DNV·GL

Certificate No:
TAE000025H

TYPE APPROVAL CERTIFICATE

This is to certify:

That the High Voltage Cable

with type designation(s)
P120 RFOU H-M FIRE RESISTANT 3,6/6 kV, P121 RFOU H-M FIRE RESISTANT 6/10 kV, P122 RFOU H-M FIRE RESISTANT 8,7/15 kV, P123 RFOU H-M FIRE RESISTANT 12/20 kV

Issued to
Controlcavi Industria S.r.l.
FERENTINO, Italy

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

General power.
Fire mechanical shocks and water jets resistant BS 8491 Cat. F120
After burning: Water Submersion 15 minutes @rated voltage.

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)
P120 RFOU H-M FIRE RESISTANT 3,6/6 kV	3,6/6	90
P121 RFOU H-M FIRE RESISTANT 6/10 kV	6/10	90
P122 RFOU H-M FIRE RESISTANT 8,7/15 kV	8,7/15	90
P123 RFOU H-M FIRE RESISTANT 12/20 kV	12/20	90

Issued at **Høvik** on **2017-09-26**
This Certificate is valid until **2022-06-30**.
DNV GL local station: **Milan**

for **DNV GL**

Approval Engineer: **Ivar Bull**

Andreas Kristoffersen
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

Construction:

Conductors:	Tinned, annealed flexible copper class 2 or class 5
Conductor screen:	Semiconducting LSOH compound
Core insulation:	HF HEPR + heat resistant rubber insulating compound
Insulation screen:	Semiconducting LSOH compound
Core screen:	Plain copper tape overlapping 50%
Firebar protection	Fibreglass tapes + fillers
Inner sheath:	Halogen free compound
EMC protection:	Cu-PET tapes overlapping 50%
Metal covering:	Tinned copper wire braid
Firebar protection	Fibreglass tapes
Sheath:	SHF2 H-M (Oils & Muds resistant) Tested with Total AZOLLA 68 hydraulic oil.

Type:	No of cores:	Cross sectional area [mm^2]
P120 RFOU FIRE RES. 3,6/6 kV	1	50 – 300
P120 RFOU FIRE RES. 3,6/6 kV	3	50 – 240
P121 RFOU FIRE RES. 6/10 kV	1	50 – 300
P121 RFOU FIRE RES. 6/10 kV	3	50 – 150
P122 RFOU FIRE RES. 8,7/15 kV	1	50 – 300
P122 RFOU FIRE RES. 8,7/15 kV	3	50 – 150
P123 RFOU FIRE RES. 12/20 kV	1	50 – 300
P123 RFOU FIRE RES. 12/20 kV	3	50 – 150

Application/Limitation

This type of cable is fire resistant according to IEC 60331-1/2 and BS 8491 F120
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

	Release	General description	Limitation
DNVGL-CP-0399	2016-03	Class Programme Electric cables	
IEC 60092-350	2014-08	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.	Including: Ozone resistance
IEC 60092-354	2014-08	Electrical installations in ships - Part 354: Single- and three-core power cables with extruded solid insulation for rated voltages 6 kV (Um = 7,2 kV) up to 30 kV (Um = 36 kV)	
IEC 60228	2004-11	Conductors of insulated cables	

	Release	General description	Limitation
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 0,6/1 kV	120 min
IEC 60332-1-2	2015-07	Tests on eletric cables under fire conditions. 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 - Part 1: Determination of the halogen acid gas content	Low Halogen: <0,5% Halogen
IEC 60533	2011-08	Electrical and electronic installations in ships – Electromagnetic compatibility (EMC)	Table B.1 Transfer imedance < 30 mΩ/m.
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 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test.	Fluorine content < 0,1%
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%
CSA C22.2 No. 38.05	2007-03	Thermoset Insulated Wires and cables. Cold bending & impact tests	Cold bend: -40°C Cold impact: -40°C
CSA C22.2 No. 0.3-01	2005-01	Test Methods	
UL 1581	2013-01	Reference Standard for Electrical Wires, Cables, and Flexible Cords. Paragraph 1200.1: Sunlight resistance Carbon arc and Xenon arc test.	720h. Max tensile strenght and elongation@break decay 20%.
NEK 606 Ed.5	2016	Cables for offshore installations halogen-free, low smoke,flame retardant/fire resistant. Technical specification.	
BS 8491	2008-01	Method for assessment of fire integrity of large diameter power cables for use as components for smoke and heat control systems and certain other active fire safety systems	Cat F120: 120 minutes@ 830°C @ rated voltage with impact directly on cable and 5 min of water jet. In addition : after burning, 15 minutes water submersion @ rated voltage

Marking of product

CCI –
P120 RFOU H-M FIRE RESISTANT 3,6/6 kV or
P121 RFOU H-M FIRE RESISTANT 6/10 kV or
P122 RFOU H-M FIRE RESISTANT 8,7/15 kV or
P123 RFOU H-M FIRE RESISTANT 12/20 kV -
Size – IEC 60092-354 – NEK 606 - IEC 60332-3-22 Cat.A – BS 8491 Cat F120 – Year meter mark-QA 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