DNV·GL

Certificate No:
TAE000015V

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Low Voltage Cable

with type designation(s)
BFOU (i) S3/S7 & (c) S4/S8 250 V, BFCU (i) & (c) 250 V, BFOU (i) S3/S7 XFR & (c) S4/S8 XFR 250 V, BFCU (i) XFR & (c) XFR 250 V

Issued to
Draka Norsk Kabel - part of the Prysmian Group
DRAMMEN, Norway

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

Application :

Control. Instrumentation. Communication. Fire resistant.
Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Type	Voltage class (V)	Temp. class (°C)
BFOU (i) S3/S7 & (c) S4/S8 250 V	**250**	**90**
BFCU (i) & (c) 250 V	**250**	**90**
BFOU (i) S3/S7 XFR & (c) S4/S8 XFR 250 V	**150/250**	**90**
BFCU (i) XFR & (c) XFR 250 V	**150/250**	**90**

This Certificate is valid until **2021-06-29**.

Issued at **Høvik** on **2016-07-21**

for **DNV GL**

DNV GL local station: **Station Oslo Maritime and CAP**

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

Types: BFOU (i) S3/S7 & (c) S4/S8 250 V and BFCU (i) & (c) 250 V.
BFOU (i) S3/S7 XFR & (c) S4/S8 & XFR 250 V
BFCU (i) XFR & (c) XFR 250 V
On request: Cold bend -40°C / Cold impact -35°C.

Construction:

Conductors:	Tinned, stranded copper and Mica-tape helically applied directly over the copper conductor
Core insulation:	EPR
Inner covering:	Extruded flame retardant halogen free compound
Metal covering:	Tinned, Copper wire braid (O) or Galvanized steel wire braid (C)
Outer sheath:	SHF2 mud resistant according to IEC 60092-360 Annex D. NEK TS 606.

BFOU:

Number of cores x conductor cross-section
mm^2
1 x 2 x 0,75
1 x 4 x 0,75
2 x 2 x 0,75
4 x 2 x 0,75
8 x 2 x 0,75
12 x 2 x 0,75
16 x 2 x 0,75
19 x 2 x 0,75
24 x 2 x 0,75
1 x 2 x 1,5
2 x 2 x 1,5
4 x 2 x 1,5

Number of cores x conductor cross-section
mm^2
8 x 2 x 1,5
12 x 2 x 1,5
16 x 2 x 1,5
19 x 2 x 1,5
24 x 2 x 1,5
1 x 2 x 2,5
2 x 2 x 2,5
4 x 2 x 2,5
8 x 2 x 2,5
12 x 2 x 2,5
16 x 2 x 2,5
24 x 2 x 2,5

Number of cores x conductor cross-section
mm^2
1 x 3 x 0,75
2 x 3 x 0,75
4 x 3 x 0,75
8 x 3 x 0,75
12 x 3 x 0,75
16 x 3 x 0,75
19 x 3 x 0,75
24 x 3 x 0,75
1 x 3 x 1,5
2 x 3 x 1,5
4 x 3 x 1,5

Number of cores x conductor cross-section
mm^2
8 x 3 x 1,5
12 x 3 x 1,5
16 x 3 x 1,5
24 x 3 x 1,5
1 x 3 x 2,5
4 x 3 x 2,5
8 x 3 x 2,5
12 x 3 x 2,5
16 x 3 x 2,5

BFOU-XFR collective screen:

Number of cores x conductor cross-section
mm2
2 x 2 x 0,75
4 x 2 x 0,75
8 x 2 x 0,75
12 x 2 x 0,75
16 x 2 x 0,75
24 x 2 x 0,75
2 x 3 x 0,75
4 x 3 x 0,75
8 x 3 x 0,75

Number of cores x conductor cross-section
mm2
12 x 3 x 0,75
16 x 3 x 0,75
24 x 3 x 0,75
2 x 2 x 1,5
4 x 2 x 1,5
8 x 2 x 1,5
12 x 2 x 1,5
16 x 2 x 1,5
24 x 2 x 1,5

