DNV·GL

Certificate No:
TAE00003DJ

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Low Voltage Cable

with type designation(s)
S101 RFOU(i) & S102 RFOU(c), S101 RFOU(i) M & S102 RFOU(c) M, RFOU(i&c), RFOU(i&c) M

Issued to
Shandong Zhongchuan Cable Co., Ltd.
Weihai, 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.

Type	Rated voltage (V)	Temp. class (°C)
S101 RFOU(i) & S102 RFOU(c)	250	90
S101 RFOU(i) M & S102 RFOU(c) M	250	90
RFOU(i&c), RFOU(i&c) M	250	90

Issued at **Hamburg** on **2019-06-26**
This Certificate is valid until **2024-06-25**.
DNV GL local station: **Yantai Station**

Approval Engineer: **Carsten Hunsalz**

for **DNV GL**

Arne Schaarmann
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: **262.1-015175-3**
Certificate No: **TAE00003DJ**

Product description

Type: NEK 606 S types 0,75mm² , 1,5mm² and 2,5mm²:
S101 RFOU (i) & S102 RFOU (c) & S101 RFOU (i) M & S102 RFOU (c) M
RFOU types: 0,5mm² and 1mm²

Construction:

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

Pairs: Number of cores x conductor cross-section	Outer diameter Nominal			NEK TS 606 S-type
	(i)	(c)	(i&c)	
mm²	mm	mm	mm	
1×2×0.5	9,6	9,4	9,6	
2×2×0.5	14,2	13,8	14,2	
3×2×0.5	15,5	14,5	15,5	
4×2×0.5	16,6	16,2	16,6	
5×2×0.5	18,1	17,3	18,1	
7×2×0.5	19,4	18,6	19,4	
10×2×0.5	24,0	23,2	24,0	
12×2×0.5	24,9	23,9	24,9	
14×2×0.5	26,0	24,9	26,0	
19×2×0.5	28,8	27,6	28,8	
24×2×0.5	33,4	32,0	33,4	
27×2×0.5	34,3	32,8	34,3	
30×2×0.5	35,4	33,9	35,4	
37×2×0.5	38,6	36,6	38,6	
48×2×0.5	44,5	42,0	44,5	
1×2×0.75	10,0	9,9	10,0	NEK 606
2×2×0.75	15,6	14,8	15,6	NEK 606
3×2×0.75	16,4	16,2	16,4	NEK 606
4×2×0.75	17,6	17,4	17,6	NEK 606
5×2×0.75	19,2	18,7	19,2	NEK 606
7×2×0.75	20,6	20,3	20,6	NEK 606
10×2×0.75	25,8	25,2	25,8	NEK 606
12×2×0.75	26,6	26,0	26,6	NEK 606
14×2×0.75	28,0	27,3	28,0	NEK 606
19×2×0.75	31,0	30,3	31,0	NEK 606
24×2×0.75	36,0	35,2	36,0	NEK 606
27×2×0.75	37,3	35,9	37,3	NEK 606
30×2×0.75	38,6	37,3	38,6	NEK 606
37×2×0.75	42,0	40,7	42,0	NEK 606
48×2×0.75	47,9	46,9	47,9	NEK 606
1×2×1	10,4	10,2	10,4	
2×2×1	16,4	15,4	16,4	
3×2×1	17,2	16,8	17,2	
4×2×1	18,8	18,1	18,8	
5×2×1	20,2	19,7	20,2	
7×2×1	22,0	21,2	22,0	
10×2×1	27,4	26,6	27,4	
12×2×1	28,4	27,4	28,4	
14×2×1	29,7	28,7	29,7	

