

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Electric Power Cable**with type designation(s)
P101 RFOU H-M, RFCU, RFOU-VFD,

Issued to

**KEI Industries Ltd.
Mumbai, Maharashtra, India**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 (kV)	Temp. class (°C)
P101 RFOU H-M	0,6/1	90
RFCU	0,6/1	90
RFOU-VFD	0,6/1	90

Issued at **Hamburg** on **2019-12-09**This Certificate is valid until **2024-12-08**.for **DNV GL**DNV GL local station: **Mumbai NB & CMC**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.



Product description

Type: P101 RFOU H-M, RFCU, RFOU-VFD

Construction:

Conductors: Tinned stranded copper class 2 or class 5

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 Oil and Mud

P101 RFOU H-M, RFCU

Number of cores x conductor cross-section mm ²	Number of cores x conductor cross-section mm ²	Number of cores x conductor cross-section mm ²	Number of cores x conductor cross-section 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.

General power and lighting.

Flame retardant in bunch Cat. A. Low smoke.

Oil and Mud resistant, Category d with Hydraulic/gear oil PARTHAN EP No.320 / ENKLO No.68

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 60092-353	2016-09	Electrical installations in ships - Part 353: Power cables for rated voltages 1 kV and 3 kV	
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%

Job Id: **262.1-030559-1**
Certificate No: **TAE00003U5**

Standard	Release	General description	Limitation
NEK TS 606	2016	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	P-types only, Mud resistance test: IRM902+IRM903 100°C 7d. Calcium Bromide 70°C 56d. <u>Oil based mud:</u> Carbo Sea 70°C 56d or EDC 95/11 70°C 56d <u>Hydraulic/gear oil:</u> PARTHAN EP No.320 / ENKLO No.68 100°C 7d.

Marking of product

KEI – P101 RFOU H-M or RFCU or RFOU-VFD - size - 0,6/1 kV – IEC 60332-3-22 - Cat A - Year

Place of Production

KEI Industries Limited, SP-919,920 & 922, Riico Industrial Area, Phase-III, Bhiwadi, Rajasthan-301019, INDIA.

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