DNV·GL

Certificate No:
**TAE00001NJ**

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the Low Voltage Cable**

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

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 class (V) | Temp. class (°C) |
|---|---|---|
| **BFOU (i) S3 & (c) S4 250 V** | **250** | **90** |
| **BFOU (i) S3/S7 & (c) S4/S8 250 V** | **250** | **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.


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## Product description

Type: BFOU (i) S3 & (c) S4 250 V & BFOU (i) S3/S7 & (c) S4/S8 250 V

| | |
|---|---|
| Conductors: | Tinned, stranded copper class 2 or class 5 |
| Core insulation: | Mica tape + HF-EPR |
| Screen: | Copper/polyester tape w/tinned copper drain wire |
| Inner covering: | Halogen free compound |
| Metal covering: | Tinned copper wire braid |
| Sheath: | SHF 2 or SHF Mud |

| Number of cores x conductor cross-section | Overall diameter Nominal | |
|---|---|---|
| | (i) | (c) |
| $mm^2$ | mm | mm |
| 1 x 2 x 0,75 | 11,5 | - |
| 2 x 2 x 0,75 | 14,6 | 14,3 |
| 4 x 2 x 0,75 | 17,9 | 16,8 |
| 7 x 2 x 0,75 | 20,6 | 19,8 |
| 8 x 2 x 0,75 | 22,1 | 20,9 |
| 12 x 2 x 0,75 | 26,2 | 24,6 |
| 16 x 2 x 0,75 | 28,8 | 26,9 |
| 19 x 2 x 0,75 | 30,3 | 28,3 |
| 24 x 2 x 0,75 | 34,5 | 32,3 |
| 32 x 2 x 0,75 | 37,8 | 35,7 |
| | | |
| 1 x 2 x 1,0 | 11,9 | - |
| 2 x 2 x 1,0 | 15,2 | 14,8 |
| 4 x 2 x 1,0 | 18,6 | 18,0 |
| 7 x 2 x 1,0 | 21,5 | 20,8 |
| 8 x 2 x 1,0 | 23,6 | 22,2 |
| 12 x 2 x 1,0 | 27,4 | 26,1 |
| 16 x 2 x 1,0 | 30,2 | 28,6 |
| 19 x 2 x 1,0 | 31,8 | 30,0 |
| 24 x 2 x 1,0 | 36,4 | 34,1 |
| 32 x 2 x 1,0 | 39,9 | 37,9 |
| | | |
| 1 x 2 x 1,5 | 13,1 | - |
| 2 x 2 x 1,5 | 16,8 | 16,4 |
| 4 x 2 x 1,5 | 20,7 | 19,9 |
| 7 x 2 x 1,5 | 24,5 | 23,7 |
| 8 x 2 x 1,5 | 26,4 | 25,3 |
| 12 x 2 x 1,5 | 31,2 | 29,6 |
| 16 x 2 x 1,5 | 34,2 | 32,5 |
| 19 x 2 x 1,5 | 36,6 | 34,1 |
| 24 x 2 x 1,5 | 41,8 | 39,4 |
| 32 x 2 x 1,5 | 45,4 | 43,7 |
| | | |
| 1 x 2 x 2,5 | 14,0 | — |

| Number of cores x conductor cross-section | Overall diameter Nominal | |
|---|---|---|
| | (i) | (c) |
| $mm^2$ | mm | mm |
| 1 x 3 x 0,75 | 11,9 | - |
| 3 x 3 x 0,75 | 18,4 | 17,9 |
| 4 x 3 x 0,75 | 19,7 | 19,0 |
| 7 x 3 x 0,75 | 23,6 | 22,1 |
| 12 x 3 x 0,75 | 29,6 | 28,2 |
| 16 x 3 x 0,75 | 32,6 | 31,1 |
| 19 x 3 x 0,75 | 34,4 | 32,4 |
| 24 x 3 x 0,75 | 39,6 | 37,5 |
| | | |
| | | |
| | | |
| 1 x 3 x 1,0 | 12,6 | - |
| 3 x 3 x 1,0 | 19,3 | 18,7 |
| 4 x 3 x 1,0 | 20,9 | 20,0 |
| 7 x 3 x 1,0 | 24,8 | 23,7 |
| 12 x 3 x 1,0 | 31,3 | 29,9 |
| 16 x 3 x 1,0 | 34,9 | 32,8 |
| 19 x 3 x 1,0 | 36,5 | 34,7 |
| 24 x 3 x 1,0 | 42,8 | 39,8 |
| | | |
| | | |
| | | |
| 1 x 3 x 1,5 | 13,6 | - |
| 3 x 3 x 1,5 | 21,4 | 20,8 |
| 4 x 3 x 1,5 | 23,7 | 22,3 |
| 7 x 3 x 1,5 | 27,7 | 26,8 |
| 12 x 3 x 1,5 | 35,5 | 33,8 |
| 16 x 3 x 1,5 | 39,7 | 38,0 |
| 19 x 3 x 1,5 | 42,4 | 39,9 |
| 24 x 3 x 1,5 | 47,8 | 46,0 |
| | | |
| | | |
| | | |
| 1 x 3 x2,5 | 14,5 | — |

## Application/Limitation

This type of cable is fire resistant in accordance with IEC 60331.

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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 and lighting. Control. Halogen free. Low smoke. Cold bend -40°C. Cold impact -35°C Flame retardant in bunch Cat. A.

## 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 60092-376 | 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 | Test for electric cables under fire conditions – Circuit integrity – Part 21: Productures and requirements – Cables of rated voltage up to and including 0,6/1,0 kV | |
| 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 | Minimum 90 min. test. |
| IEC 60332-1-2 | 2015-07 | Tests on electric and optical fibre cables under fire conditions –<br>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<br>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:<br><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:<br>pH > 4,3<br>Conductivity < 10µS |
| IEC 61034-1/2 | 2013-06 | Measurement of smoke density of cables burning under defined conditions –<br>Test apparatus, procedure and requirements | Low smoke |

| Standard | Release | General description | Limitation |
|---|---|---|---|
| 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 – BFOU (i) S3 or BFOU (c) S4 or BFOU (i) S3/S7 or BFOU (c) S4/S8 – Size –150/250V – IEC 60331-1/2 – 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.

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