Pairs: Number of cores x conductor cross-section	Outer diameter Nominal			NEK TS 606 S-type
	(i)	(c)	(i&c)	
mm²	mm	mm	mm	
19×2×1	33,0	31,8	33,0	
24×2×1	39,0	37,2	39,0	
27×2×1	39,8	38,0	39,8	
30×2×1	41,7	39,3	41,7	
37×2×1	45,0	42,8	45,0	
48×2×1	51,8	49,4	51,8	
1×2×1.5	11,3	11,2	11,3	NEK 606
2×2×1.5	18,4	18,0	18,4	NEK 606
3×2×1.5	19,4	19,0	19,4	NEK 606
4×2×1.5	21,0	20,7	21,0	NEK 606
5×2×1.5	22,9	22,4	22,9	NEK 606
7×2×1.5	24,9	24,4	24,9	NEK 606
10×2×1.5	31,4	30,8	31,4	NEK 606
12×2×1.5	32,4	31,8	32,4	NEK 606
14×2×1.5	34,1	33,5	34,1	NEK 606
19×2×1.5	38,3	37,2	38,3	NEK 606
24×2×1.5	45,2	44,4	45,2	NEK 606
27×2×1.5	46,3	45,3	46,3	NEK 606
30×2×1.5	47,9	47,1	47,9	NEK 606
37×2×1.5	52,1	50,8	52,1	NEK 606
48×2×1.5	59,7	58,5	59,7	NEK 606
1×2×2.5	12,5	12,1	12,5	NEK 606
2×2×2.5	20,4	20,0	20,4	NEK 606
3×2×2.5	21,7	21,1	21,7	NEK 606
4×2×2.5	23,6	23,1	23,6	NEK 606
5×2×2.5	25,8	25,0	25,8	NEK 606
7×2×2.5	28,1	27,3	28,1	NEK 606
10×2×2.5	35,6	34,6	35,6	NEK 606
12×2×2.5	36,7	35,7	36,7	NEK 606
14×2×2.5	39,1	37,6	39,1	NEK 606
19×2×2.5	44,1	42,3	44,1	NEK 606
24×2×2.5	52,0	50,0	52,0	NEK 606
27×2×2.5	53,1	51,2	53,1	NEK 606
30×2×2.5	55,1	53,0	55,1	NEK 606
37×2×2.5	59,5	57,9	59,5	NEK 606
48×2×2.5	68,7	66,2	68,7	NEK 606

Triples: Number	Outer diameter	NEK

Triples: Number of	Outer diameter	NEK

of cores x conductor cross-section	Nominal			TS 606 S-type
	(i)	(c)	(i&c)	
mm^2	mm	mm	mm	
1 x3 x 0,5	9,9	9,8	9,9	
2 x3 x 0,5	15,4	14,6	15,4	
3 x3 x 0,5	16,2	15,9	16,2	
4 x3 x 0,5	17,6	17,1	17,6	
5 x3 x 0,5	18,9	18,6	18,9	
7 x3 x 0,5	20,5	20,0	20,5	
10 x3 x 0,5	25,4	24,8	25,4	
12 x3 x 0,5	26,4	25,7	26,4	
14 x3 x 0,5	27,5	26,9	27,5	
19 x3 x 0,5	30,5	29,8	30,5	
24 x3 x 0,5	36,0	34,6	36,0	
27 x3 x 0,5	36,7	35,5	36,7	
30 x3 x 0,5	37,9	36,7	37,9	
37 x3 x 0,5	41,5	40,0	41,5	
48 x3 x 0,5	47,3	46,1	47,3	
1 x3 x 0,75	10,4	10,2	10,4	NEK 606
2 x3 x 0,75	16,4	16,0	16,4	NEK 606
3 x3 x 0,75	17,2	16,8	17,2	NEK 606
4 x3 x 0,75	18,8	18,3	18,8	NEK 606
5 x3 x 0,75	20,2	19,7	20,2	NEK 606
7 x3 x 0,75	22,0	21,2	22,0	NEK 606
10 x3 x 0,75	27,6	26,6	27,6	NEK 606
12 x3 x 0,75	28,4	27,4	28,4	NEK 606
14 x3 x 0,75	29,9	28,9	29,9	NEK 606
19 x3 x 0,75	33,2	32,0	33,2	NEK 606
24 x3 x 0,75	39,6	37,8	39,6	NEK 606
27 x3 x 0,75	40,4	38,6	40,4	NEK 606
30 x3 x 0,75	41,9	39,9	41,9	NEK 606
37 x3 x 0,75	45,2	43,6	45,2	NEK 606
48 x3 x 0,75	52,0	49,6	52,0	NEK 606
1 x3 x 1	10,8	10,6	10,8	
2 x3 x 1	17,2	16,8	17,2	
3 x3 x 1	18,3	17,7	18,3	
4 x3 x 1	19,8	19,3	19,8	
5 x3 x 1	21,5	20,8	21,5	
7 x3 x 1	23,2	22,6	23,2	
10 x3 x 1	29,2	28,2	29,2	
12 x3 x 1	30,1	29,3	30,1	
14 x3 x 1	31,7	30,6	31,7	

