DNV·GL

Certificate No:
TAE00003U6

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Electric Power Cable

with type designation(s)
P105 BFOU H-M, BFCU, BFOU 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)
P105 BFOU H-M	0,6/1	90
BFCU	0,6/1	90
BFOU VFD	0,6/1	90

Issued at **Hamburg** on **2019-12-09**

This Certificate is valid until **2024-12-08**.
DNV GL local station: **Mumbai NB & CMC**

Approval Engineer: **Carsten Hunsalz**

for **DNV GL**
Digitally Signed By: Schaarmann, Arne
Location: DNV GL SE Hamburg, Germany
Signing Date: 2019-12-09

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: P105 BFOU H-M, BFCU, BFOU-VFD

Construction:

Conductors:	Tinned stranded copper class 2 or class 5
Core Insulation:	Mica tape + EPR
Filler:	Extruded SHF1
Metal covering:	Tinned copper wire braid (O) or Galvanised steel wire braid (C) for multicore cables only Additional copper taped screen for Type BFOU-VFD
Outer sheath:	SHF2 or SHF Oil and Mud

P105 BFOU H-M, BFCU

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 70 / 35	4 x 150 / 75	3CX16
1 x 16	3 x 95 / 47.5	4 x 240 / 120	3CX25
1 x 25	3 x 120 / 60		3CX35
1 x 35	3 x 150 / 75	5 x 1,5 / 6	3CX50
1 x 50	3 x 185 / 95	5 x 2,5 / 6	3CX70
1 x 70	3 x 240 / 120	7 x 1,5 / 9	3CX95
1 x 95		7 x 2,5 / 10	3CX240
1 x 120	3C+E X 2.5	12 x 1,5 / 12	
1 x 150	3C+E X 4	12 x 2,5 / 13	
1 x 185	3C+E X 6	19 x 1,5 / 13	4CX1.5
1 x 240	3C+E X 10	19 x 2,5 / 14	4CX 2.5
1 x 300	3C+E X 16	27 x 1,5 / 16	4CX4
1 x 400	3C+E X 25	27 x 2,5 / 19	4CX6
1 x 500	3C+E X 35	37 x 1,5 / 25	4CX10
1 x 630	3C+E X 50	37 x 2,5 / 30	4CX16
1 x 800	3C+E X 70		4CX25
1 x 1000	3C+E X 95	**BFCU**	4CX35
	3C+E X 120		4CX50
2 x 1,5 / 7	3C+E X 150	2CX1.5	4CX70
2 x 2,5 / 7	3C+E X 185	2CX2.5	4CX95
2 x 4 / 8	3C+E X 240	2CX4	
2 x 6 / 8		2CX6	5CX2.5
2 x 10 / 10	4 x 1,5 / 7	2CX10	7C x 1.5
2 x 16 / 16	4 x 2,5 / 8	2CX16	7CX2.5
2 x 25 / 16	4 x 4 / 9	2CX25	8C x 2.5
	4 x 6 / 9	2CX50	12CX1.5
3 x 1,5 /7	4 x 10 / 10	2CX70	12CX2.5
3 x 2,5 / 7	4 x 16 / 16	2CX95	14C x 2.5
3 x 4 / 8	4 x 25 / 16	2CX120	19CX1.5
3 x 6 / 9			19CX2.5
3 x 10 / 10	4 x 35 / 17.5	3CX1.5	21C x 1.5
3 x 16 / 16	4 x 50 / 25	3CX2.5	27CX1.5
3 x 25 / 16	4 x 70 / 35	3CX4	27CX2.5
3 x 35 / 17.5	4 x 95 / 47.5	3CX6	37CX1.5
3 x 50 / 25	4 x 120 / 60	3CX10	37CX2.5

Job Id: **262.1-002361-5**
Certificate No: **TAE00003U6**

Application / Limitation

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

Data sheets: KEI BFOU P5/P12 0,6/1 and BFCU 0,6/1 kV and BFOU VFD 0,6/1kV dated 2009-09-10
KEI/19/DNV DATED: 08 March 2019
Test reports KEI BFOU P5/P12 0,6/1 and BFCU 0,6/1 kV BFOU VFD 0,6/1kV dated 2010-06-02
KEI DNV/19/IT/01 dated 2019-09-04/05/13/20 and 2019-11-02 and 2019-06-10

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 60331-1	2018-03	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 120 min
IEC 60331-21	1999-04	Tests for electric cables under fire conditions – Circuit integrity – Part 21: Procedures and requirements – Cables of rated voltage up to and including 0,6/1,0 kV	Minimum 90 min + 15 min cooling down time
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

Standard	Release	General description	Limitation
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	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. Oil based mud: Carbo Sea 70°C 56d or EDC 95/11 70°C 56d Hydraulic/gear oil: PARTHAN EP No.320 / ENKLO No.68 100°C 7d.

Marking of product

KEI – P105 BFOU H-M or BFCU or BFOU-VFD – size - 0,6/1 kV - IEC 60331-1/21 - 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