

TYPE APPROVAL CERTIFICATE

This is to certify:

That the High Voltage Cable

with type designation(s)
RFOU 36/66 (72,5)kV

Issued to

Prysmian Group Norge AS
DRAMMEN, Norway

is found to comply with

DNV rules for classification – Ships, offshore units, and high speed and light craft

Application :

Rated voltage (kV) 36/66 (72,5)kV
Temp. class (°C) 90

Issued at **Høvik** on **2024-10-16**

This Certificate is valid until **2029-10-15**.

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

Approval Engineer: **Ivar Bull**

for **DNV**

Frederik Tore Elter
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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Product description

High Voltage Power cables designed according to IEC 60092-354 and tested according to IEC 60840. Insulation thickness and voltage level 36/66(72.5)kV is higher than max voltage 18/30(36kV) in Part -354.

Type: RFOU 36/66 (72,5)kV

Construction:

Conductors:	Tinned, stranded copper IEC 60228 Class 5
Conductor screen:	Semiconducting layer
Core insulation:	HEPR
Insulation screen:	Semiconducting layer
Screen:	Tinned copper wire braid
Inner covering:	Flame retardant and halogen-free extruded compound
Tape over inner covering:	PET tape
Armour:	Tinned annealed copper wire braid
Tape over armour:	PET tape
Outer sheath:	SHF2 or SHF2 Mud resistant according to IEC 60092-360 Annex D. NEK TS 606.

No of cores:	Cross sectional area [mm ²]
1	400

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.

DNV Rules states that maximum system voltage in distribution systems is 17 500V. Where necessary for special application higher voltages may be accepted by the Society. (IACS UR E11 1.2).

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
IEC 60840	2023-06	Power cables with extruded insulation and their accessories for rated voltages above 30 kV (Um= 36 kV) up to 150 kV (Um = 170 kV) - Test methods and requirements	Test standard
IEC 60092-350	2020-01	Electrical installations in ships - Part 350: General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	Reference standard
IEC 60092-360	2021-01	Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables	Material standard.
IEC 60092-354	2020-02	Electrical installations in ships – Part 354: Single- and three-core power cables with extruded solid insulation for rated voltages 6 kV up to 30 kV.	Design standard, but insulation thickness and voltage level 36/66(72.5)kV is higher than max voltage 18/30(36kV) in Part -354.
IEC 60332-1-2	2015-07	Tests on electric cables under fire conditions. Test for vertical flame propagation for a single insulated wire or cable.	
IEC 60332-3-22	2018-07	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	Charred portion of sample does not exceed 2,5m above bottom edge of burner

Standard	Release	General description	Limitation
IEC 60754-1	2019-11	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	2019-11	Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content	Halogen free: pH > 4,3 Conductivity < 10µS/mm
IEC 61034-1/2	2019-11	Measurement of smoke density of cables burning under defined conditions – Part 1: Test apparatus Part 2: Test procedure and requirements	Low smoke Light transmittance >60%
NEK TS606 Ed6	2022-03	Cables for offshore installations - halogen-free low smoke flame-retardant / fire-resistant (HFFR-LS). Technical specification.	Mud resistance test: IRM903 100°C 7d. Calcium Bromide 70°C 56d. EDC 95/11 70°C 56d

Marking of product

"meter" "year/week" DRAKA 04 Part no. <SAP-code> RFOU(F) M 36/66(72.5) kV 1x 400/35 mm² IEC 60332-3-22
Production no. <Production order number>

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the Type approval is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the periodical assessment are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Production Sample Tests (PST) and Routines (RT) checked (if not available tests according to PST and 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.

Survey to be performed at least every second year.

END OF CERTIFICATE