

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Low Voltage Cable**

with type designation(s)

**BFOU-JF(i+c) 1000V / 250 kW/m² / 1200° C,
BFOU-JF(i) 1000V / 250 kW/m² / 1200° C**

Issued to

**Prysmian Group Norge AS
DRAMMEN, Norway**

is found to comply with

DNV GL rules for classification – Ships and offshore units**DNV GL class programme DNVGL-CP-0399 – Type approval – Electric cables****Application :****Control and instrumentation.****Jet fire resistant 30 minutes.****Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.**

Type	Rated voltage (V)	Temp. class (°C)
BFOU-JF(i+c) 1000V / 250 kW/m² / 1200° C	0,6/1	90
BFOU-JF(i) 1000V / 250 kW/m² / 1200° C	0,6/1	90

This Certificate is valid until **2021-06-29**.Issued at **Høvik** on **2020-10-14**DNV GL local station: **Oslo Maritime and CAP**for **DNV GL**Approval Engineer: **Ivar Bull**

**Marta Alonso Pontes
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: BFOU-JF(i+c) 1000V / 250 kW/m² / 1200° C,
BFOU-JF(i) 1000V / 250 kW/m² / 1200° C

Control and instrumentation cables designed according to IEC 60092-376 and NEK TS 606 Ed5: 2016.
Enhanced insulation thickness and voltage class.

Construction:

Conductors: Tinned, stranded copper and Mica-tape helically applied directly over the copper conductor
Core insulation: EPR
Individual screen: Copper backed polyester tape with tinned copper drain wire (i)
Collective screen: Copper backed polyester tape with tinned copper drain wire (c)
Inner covering: Extruded flame retardant halogen free compound
Braid armour: Tinned, Copper wire braid (O)
Outer sheath: SHF2 Mud resistant according to IEC 60092-360 Annex D. NEK TS 606.
JF protection: Extruded heat block compound
Tape: Lapped glass fibre tape
Overall sheath: Flame retardant, halogen free thermoplastic compound SHF1

No of pairs:	Cross sectional area [mm ²]
1, 4, 8	1,5
1	2,5

*) Test performed on smallest cross section in range 3x 1,5mm².

Application/Limitation

This type of cable is Jet fire resistant for 30 minutes in accordance with International Standard ISO 22899-1.

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

Tests carried out on a standard BFOU P5/P12 cable E-11343:

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	2017-05	Cables for control and instrumentation circuits 150/250 V (300 V) Electrical installations in ships - Part 376: Cables for control and instrumentation circuits 150/250 V (300 V)	
IEC 60092-360	2014-04	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	120 min. test @1000 °C
IEC 60331-1/2	2009-05	Fire resistance / Circuit integrity – Test for method for fire with shock at temperature of at least 830°C for cables rated up to and including 0,6/1kV	120 minutes @830 °C + 15 minutes cooling down

Job Id: **262.1-002558-13**
Certificate No: **TAE0000455**

Standard	Issued	General description	Limitation
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
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	2013-07 2013-09	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance ≥60%

Additional test carried out on BFOU-JF cable:

NEK TS 606	2016	Cables for offshore installations - halogen-free low smoke flame-retardant / fire-resistant (HFFR-LS)	
ISO 22899-1	2007-12	Determination of the resistance to jet fires of passive fire protection materials -- Part 1: General requirements	Successful test 30 minutes @ Heat flux 250W/m2. Acceptance criteria: Fault current <30mA

Marking of product

Eg. "meter" "year" "week no" DRAKA 01 "part no" BFOU-JF(i+c) or BFOU-JF(i) - 1000V - 1200/30 FLEX - FLAME IEC 60332-3-22, IEC 60092-376, "Prod. order 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 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.

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