DNV·GL

Certificate No:
TAE00000XM

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Electric Power Cable

with type designation(s)
BFOU P5 0,6/1 kV, BFOU P5/P12 0,6/1 kV, BFOU-VFD 0,6/1kV

Issued to
TriCab (USA) Inc.
Worcester MA, United States

is found to comply with
DNV GL rules for classification – Ships and offshore units

Application :

General power and lighting
Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Type	Voltage class (kV)	Temp. class (°C)
BFOU P5 0,6/1 kV	**0,6/1**	**90**
BFOU P5/P12 0,6/1 kV	**0,6/1**	**90**
BFOU-VFD 0,6/1kV	**0,6/1**	**90**

This Certificate is valid until **2018-06-30**.

Issued at **Høvik** on **2016-01-25**

for **DNV GL**

DNV GL local station: **New York**

Approval Engineer: **Marta Alonso Pontes**

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: BFOU P5 0,6/1 kV (NTC)
BFOU P5/ P12 0,6/1 kV (NTM)
BFOU-VFD 0,6/1kV (NFC or NFM)

Construction:
Conductors: Tinned stranded copper, Class 5
Core insulation: Mica tape + EPR
Inner covering: Flame retardant halogen free compound
Metal covering: Tinned copper wire braid
Outer sheath: SHF2 for P5 and NFC
SHF2 MUD For P5/P12 and NFM

Number of cores x cross-section	Overall diameter
mm^2	mm
1 x 2,5	10,0
1 x 4	10,4
1 x 6	11,0
1 x 10	12,2
1 x 16	13,7
1 x 25	15,5
1 x 35	17,1
1 x 50	18,9
1 x 70	20,7
1 x 95	23,3
1 x 120	25,2
1 x 150	27,6
1 x 185	29,7
1 x 240	33,2
1 x 300	36,4
1 x 400	40,5
1 x 500	45,0
1 x 630	48,8
2 x 1,5	13,9
2 x 2,5	15,6
2 x 4	16,6
2 x 6	17,8
2 x 10	20,0
2 x 16	22,4
2 x 25	25,7
2 x 35	28,5
2 x 50	32,6
2 x 70	36,1
2 x 95	41,6
2 x 120	45,6
2 x 150	50,3
2 x 185	54,8
2 x 240	60,9
2 x 300	66,4
2 x 400	75,1
2 x 500	82,8

Number of cores x cross-section	Overall diameter
mm^2	mm
3 x 1,5	15,0
3 x 2,5	16,4
3 x 4	17,4
3 x 6	18,7
3 x 10	21,1
3 x 16	23,6
3 x 25	27,1
3 x 35	30,4
3 x 50	34,7
3 x 70	38,9
3 x 95	44,7
3 x 120	48,5
3 x 150	53,6
3 x 185	58,8
3 x 240	65,0
3 x 300	71,1
3 x 400	80,3
3 x 500	88,5
4 x 1,5	16,0
4 x 2,5	17,8
4 x 4	18,7
4 x 6	20,4
4 x 10	23,0
4 x 16	25,7
4 x 25	29,7
4 x 35	33,7
4 x 50	38,7
4 x 70	42,7
4 x 95	49,3
4 x 120	53,6
4 x 150	59,2
4 x 185	65,0
4 x 240	71,9
4 x 300	79,1
4 x 400	88,9
4 x 500	98,7

Number of cores x cross-section	Overall diameter
mm^2	mm
5 x 1,5	17,5
5 x 2,5	19,4
5 x 4	20,5
5 x 6	22,3
5 x 10	25,2
5 x 16	28,3
5 x 25	33,4
5 x 35	37,6
5 x 50	42,7
5 x 70	47,8
5 x 95	54,8
5 x 120	59,5
5 x 150	66,0
5 x 185	72,4
5 x 240	80,2
5 x 300	88,1
5 x 400	99,7
5 x 500	110,1
7 x 1,5	18,8
10 x 1,5	23,2
12 x 1,5	24,0
14 x 1,5	25,3
16 x 1,5	26,5
19 x 1,5	28,0
21 x 1,5	29,5
24 x 1,5	32,6
27 x 1,5	33,7
33 x 1,5	36,6
37 x 1,5	37,8
7 x 2,5	20,9
10 x 2,5	25,9
12 x 2,5	26,9
14 x 2,5	28,3
16 x 2,5	29,8
19 x 2,5	31,4
21 x 2,5	33,8

Number of cores x cross-section	Overall diameter
mm²	mm
24 x 2,5	37,3
27 x 2,5	38,5
33 x 2,5	41,3
37 x 2,5	42,8
BFOU-VFD	
3X10 + 3X4	22

Number of cores x cross-section	Overall diameter
mm²	mm
3X16 + 3X6	23,6
3X25 + 3X6	27,3
3X35 + 3X6	29,9
3X50 + 3X10	34,6
3X70 + 3X16	39,3
3X95 + 3X16	44,1
3X120 + 3X25	48,3

Number of cores x cross-section	Overall diameter
mm²	mm
3X150 + 3X25	51,9
3X185 + 3X35	57,5
3X240 + 3X50	63,1
3X300 + 3X50	70,3
3X400 + 3X70	78,6
3X500 + 3X95	86,1

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.

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
IEC 60092-350	2008-02	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	0,6/1 kV
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	
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.
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	2005-04	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance ≥60%

Standard	Release	General description	Limitation
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

TRICAB – BFOU P5 or BFOU P5/P12 or BFOU-VFD NFC or BFOU-VFD NFM – size – 0,6/1 kV – IEC 60332-3-22 – IEC 60331-21 - Tricab Lot No.

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 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