DNV·GL

TYPE APPROVAL CERTIFICATE

Certificate No:
E-14124
File No:
827.10
Job Id:
262.1-002361-2

This is to certify:

That the Electric Power Cable

with type designation(s)
RFOU P1/P8 0,6/1 kV, RFCU 0,6/1 kV, RFOU-VFD 0,6/1 kV,

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 60092-353 (2011-08)
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) (P-types only)

Application :

General power and lighting.
Flame retardant Cat. A. Halogen free. Low smoke. Mud resistant.

Type	Voltage class (kV)	Temp. class (°C)
RFOU P1/P8 0,6/1 kV	0,6/1	90
RFCU 0,6/1 kV	0,6/1	90
RFOU-VFD 0,6/1 kV	0,6/1	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.

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Product description

Type: RFOU P1/P8 0,6/1 kV, RFCU 0,6/1 kV, RFOU-VFD 0,6/1 kV

Construction:	
Conductors:	Tinned stranded copper class 2
Core Insulation:	EPR
Filler:	Extruded SHF1
Metal covering:	Tinned copper wire braid (O) or Galvanised steel wire braid (C) for multicore cables only Additional Cu-screen for VFD cable.
Outer sheath:	SHF2 or SHF Mud

RFOU P1/P8 0,6/1 kV, RFCU 0,6/1 kV:

Number of cores x conductor cross-section	Number of cores x conductor cross-section	Number of cores x conductor cross-section	Number of cores x conductor cross-section
mm^2	mm^2	mm^2	mm^2
1 x 10	3 x 150 / 75	4C+E X 10	3CX4
1 x 16	3 x 185 / 92.5	4C+E X 16	3CX6
1 x 25	3 x 240 / 120	4C+E X 25	3CX10
1 x 35		4C+E X 35	3CX16
1 x 50	3C+E X 2.5	4C+E X 50	3CX25
1 x 70	3C+ E X 4	4C+E X 70	3CX35
1 x 95	3C+E X 6	4C+E X 95	3CX50
1 x 120	3C+E X 10	4C+E X 120	3CX70
1 x 150	3C+E X 16	4C+E X 150	3CX95
1 x 185	3C+E X 25	4C+E X 185	3CX120
1 x 240	3C+E X 35	4C+E X 240	3CX150
1 x 300	3C+E X 50	4C+E X 300	3CX240
1 x 400	3C+E X 70	4C+E X 400	
1 x 500	3C+E X 95		4CX1.5
1 x 630	3C+E X 120	5 x 1,5 / 6	4CX2.5
1 x 800	3C+E X 150	5 x 2,5 / 6	4CX4
1 x 1000	3C+E X 185	7 x 1,5 / 6	4CX6
	3C+E X 240	7 x 2,5 / 6	4CX10
2 x 1,5 / 4		12 x 1,5 / 10	4CX16
2 x 2,5 / 4	4 x 1,5 / 4	12 x 2,5 / 10	4CX25
2 x 4 / 6	4 x 2,5 / 6	19 x 1,5 / 10	4CX35
2 x 6 / 6	4 x 4 / 6	19 x 2,5 / 10	4CX50
2 x 10 / 10	4 x 6 / 6	27 x 1,5 / 10	4CX70
2 x 16 / 16	4 x 10 / 10	27 x 2,5 / 16	4CX95
2 x 25 / 16	4 x 16 / 16	37 x 1,5 / 16	4CX120
	4 x 25 / 16	37 x 2,5 / 16	
3 x 1,5 /4	4 x 35 / 17.5		5CX2.5
3 x 2,5 / 6	4 x 50 / 25	**RFCU**	7CX1.5
3 x 4 / 6	4 x 70 / 35		7CX2.5
3 x 6 / 6	4 x 95 / 47.5	2CX1.5	12CX1.5
3 x 10 / 10	4 x 120 / 60	2CX2.5	12CX2.5
3 x 16 / 16	4 x 150 / 75	2CX4	19CX1.5
3 x 25 / 16	4 x 185 / 92.5	2CX6	19CX2.5
3 x 35 / 17.5	4 x 240 / 120	2CX10	27CX1.5
3 x 50 / 25		2CX16	27CX2.5
3 x 70 / 35	4C+E X 2.5	2CX25	37CX1.5
3 x 95 / 47.5	4C+E X 4	3CX1.5	37CX2.5
3 x 120 / 60	4C+E X 6	3CX2.5	

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.

Type Approval documentation

Data sheets: KEI RFOU P5/P12 0,6/1 and RFCU 0,6/1 kV dated 2010-06-07
Test reports KEI RFOU P5/P12 0,6/1 and RFCU 0,6/1 kV dated 2010-06-07

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.	
IEC 60092-353	2011-08	Electrical installations in ships - Part 353: Power cables for rated voltages 1 kV and 3 kV	
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 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 7d. Calcium Bromide 70°C 56d. Oil based mud: Carbo Sea 70°C 56d or EDC 95/11 70°C 56d

Marking of product

KEI - RFOU P1/P8 or RFCU or RFOU-VFD - size - 0,6/1 kV – 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