

TYPE APPROVAL CERTIFICATE

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

with type designation(s)

RFOU P2 & P2/P9 3,6/6 kV, RFOU P3 & P3/P10 6/10 kV, RFOU P4 & P4/P11 8,7/15 kV, RFOU P19 & P19/P21 12/20 kV

Issued to

**Prysmian Tianjin Cables Co., Ltd.
Tianjin, China**

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	Voltage (kV)	Temp. class (°C)
RFOU P2 & P2/P9 3,6/6 kV	3,6/6	90
RFOU P3 & P3/P10 6/10 kV	6/10	90
RFOU P4 & P4/P11 8,7/15 kV	8,7/15	90
RFOU P19 & P19/P21 12/20 kV	12/20	90

This Certificate is valid until **2021-12-31**.Issued at **Hamburg** on **2017-01-25**DNV GL local station: **Tianjin**for **DNV GL**Approval Engineer: **Holger Jansen**

Joannis Papanuskas
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: RFOU P2 & P2/P9 3,6/6 kV
RFOU P3 & P3/P10 6/10 kV
RFOU P4 & P4/P11 8,7/15 kV
RFOU P19 & P19/P20 12/20 kV

Conductors: Tinned, stranded copper class 2 or class 5
Core insulation: HF-HEPR
Screening: Tinned copper wire braid
Inner covering: Halogen-free compound
Metal covering: Tinned copper wire braid
Outer sheath: SHF2 or SHF Mud

Type: RFOU P2 & P2/P9 3,6/6 kV

Number of cores x conductor cross- section mm ²	Overall diameter Nominal Mm
1 x 25	24,0
1 x 35	25,1
1 x 50	26,3
1 x 70	28,2
1 x 95	30,0
1 x 120	31,8
1 x 150	33,5
1 x 185	35,4
1 x 240	38,8
1 x 300	42,3

Number of cores x conductor cross- section mm ²	Overall diameter Nominal mm
3 x 25	45,4
3 x 35	47,6
3 x 50	50,9
3 x 70	54,8
3 x 95	58,9
3 x 120	63,5
3 x 150	67,4

Type: RFOU P3 & P3/P10 6/10 kV

Number of cores x conductor cross- section mm ²	Overall diameter Nominal mm
1 x 25	26,0
1 x 35	26,9
1 x 50	28,3
1 x 70	30,0
1 x 95	32,0
1 x 120	33,8
1 x 150	35,3
1 x 185	37,8
1 x 240	41,0
1 x 300	43,7

Number of cores x conductor cross- section mm ²	Overall diameter Nominal mm
3 x 25	50,1
3 x 35	52,2
3 x 50	55,1
3 x 70	58,9
3 x 95	63,5
3 x 120	67,6
3 x 150	71,7

Type: RFOU P4 & P4/P11 8,7/15 kV

Number of cores x conductor cross- section mm ²	Overall diameter Nominal mm

Number of cores x conductor cross- section mm ²	Overall diameter Nominal mm

Job Id:
Certificate No: **TAE00001NN**

Number of cores x conductor cross- section mm ²	Overall diameter Nominal mm
1 x 25	28,4
1 x 35	29,3
1 x 50	30,7
1 x 70	32,4
1 x 95	34,4
1 x 120	36,6
1 x 150	38,1
1 x 185	40,6
1 x 240	43,4
1 x 300	46,3

Number of cores x conductor cross- section mm ²	Overall diameter Nominal mm
3 x 25/16	55,3
3 x 35/16	57,5
3 x 50/25	60,6
3 x 70/35	64,4
3 x 95/50	68,7
3 x 120/60	72,7
3 x 150/75	76,8

Type: RFOU P19 & P19/P20 12/20 kV

Number of cores x conductor cross- section mm ²	Overall diameter Nominal mm
1 x 35	31,5
1 x 50	32,9
1 x 70	34,6
1 x 95	37,0
1 x 120	38,8
1 x 150	40,7
1 x 185	42,9
1 x 240	45,8
1 x 300	48,5

Number of cores x conductor cross- section mm ²	Overall diameter Nominal mm
3 x 35/16	62,6
3 x 50/25	65,4
3 x 70/35	69,1
3 x 95/50	73,4
3 x 120/60	77,4
3 x 150/75	81,9

Application/Limitation

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. Halogen free. Low smoke. Cold bend -40°C. Cold impact -35°C
Flame retardant in bunch Cat. A. Mud resistant

Type Approval documentation

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 60092-354	2014-08	Single- and three-core power cables with extruded solid insulation for rated voltages 6 kV ($U_m=7,2$ kV) up to 30 kV ($U_m=36$ kV)	

Job Id:
Certificate No: **TAE00001NN**

Standard	Release	General description	Limitation
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 60332-1-2	2015-07	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 – Procedure for 1 kW pre-mixed flame	
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 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test	Fluorine content < 0,1%
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
IEC 61034-1/2	2013-06	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke
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
NEK TS 606	2016	Cables for offshore installation. Halogen-free low smoke and flame-retardant / fire resistant (HFFR-LS) Technical specification.	

Marking of product

PRYSMIAN PT – TEOF RFOU P2 or P2/P9 3,6/6 kV or RFOU P3 or P3/P10 6/10 kV or RFOU P4 or P4/P11 8,7/15 kV or P19 or P19/P20 12/20 kV – IEC 60332-3-22 Cat.A – Year

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.



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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