DNV·GL

Certificate No:
**TAE00001B0**

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the Electric Power Cable**

with type designation(s)
**RFOU P1 &  P1/P8 & RFCU & RFCU MR 0,6/1 kV**

Issued to
**Nexans (Suzhou) Cable Solutions Co.,Ltd**
**Suzhou Jiangsu, China**

is found to comply with
**DNV GL rules for classification – Ships**
**DNV GL offshore standards**
**DNV GL rules for classification – High speed and light craft**

## Application :

**Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**
**Voltage class (kV)  0,6/1**
**Temp. class (°C)  90**

This Certificate is valid until **2021-11-06**.

Issued at **Hamburg** on **2016-11-07**
DNV GL local station: **Shanghai CMC**

for **DNV GL**

Approval Engineer: **Carsten Hunsalz**

**Duy Nam Le**
**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: RFOU P1 & P1/P8 & RFCU & RFCU MR 0,6/1 kV

Construction:

| | |
|---|---|
| Conductors: | Tinned stranded copper class 2 |
| Core insulation: | EPR |
| Inner covering: | Polyolefin |
| Metal covering: | Tinned copper wire braid (P-types) or galv. steelwire braid (RFCU) |
| Outer sheath: | SHF2 or SHF Mud |

| Number of cores x conductor cross-section | Overall diameter min. | Overall diameter max. |
|---|---|---|
| $mm^2$ | mm | mm |
| 1 x 1,5 | 8,2 | 9,8 |
| 1 x 2,5 | 8,6 | 10,5 |
| 1 x 4 | 9,2 | 11,0 |
| 1 x 6 | 9,6 | 11,5 |
| 1 x 10 | 10,5 | 12,5 |
| 1 x 16 | 11,5 | 14,0 |
| 1 x 25 | 13,0 | 16,0 |
| 1 x 35 | 15,0 | 18,0 |
| 1 x 50 | 16,5 | 19,5 |
| 1 x 70 | 18,0 | 21,5 |
| 1 x 95 | 20,5 | 24,5 |
| 1 x 120 | 22,0 | 26,0 |
| 1 x 150 | 23,5 | 28,0 |
| 1 x 185 | 26,0 | 31,0 |
| 1 x 240 | 29,0 | 34,0 |
| 1 x 300 | 31,5 | 37,0 |
| | | |
| 2 x 1,5 | 11,5 | 14,0 |
| 2 x 2,5 | 12,5 | 15,0 |
| 2 x 4 | 14,0 | 17,0 |
| 2 x 6 | 15,0 | 18,0 |
| 2 x 10 | 17,0 | 20,5 |
| 2 x 16 | 19,0 | 23,0 |
| 2 x 25 | 22,5 | 26,5 |
| 2 x 35 | 24,5 | 29,5 |
| 2 x 50 | 28,0 | 33,0 |
| 2 x 70 | 31,5 | 37,0 |
| 2 x 95 | 36,5 | 43,5 |
| 2 x 120 | 39,5 | 47,0 |
| | | |
| 3 x 1,5 | 12,0 | 14,5 |

