DNV·GL

Certificate No:
TAE00001TE

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Low Voltage Cable

with type designation(s)
BFOU (i) S103 & (c) S104 250 V (BFOU (i) S3 & (c) S4 250V), BFOU (i) S103 E & (c) S104 E 250V, BFOU (i) S103 M & (c) S104 M 250V (BFOU (i) S3/S7 & (c) S4/S8 250V)

Issued to
Suzhou Draka Cable Co. Ltd.
SUZHOU JIANGSU, China

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

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

Issued at **Hamburg** on **2017-04-26**
This Certificate is valid until **2022-04-25**.
DNV GL local station: **Shanghai CMC**

Approval Engineer: **Holger Jansen**

for **DNV GL**

Joannis Papanuskas
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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Product description

Type: BFOU (i) S103 & (c) S104 250 V (BFOU (i) S3 & (c) S4 250V), BFOU (i) S103 E & (c) S104 E 250V, BFOU (i) S103 M & (c) S104 M 250V (BFOU (i) S3/S7 & (c) S4/S8 250V)

Conductors: Tinned, stranded copper class 2 or class 5
Core insulation: Mica tape + HF-EPR
Screen: Copper/polyester tape w/tinned copper drain wire
Inner covering: Halogen free compound
Metal covering: Tinned copper wire braid
Sheath: SHF 2 or SHF Mud

Number of cores x conductor cross-section	Overall diameter Nominal	
	(i)	(c)
mm^2	mm	mm
1 x 2 x 0,75	11,5	-
2 x 2 x 0,75	14,6	14,3
4 x 2 x 0,75	17,9	16,8
7 x 2 x 0,75	20,6	19,8
8 x 2 x 0,75	22,1	20,9
12 x 2 x 0,75	26,2	24,6
16 x 2 x 0,75	28,8	26,9
19 x 2 x 0,75	30,3	28,3
24 x 2 x 0,75	34,5	32,3
32 x 2 x 0,75	37,8	35,7
1 x 2 x 1,0	11,9	-
2 x 2 x 1,0	15,2	14,8
4 x 2 x 1,0	18,6	18,0
7 x 2 x 1,0	21,5	20,8
8 x 2 x 1,0	23,6	22,2
12 x 2 x 1,0	27,4	26,1
16 x 2 x 1,0	30,2	28,6
19 x 2 x 1,0	31,8	30,0
24 x 2 x 1,0	36,4	34,1
32 x 2 x 1,0	39,9	37,9
1 x 2 x 1,5	13,1	-
2 x 2 x 1,5	16,8	16,4
4 x 2 x 1,5	20,7	19,9
7 x 2 x 1,5	24,5	23,7
8 x 2 x 1,5	26,4	25,3
12 x 2 x 1,5	31,2	29,6
16 x 2 x 1,5	34,2	32,5
19 x 2 x 1,5	36,6	34,1
24 x 2 x 1,5	41,8	39,4
32 x 2 x 1,5	45,4	43,7
1 x 2 x 2,5	14,0	—

Number of cores x conductor cross-section	Overall diameter Nominal	
	(i)	(c)
mm^2	mm	mm
1 x 3 x 0,75	11,9	-
3 x 3 x 0,75	18,4	17,9
4 x 3 x 0,75	19,7	19,0
7 x 3 x 0,75	23,6	22,1
12 x 3 x 0,75	29,6	28,2
16 x 3 x 0,75	32,6	31,1
19 x 3 x 0,75	34,4	32,4
24 x 3 x 0,75	39,6	37,5
1 x 3 x 1,0	12,6	-
3 x 3 x 1,0	19,3	18,7
4 x 3 x 1,0	20,9	20,0
7 x 3 x 1,0	24,8	23,7
12 x 3 x 1,0	31,3	29,9
16 x 3 x 1,0	34,9	32,8
19 x 3 x 1,0	36,5	34,7
24 x 3 x 1,0	42,8	39,8
1 x 3 x 1,5	13,6	-
3 x 3 x 1,5	21,4	20,8
4 x 3 x 1,5	23,7	22,3
7 x 3 x 1,5	27,7	26,8
12 x 3 x 1,5	35,5	33,8
16 x 3 x 1,5	39,7	38,0
19 x 3 x 1,5	42,4	39,9
24 x 3 x 1,5	47,8	46,0
1 x 3 x2,5	14,5	—

Application/Limitation

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

General power and lighting. Control. Halogen free. Low smoke. Cold bend -40°C. Cold impact -35°C Flame retardant in bunch Cat. A.

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	2003-05	Cables for control and instrumentation circuits 150/250 V (300 V)	
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 60331-21	1999-04	Test for electric cables under fire conditions – Circuit integrity – Part 21: Productures and requirements – Cables of rated voltage up to and including 0,6/1,0 kV	
IEC 60331-1/2	2009-05	Fire resistance / Circuit integrity – Test for method for fire *with shock* at temperature of at least 830ºC for cables rated up to and including 0,6/1 kV	Minimum 90 min. test.
IEC 60332-1-2	2015-07	Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable –Procedure for 1 kW pre-mixed flame	
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 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test	Fluorine content < 0,1%
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
IEC 61034-1/2	2013-06	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke

Standard	Release	General description	Limitation
CSA C22.2 NO. 03	2009	4.12 Flexibility at any specified temperature	Cold bend: -40°C
CSA C22.2 NO. 03	2009	4.13 Abnormal low temperature – impact	Cold impact: -35°C
NEK TS 606	2016	Cables for offshore installation. Halogen-free low smoke and flame-retardant / fire resistant (HFFR-LS) Technical specification.	

Marking of product

SUZHOU DRAKA – BFOU (i) S103 or BFOU (c) S104 or BFOU (i) S103 E or BFOU (c) S104 E or BFOU (i) S103 M or BFOU (c) S104 M or BFOU (i) S3 or BFOU (c) S4 or BFOU (i) S3/S7 or BFOU (c) S4/S8 – Size – 150/250V – IEC 60331-1/2 – IEC 60332-3-22 Cat.A – Year

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) checked (if not available tests according to 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 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