DNV·GL

Certificate No:
TAE0000389

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Low Voltage Cable

with type designation(s)
RFOU (i) S1/S5 250 V, RFOU (c) S2/S6 250 V, RFOU (i+c) 250 V

Issued to
Untel Kablolari San. ve Tic. A.S.
Dilovasi, Turkey

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)
RFOU (i) S1/S5 250 V	250	90
RFOU (c) S2/S6 250 V	250	90
RFOU (i+c) 250 V	250	90

Issued at **Hamburg** on **2019-01-18**
This Certificate is valid until **2024-01-17**.
DNV GL local station: **Istanbul**

for **DNV GL**

Approval Engineer: **Carsten Hunsalz**

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.

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Product description

Type: RFOU (i) S1/S5, RFOU (c) S2/S6 and RFOU (i+c) 250 V

Construction:

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

Number of pairs x conductor cross-section	Overall diameter Approx.	Overall diameter Approx.	Overall diameter Approx.
mm^2	mm	mm	mm
	RFOU(i)	RFOU(c)	RFOU(i+c)
1 x 2 x 0,75	10,1	10,1	
2 x 2 x 0,75	14,7	13,8	15,0
4 x 2 x 0,75	16,8	15,6	17,1
7 x 2 x 0,75	19,6	17,9	19,9
10 x 2 x 0,75	24,4	22,2	24,9
14 x 2 x 0,75	26,5	23,9	26,8
19 x 2 x 0,75	29,3	26,4	29,6
24 x 2 x 0,75	34,6	30,5	34,9
1 x 3 x 0,75	10,5	10,5	
2 x 3 x 0,75	16,1	14,9	16,4
4 x 3 x 0,75	18,3	17,0	18,8
7 x 3 x 0,75	21,7	19,8	22,0
14 x 3 x 0,75	27,0	24,7	27,3
19 x 3 x 0,75	29,4	26,6	29,7
24 x 3 x 0,75	33,0	29,5	33,3
1 x 2 x 1,5	11,3	11,3	
2 x 2 x 1,5	17,0	15,9	17,3
4 x 2 x 1,5	19,6	18,0	19,9
7 x 2 x 1,5	23,0	21,1	23,3
10 x 2 x 1,5	29,0	26,4	29,3
14 x 2 x 1,5	31,6	28,6	32,3
19 x 2 x 1,5	35,8	32,1	36,1
24 x 2 x 1,5	41,8	37,8	42,1
1 x 3 x 1,5	11,8	11,8	
2 x 3 x 1,5	18,7	17,4	19,0

Number of pairs x conductor cross-section	Overall diameter Approx.	Overall diameter Approx.	Overall diameter Approx.
mm^2	mm	mm	mm
	RFOU(i)	RFOU(c)	RFOU(i+c)
4 x 3 x 1,5	21,6	19,9	21,9
7 x 3 x 1,5	25,5	23,4	25,8
10 x 3 x 1,5	32,7	29,5	33,0
14 x 3 x 1,5	36,0	32,4	36,3
19 x 3 x 1,5	40,1	36,3	40,4
24 x 3 x 1,5	47,2	42,3	47,5
1 x 2 x 2,5	12,1	12,1	
2 x 2 x 2,5	18,6	17,3	18,9
4 x 2 x 2,5	21,3	19,8	21,8
7 x 2 x 2,5	25,4	23,2	25,7
10 x 2 x 2,5	32,5	29,2	32,8
14 x 2 x 2,5	35,7	32,1	36,0
19 x 2 x 2,5	39,6	36,0	40,1
24 x 2 x 2,5	46,9	42,0	47,2
1 x 3 x 2,5	12,8	12,8	
2 x 3 x 2,5	20,4	19,1	20,7
4 x 3 x 2,5	23,6	22,0	23,9
7 x 3 x 2,5	28,2	25,9	28,5
10 x 3 x 2,5	36,5	33,1	37,0
14 x 3 x 2,5	40,0	36,3	40,3
19 x 3 x 2,5	44,7	40,4	45,0
24 x 3 x 2,5	52,5	47,6	52,8
1 x 4 x 0,75	10,1	10,1	
1 x 4 x 1,5	11,3	11,3	
1 x 4 x 2,5	12,1	12,1	

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.	
EC 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 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	2009	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	S-types only

Marking of product

ÜNTEL – RFOU (i) (NEK 606 S1/S5) or RFOU (c) (NEK 606 S2/S6) or RFOU (i+c) – size – 250 V - IEC 60332-3-22

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