



Certificate No:
TAE00004VU

TYPE APPROVAL CERTIFICATE

This is to certify:

That the High Voltage Cable

with type designation(s)

**P102 RFOU, P102 RFOU-E,
P102 RFOU-M, P103 RFOU,
P103 RFOU-E, P103 RFOU-M,
P104 RFOU, P104 RFOU-E, P104 RFOU-M,
P112 RFOU, P112 RFOU-E, P112 RFOU-M**

Issued to

**Unika Universal Kablo San. ve Tic. A.S.
ISTANBUL, Türkiye**

is found to comply with

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

Application :

High voltage power cables.

Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Type	Rated voltage (kV)	Temp. class (°C)
P102 RFOU, P102 RFOU-E, P102 RFOU-M	3,6/6 kV	90
P103 RFOU, P103 RFOU-E, P103 RFOU-M	6/10 kV	90
P104 RFOU, P104 RFOU-E, P104 RFOU-M	8,7/15 kV	90
P112 RFOU, P112 RFOU-E, P112 RFOU-M	12/20 kV	90

Issued at **Høvik** on **2024-05-13**

This Certificate is valid until **2029-05-12**.

for **DNV**

DNV local unit: **Istanbul**

Approval Engineer: **Ivar Bull**

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.



Form code: TA 251

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Page 1 of 3

Product description

Types:

P102 RFOU, P102 RFOU-E, P102 RFOU-M	3,6/6 kV
P103 RFOU, P103 RFOU-E, P103 RFOU-M	6/10 kV
P104 RFOU, P104 RFOU-E, P104 RFOU-M	8,7/15 kV
P112 RFOU, P112 RFOU-E, P112 RFOU-M	12/20 kV

Construction:

Conductors:	Tinned or plain stranded copper class 2 or class 5
Conductor screen:	Semi conducting material
Core insulation:	EPR
Insulation screen:	Semi conducting material and tinned copper wire
Bedding/Inner covering:	Halogen free compound
Braid armour:	Copper wire braid
Outer sheath:	SHF2 or SHF2 MUD for RFOU-M cables

Single cores :

Voltage U ₀ / U [kV]				
P102	P103	P104	P112	P113
3,6/6	6/10	8,7/15	12/20	18/30
-	-	-	-	-
1 x 16	1 x 16	-	-	-
1 x 25	1 x 25	1 x 25	-	-
1 x 35	1 x 35	1 x 35	1 x 35	-
1 x 50	1 x 50	1 x 50	1 x 50	-
1 x 70	1 x 70	1 x 70	1 x 70	-
1 x 95	1 x 95	1 x 95	1 x 95	-
1 x 120	1 x 120	1 x 120	1 x 120	-
1 x 150	1 x 150	1 x 150	1 x 150	-
1 x 185	1 x 185	1 x 185	1 x 185	-
1 x 240	1 x 240	1 x 240	1 x 240	-
1 x 300	1 x 300	1 x 300	1 x 300	-

3 cores :

Voltage U ₀ / U [kV]				
P102	P103	P104	P112	P113
3,6/6	6/10	8,7/15	12/20	18/30
-	-	-	-	-
3 x 16	3 x 16	-	-	-
3 x 25	3 x 25	3 x 25	-	-
3 x 35	3 x 35	3 x 35	3 x 35	-
3 x 50	3 x 50	3 x 50	3 x 50	-
3 x 70	3 x 70	3 x 70	3 x 70	-
3 x 95	3 x 95	3 x 95	3 x 95	-
3 x 120	3 x 120	3 x 120	3 x 120	-
3 x 150	3 x 150	-	-	-
3 x 185	3 x 185	-	-	-
3 x 240	-	-	-	-
-	-	-	-	-

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 Bundles of Cables or Wires) are fulfilled without any additional measures.

Type Approval documentation

Tests carried out

Standard	Issued	General description	Limitation
IEC 60092-350	2020-01	General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications	
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.	
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 (U _m = 7,2 kV) up to 30 kV (U _m = 36 kV)	
IEC 60332-1-2	2018-03	Tests on electric cables under fire conditions. Test for vertical flame propagation for a single insulated wire or cable.	

Standard	Issued	General description	Limitation
IEC 60332-3-22	2018-07	Tests on electric 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.
IEC 60754-1:2011 +AMD1:2019 CSV	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 60754-2:2011 +AMD1:2019 CSV	2019-11	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/mm
IEC 61034-1&2:2005 +AMD1:2013 +AMD2:2019 CSV	2019-11	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance >60%
NEK 606 Ed. 6	2022-03	Cables for offshore installations - halogen-free low smoke flame-retardant / fire-resistant (HFFR-LS)	<i>Mud resistance test:</i> IRM903 100°C 7d. Calcium Bromide 70°C 56d. EDC 95/11 70°C 56d
NEK 606 Ed. 6	2022-03	NEK 606 Item 4.11.1 Cables designed for Cold climate	<i>Cold climate:</i> Cold bend: -25°C Cold impact: -25°C
IEC 60092-350	2020-01	Annex E: Procedure 8.10: Temperature requirements and NEK 606 Item 4.11.2 Cables designed for Arctic climate (Optional)	<i>Arctic climate:</i> Cold bend: -40°C Cold impact: -35°C
UL2556	2021-04	UV Resistance Test. ASTM G155 Cycle 1/ ISO 4892:2016 /UL2556:2021. Irradiance 0,35 W/m²/nm.	720h. Max tensile strength and elongation@break decay 20%.

Marking of product

Unika - P102 RFOU or P102 RFOU-E or P102 RFOU-M 3,6/6 kV - IEC 60332-3-22 Cat. A – Year
Unika - P103 RFOU or P103 RFOU-E or P103 RFOU-M 6/10 kV - IEC 60332-3-22 Cat. A – Year or
Unika - P104 RFOU or P104 RFOU-E or P104 RFOU-M 8,7/15 kV - IEC 60332-3-22 Cat. A – Year
Unika - P112 RFOU or P112 RFOU-E or P112 RFOU-M 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) and selected type tests (ref. to applicable class programs) checked (if not available these tests shall 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