| Number of cores x conductor cross-section | Overall diameter min. | Overall diameter max. |
|---|---|---|
| $mm^2$ | mm | mm |
| 3 x 2,5 | 14,0 | 16,5 |
| 3 x 4 | 15,0 | 17,5 |
| 3 x 6 | 16,0 | 19,0 |
| 3 x 10 | 18,0 | 21,5 |
| 3 x 16 | 20,0 | 24,0 |
| 3 x 25 | 23,5 | 28,0 |
| 3 x 35 | 26,0 | 31,0 |
| 3 x 50 | 30,0 | 35,5 |
| 3 x 70R | 34,0 | 40,0 |
| 3 x 95R | 39,0 | 46,5 |
| 3 x 120R | 42,5 | 50,0 |
| 3 x 150R | 47,0 | 55,5 |
| 3 x 185R | 52,0 | 61,0 |
| 3 x 240R | 58,5 | 68,5 |
| | | |
| 4 x 1,5 | 14,0 | 16,5 |
| 4 x 2,5 | 14,5 | 17,5 |
| 4 x 4 | 16,0 | 19,0 |
| 4 x 6 | 17,5 | 20,5 |
| 4 x 10 | 19,5 | 23,5 |
| 4 x 16 | 22,0 | 26,0 |
| 4 x 25 | 26,0 | 31,0 |
| 4 x 35 | 28,5 | 34,0 |
| 4 x 50 | 33,0 | 39,0 |
| 4 x 70R | 38,0 | 45,0 |
| 4 x 95R | 43,0 | 51,5 |
| 4 x 120R | 47,5 | 56,0 |
| 4x 150R | 52,0 | 61,0 |
| 4 x 185R | 57,5 | 68,0 |
| 4 x 240R | 64,5 | 75,5 |
| | | |

| Number of cores x conductor cross-section | Overall diameter min. | Overall diameter max. |
|---|---|---|
| $mm^2$ | mm | mm |
| 5 x 1,5 | 14,5 | 17,5 |
| 7 x 1,5 | 15,5 | 18,5 |
| 10 x 1,5 | 19,5 | 23,0 |
| 12 x 1,5 | 20,0 | 23,5 |
| 14 x 1,5 | 21,0 | 24,5 |
| 19 x 1,5 | 23,0 | 27,0 |
| 24 x 1,5 | 26,5 | 31,0 |
| 27 x 1,5 | 27,0 | 32,0 |
| 30 x 1,5 | 28,0 | 33,0 |
| 37 x 1,5 | 30,5 | 35,0 |
| 48 x 1,5 | 35,5 | 41,0 |
| 61 x 1,5 | 38,5 | 44,5 |
| | | |
| 5 x 2,5 | 16,0 | 19,0 |
| 7 x 2,5 | 17,0 | 20,5 |
| 10 x 2,5 | 21,0 | 25,0 |
| 12 x 2,5 | 22,0 | 25,5 |
| 14 x 2,5 | 23,0 | 27,0 |
| 19 x 2,5 | 25,0 | 29,5 |
| 24 x 2,5 | 29,5 | 34,0 |
| 27 x 2,5 | 30,0 | 35,0 |
| 30 x 2,5 | 31,0 | 36,0 |
| 37 x 2,5 | 33,5 | 39,0 |
| 48 x 2,5 | 39,0 | 45,0 |
| | | |
| 5 x 4 | 17,5 | 20,5 |
| 7 x 4 | 18,5 | 22,0 |
| 10 x 4 | 23,5 | 27,5 |
| 12 x 4 | 24,0 | 28,0 |
| | | |
| | | |

## 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 and lighting.
Flame retardant in bunch Cat. A. Halogen free. Low smoke.
Low temperature. 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 60092-353 | 2011-08 | Electrical installations in ships - Part 353: Power cables for rated voltages 1 kV and 3 kV | |
| 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 60332-3-22 | 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 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/mm |
| IEC 61034-1/2 | 2013-07<br>2013-09 | Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements | Low smoke<br>Light transmittance ≥60% |
| NEK TS 606 | 2016 | Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification. | Mud resistance test:<br>IRM903 100°C 7d.<br>Calcium Bromide 70°C 56d.<br>Carbo Sea 70°C 56d. |
| IEC 60092-350 | 2014-08 | Annex E: Procedure<br>8.10: Temperature requirements | Cold bend: -15°C<br>Cold impact: -15°C |

## Marking of product

NEXANS 448 – RFOU P1 or P1/P8 – IEC 60332 Cat. A – NEK 606 – size - 0,6/1 kV – Lot. No or
NEXANS 448 – RFCU or RFCU MR – IEC 60332 Cat. A – size – 0,6/1 kV – Lot. 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) 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.

Assessment to be performed at least every second year.

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END OF CERTIFICATE