Number of cores x conductor cross-section
mm2
2 x 3 x 1,5
4 x 3 x 1,5
8 x 3 x 1,5
12 x 3 x 1,5
16 x 3 x 1,5
24 x 3 x 1,5
2 x 2 x 2,5
4 x 2 x 2,5
8 x 2 x 2,5

Number of cores x conductor cross-section
mm2
12 x 2 x 2,5
16 x 2 x 2,5
24 x 2 x 2,5
2 x 3 x 2,5
4 x 3 x 2,5
8 x 3 x 2,5
12 x 3 x 2,5
16 x 3 x 2,5

BFOU-XFR Individual screen:

Number of cores x conductor cross-section
mm2
1 x 2 x 0,75
2 x 2 x 0,75
4 x 2 x 0,75
8 x 2 x 0,75
12 x 2 x 0,75
16 x 2 x 0,75
24 x 2 x 0,75
1 x 3 x 0,75
2 x 3 x 0,75
4 x 3 x 0,75

Number of cores x conductor cross-section
mm2
8 x 3 x 0,75
12 x 3 x 0,75
16 x 3 x 0,75
24 x 3 x 0,75
1 x 2 x 1,5
2 x 2 x 1,5
4 x 2 x 1,5
8 x 2 x 1,5
12 x 2 x 1,5
16 x 2 x 1,5

Number of cores x conductor cross-section
mm2
24 x 2 x 1,5
1 x 3 x 1,5
2 x 3 x 1,5
4 x 3 x 1,5
8 x 3 x 1,5
12 x 3 x 1,5
16 x 3 x 1,5
24 x 3 x 1,5
1 x 2 x 2,5
2 x 2 x 2,5

Number of cores x conductor cross-section
mm2
4 x 2 x 2,5
8 x 2 x 2,5
12 x 2 x 2,5
16 x 2 x 2,5
1 x 3 x 2,5
2 x 3 x 2,5
4 x 3 x 2,5
8 x 3 x 2,5
12 x 3 x 2,5

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	Issued	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	2003-05	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.	
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 0,6/1,0 kV	90 min. test @750 ºC + 15 minutes cooling down
IEC 60331-1/2	2009-05	Fire resistance / Circuit integrity – Test for method for fire with shock at temperature of at least 830ºC for cables rated up to and including 0,6/1kV	90 minutes @830 ºC + 15 minutes cooling down
IEC 60332-1-2	2004-07	Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable	
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	Bunch test Category A
IEC 60754-1	2011-11	Test on gases evolved during combustion of materials from cables – Determination of the amount of halogen acid gas	Low Halogen: <0,5% Halogen

Standard	Issued	General description	Limitation
IEC 60754-2	2011-11	Test on gases evolved during combustion of materials from cables – Determination of the degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity	Halogen free: pH > 4,3 Conductivity < 10µS
IEC 61034-1/2	2005-04	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke
NEK TS606 Ed. 4*	2009-05	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	S-types only

* Only S-types comply with NEK TS 606

On special request (-XFR):

EN50200	2006-05	Method of test for resistance to fire of unprotected small cables for use in emergency circuits. The standard also includes in Annex E a means of applying water spray to the cable during the test.	Water spray during 90 to 180 minutes of flame application
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 0,6/1,0 kV	180 min. test @1000 ºC

On special request: Arctic Grade

IEC 60092-350	2014-08	Annex E: Cold bend test and impact test for low temperature behaviour	Cold bend: -40°C Cold impact: -35°C
CSA C22.2 No.03	2009	4.12 Flexibility at any specified temperature	Cold bend: -40°C
CSA C22.2 No.03	2009	4.13 Abnormal low temperature – impact	Cold impact: -35°C

Marking of product

DRAKA 01 – meter – year - BFOU (i) S3/S7 or (c) S4/S8 – ARCTIC GRADE (optional) – XFR (optional) - size – 150/250 V – IEC 60331 – IEC 60332-3-22 or
DRAKA 01 – meter – year - BFCU (i) or (c) – ARCTIC GRADE (optional) – XFR (optional) – size – 150/250 V – IEC 60331 – 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) and selected type tests (ref. to applicable class programs) checked (if not available these tests shall 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