0
16 x 2 x 0,75	19 x 3 x 0,75	5 x 2 x 1,0	4 x 3 x 1,0
19 x 2 x 0,75	24 x 3 x 0,75	6 x 2 x 1,0	5 x 3 x 1,0
20 x 2 x 0,75	32 x 3 x 0,75	7 x 2 x 1,0	7 x 3 x 1,0
24 x 2 x 0,75	1 x 4 x 0,75	8 x 2 x 1,0	8 x 3 x 1,0

Number of cores x conductor cross-section mm²	Number of cores x conductor cross-section mm²	Number of cores x conductor cross-section mm²	Number of cores x conductor cross-section mm²
12 x 3 x 1,0	10 x 2 x 1,5	2 x 4 x 1,5	32 x 2 x 2,5
14 x 3 x 1,0	12 x 2 x 1,5	3 x 4 x 1,5	1 x 3 x 2,5
16 x 3 x 1,0	14 x 2 x 1,5	4 x 4 x 1,5	2 x 3 x 2,5
19 x 3 x 1,0	16 x 2 x 1,5	7 x 4 x 1,5	3 x 3 x 2,5
24 x 3 x 1,0	19 x 2 x 1,5	8 x 4 x 1,5	4 x 3 x 2,5
32 x 3 x 1,0	20 x 2 x 1,5	12 x 4 x 1,5	5 x 3 x 2,5
1 x 4 x 1,0	24 x 2 x 1,5	15 x 4 x 1,5	7 x 3 x 2,5
2 x 4 x 1,0	32 x 2 x 1,5	1 x 2 x 2,5	8 x 3 x 2,5
3 x 4 x 1,0	1 x 3 x 1,5	2 x 2 x 2,5	12 x 3 x 2,5
4 x 4 x 1,0	2 x 3 x 1,5	3 x 2 x 2,5	14 x 3 x 2,5
7 x 4 x 1,0	3 x 3 x 1,5	4 x 2 x 2,5	16 x 3 x 2,5
8 x 4 x 1,0	4 x 3 x 1,5	5 x 2 x 2,5	19 x 3 x 2,5
12 x 4 x 1,0	5 x 3 x 1,5	6 x 2 x 2,5	24 x 3 x 2,5
15 x 4 x 1,0	7 x 3 x 1,5	7 x 2 x 2,5	32 x 3 x 2,5
1 x 2 x 1,5	8 x 3 x 1,5	8 x 2 x 2,5	1 x 4 x 2,5
2 x 2 x 1,5	12 x 3 x 1,5	10 x 2 x 2,5	2 x 4 x 2,5
3 x 2 x 1,5	14 x 3 x 1,5	12 x 2 x 2,5	3 x 4 x 2,5
4 x 2 x 1,5	16 x 3 x 1,5	14 x 2 x 2,5	4 x 4 x 2,5
5 x 2 x 1,5	19 x 3 x 1,5	16 x 2 x 2,5	7 x 4 x 2,5
6 x 2 x 1,5	24 x 3 x 1,5	19 x 2 x 2,5	8 x 4 x 2,5
7 x 2 x 1,5	32 x 3 x 1,5	20 x 2 x 2,5	12 x 4 x 2,5
8 x 2 x 1,5	1 x 4 x 1,5	24 x 2 x 2,5	15 x 4 x 2,5

Application/Limitation

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

The requirement of SOLAS Chapter II-1 Part D Reg. 45, 5.2 to limit Fire Propagation along Bunches of Cables or Wires are fulfilled without any additional measures.

Type Approval documentation

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 60092-376	2017-05	Cables for control and instrumentation circuits 150/250V(300V)	
IEC 60092-360	2014-04	Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation, telecommunication cables	
IEC 60332-1	2015-07	Test for vertical flame propagation for a single insulated wire or cable	
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

Standard	Release	General description	Limitation
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 0,6/1,0 kV	@ 750°C/120 min.
IEC 60331-1/-2	2009-05	Fire resistance / Circuit integrity – Test method for fire *with shock* at temperature of at least 830ºC for cables rated up to and including 0,6/1 kV	@ 830 °C w/shock (120 min.)
IEC 60754-1	2014-05	Test on gases evolved during combustion of materials from cables – Determination of the amount of halogen acid gas	Low Halogen <0,5%
IEC 60754-2	2014-05	Test on gases evolved during combustion of materials from cables – Determination of the degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and condctivity	Halogen free ≥4,3pH, ≤10µS/mm
IEC 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test.	Fluorine content <0,1%
IEC 61034-1/2	2005-04	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke >60%
UL 1581	2015	Sunlight resistant -Section 1200	720 hrs
NEK 606	2016	Cables for offshore installations	Oil & Mud resistant – Category a/b/c/d

Marking of product

Voltage rating – Type designation – Size – LS cable – Year of manufacture – IEC60332-3A – IEC60331(120) – Length

Periodical assessment

The scope of the retention/renewal survey is to verify that the conditions stipulated for the Type Approval Certificate are complied with and that no alterations are made to the design and/or the material of product.

The main elements of the survey are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Check of results from Production Sample Tests (PST) and Routine tests (RT) (if not available, PST and RT are to be carried out)
- Review of type approval documentation
- Review of possible changes in design, material 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