DNV·GL

Certificate No:
TAE000016B

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Electric Power Cable

with type designation(s)
RFOU P1/P8/P101, RFOU VFD with/without 3x earth conductors, RFCU

Issued to
Draka Norsk Kabel - part of the Prysmian Group
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 :

General power & Lighting. Special types with enhanced insulation class for VFD applications.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Type	Voltage class (kV)	Temp. class (°C)
RFOU P1/P8/P101	0,6/1	90
RFOU VFD with/without 3x earth conductors	0,6/1 (1,8/3)	90
RFCU	0,6/1	90

This Certificate is valid until **2021-06-29**.

Issued at **Høvik** on **2016-10-07**

for **DNV GL**

DNV GL local station: **Station Oslo Maritime and CAP**

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

Power cable designed according to NEK TS 606 Ed5: 2016
Type: RFOU P1/P8 / P101 0,6/1 kV & RFOU-VFD 0,6/1 kV & RFCU 0,6/1 kV *
On request: Cold bend -40°C / Cold impact -35°C.

Construction:

Conductors:	Tinned, stranded copper
Core insulation:	EPR
Inner covering:	Extruded flame retardant halogen free compound
Metal covering:	Tinned, Copper wire braid (O) or Galv. Steel wire braid (C)
Outer sheath:	SHF2 mud resistant according to IEC 60092-360 Annex D. NEK TS 606 (P-types only)

* RFOU P1/P8 designed according to NEK TS 606 Ed4: 2009

No of cores:	Cross sectional area [mm2]
1	16 - 630
2	1,5 – 240
3	1,5 *) – 240
3G	1,5 - 25
4	1,5 – 240
4G	1,5 - 185
5	1,5-150
5G	1,5-120
7G	1,5 – 2,5
7, 12, 19, 27, 37	1,5 2,5

RFOU-VFD 0,6/1 kV (1,8/3kV) with 3x symmetrical distributed earth conductors

Construction:

Conductors:	Tinned, stranded copper class 2 or class 5
Earth conductors:	3x distributed earth conductors class 5
Core insulation:	EPR
Inner covering:	Extruded flame retardant halogen free compound
Electrostatic screen:	Cu/PETP-tape
Metal covering:	Tinned, Copper wire braid (O)
Outer sheath:	SHF2 mud resistant according to IEC 60092-360 Annex D.

No of cores:	Cross sectional area [mm2]
3 / 3E	10-185 / 4-70

RFOU-VFD 0,6/1 kV (1,8/3kV) with copper braid as earth conductor

Construction:

Conductors:	Tinned, stranded copper class 2 or class 5
Core insulation:	EPR
Inner covering:	Extruded flame retardant halogen free compound
Electrostatic screen:	Cu/PETP-tape
Metal covering:	Tinned, Copper wire braid (O)
Outer sheath:	SHF2 mud resistant according to IEC 60092-360 Annex D.

No of cores:	Cross sectional area [mm2]
3	2,5-240 / 10-120

Job Id: **262.1-002558-9**
Certificate No: **TAE000016B**

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.

Type Approval documentation

Tests carried out

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 60092-353	*2011-08*	*Single and multicore non-radial field power cables with extruded solid insulation for rated Voltages of 1 kV and 3 kV*	
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*	*90 min. test @750* ºC
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 0,6/1kV	120 minutes *@830* ºC + 15 minutes cooling down
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%

On special request: ARCTIC GRADE

IEC 60092-350	2014-08	Annex E: Cold bend test and impact test for low temperature behaviour	Cold bend: -40°C
IEC 60092-350	2014-08	Annex E: Cold bend test and impact test for low temperature behaviour	Cold impact: -35°C
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

Marking of product

"meter" "year" “week” DRAKA 01 “part no.” RFOU P1/P8/P101 or RFCU – ARCTIC GRADE (optional) – size - 0,6/1 kV – IEC 60332-3-22 “prod. Order no” or
"meter" "year" “week” DRAKA 01 “part no.” RFOU VFD – size – ARCTIC GRADE (optional) – 0,6/1 (1,8/3)kV – IEC 60332-3-22 “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) 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.

END OF CERTIFICATE