cores x conductor cross-section	Nominal			TS 606 S-type
	(i)	(c)	(i&c)	
mm^2	mm	mm	mm	
19 x3 x 1	35,2	34,0	35,2	
24 x3 x 1	42,0	40,2	42,0	
27 x3 x 1	43,0	41,0	43,0	
30 x3 x 1	44,5	43,0	44,5	
37 x3 x 1	48,0	46,4	48,0	
48 x3 x 1	55,4	53,4	55,4	
1 x3 x 1,5	12,0	11,6	12,0	NEK 606
2 x3 x 1,5	19,4	19,0	19,4	NEK 606
3 x3 x 1,5	20,7	20,0	20,7	NEK 606
4 x3 x 1,5	22,4	21,9	22,4	NEK 606
5 x3 x 1,5	24,4	23,7	24,4	NEK 606
7 x3 x 1,5	26,4	25,8	26,4	NEK 606
10 x3 x 1,5	33,6	32,6	33,6	NEK 606
12 x3 x 1,5	34,7	33,6	34,7	NEK 606
14 x3 x 1,5	36,5	35,4	36,5	NEK 606
19 x3 x 1,5	41,0	39,8	41,0	NEK 606
24 x3 x 1,5	48,6	47,0	48,6	NEK 606
27 x3 x 1,5	49,6	48,2	49,6	NEK 606
30 x3 x 1,5	51,5	49,8	51,5	NEK 606
37 x3 x 1,5	56,0	53,8	56,0	NEK 606
48 x3 x 1,5	64,6	61,8	64,6	NEK 606
1 x3 x 2,5	13,0	12,9	13,0	NEK 606
2 x3 x 2,5	21,6	21,2	21,6	NEK 606
3 x3 x 2,5	22,8	22,6	22,8	NEK 606
4 x3 x 2,5	25,0	24,6	25,0	NEK 606
5 x3 x 2,5	27,3	26,9	27,3	NEK 606
7 x3 x 2,5	29,6	29,3	29,6	NEK 606
10 x3 x 2,5	38,2	37,2	38,2	NEK 606
12 x3 x 2,5	40,0	39,0	40,0	NEK 606
14 x3 x 2,5	42,1	40,9	42,1	NEK 606
19 x3 x 2,5	46,8	46,1	46,8	NEK 606
24 x3 x 2,5	55,4	54,4	55,4	NEK 606
27 x3 x 2,5	56,5	55,7	56,5	NEK 606
30 x3 x 2,5	58,7	57,7	58,7	NEK 606
37 x3 x 2,5	64,0	62,5	64,0	NEK 606
48 x3 x 2,5	73,3	72,1	73,3	NEK 606

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.

Instrumentation, communication and control.
Flame retardant in bunch Cat. A. Halogen free. Low smoke.
Mud resistant.

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 150/250 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 60332-3-22	2018-07	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.
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 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test.	Fluorine content < 0,1%
IEC 61034-1/2	2013-06	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance >60%
NEK TS 606	2016	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	S-types only

Marking of product

Shandong Zhongchuan Cable Co., Ltd. – S101 RFOU(i) or S102 RFOU(c) or S101 RFOU(i) M or S102 RFOU(c) M – Size – 150/250V – IEC 60332-3-22 Cat.A – Year or
Shandong Zhongchuan Cable Co., Ltd.– RFOU(i) or RFOU(i&c) or RFOU(c) or RFOU(i) M or RFOU(i&c) M or RFOU(c) M – Size – 150/250V – 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