

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Low Voltage Cable**with type designation(s)
Armoured Hybrid cable

Issued to

TELDOR Cables & Systems Ltd.
Israel, Israel

is found to comply with

DNV GL rules for classification – Ships, offshore units, and high speed and light craft**Application :****Combined data, fiber optic and low voltage control, instrumentation and power. Armoured.****Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.****Rated voltage (V) 0,6/1 kV**
Temp. class (°C) 90Issued at **Høvik** on **2020-06-02**for **DNV GL**This Certificate is valid until **2023-07-11**.DNV GL local station: **Haifa**Approval Engineer: **Ivar Bull****Marta Alonso Pontes**
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 GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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.



Job Id: **262.1-025553-2**
 Certificate No: **TAE00001UV**
 Revision No: **5**

Product description

Armoured Hybrid cable composed of combinations of valid DNV GL type approved cables as listed below:

Hybrid cable element:	Fire resistant element	DNVGL TAC numbers:
150/250V Armoured/screened control and instrumentation cables designed according to IEC60092-376	- - IEC 60331 IEC 60331	TAE00002UU TAE00002UV TAE00002UW TAE00002UX
Armoured/screened Fieldbus Data communication cables	- - IEC 60331-21/23 IEC 60331-21/23	TAE00002NM TAE00002NK TAE00003ZM TAE00003ZK
Armoured/screened Category cables	- - - - IEC 60331-21/23 IEC 60331-21/23	TAE00000GE TAE00000GF TAE00000GG TAE00000GH TAE00000U3 TAE00000U4
Armoured coaxial cable	- -	TAE000020S TAE000020R
Fibre optic cables	- - IEC 60331-25 IEC 60331-25	TAE0000182 TAE0000183 TAE0000184 TAE0000185
Power cores of 1,0 1,5 and 2,5mm ² (switchboard wires) designed according to IEC60092-376 and increased voltage class 0,6/1kV	- - IEC 60331 IEC 60331	TAE00000NG TAE00000NH TAE00000NJ TAE00000NK
Power cores of 1-10mm ² 0,6/1kV (switchboard wires) designed according to IEC60092-353	- - IEC 60331 IEC 60331	TAE00000NC TAE00000ND TAE00000NE TAE00000NF

- *Fire resistance will be limited to the fire resistant properties of each element.*
- Overall fire resistance will be limited to the lowest fire temperature and duration.
- Complete hybrid cable can only be marked as fire resistant if all elements are fire resistant.
- Please refer to DNV GL TAC numbers listed above for details on cable elements.
- If cross sectional area is listed as AWG, at least same cross section as required by IEC shall be used.

Overall screen (if any): Aluminium/polyester tape with tinned copper drain wire
 Inner sheath: SHF1 or SHF2
 Overall metal covering: IEC 60092-350 options:
 Plain/tinned copper wire braid or copper alloy wire braid or galvanized steel wire braid.
Other options:
 Bonded Aluminum Moisture barrier

Job Id: **262.1-025553-2**
 Certificate No: **TAE00001UV**
 Revision No: **5**

Outer sheath: Corrugated steel tape
 SHF1 or SHF2 or SHF2 MUD

Thickness of braid wires and sheaths as per IEC 60092-350 Annex A fictitious calculations.

Application/Limitation

If power conductors are operated with voltage above 50V, as a safety measure the braid and/or screen of all copper instrument and data cables shall be connected to earth potential. Conversely, when power conductors are operated below 50V the earthed braid/screen is not required.

If one power core trips on overcurrent or short circuit, all power cores shall trip simultaneously.

All power, control and data elements of hybrid cable shall serve same consumer.

System designer shall ensure that hybrid cable provides sufficient signal integrity for reliable operation of equipment. Special care shall be taken if analogue signals are transmitted in combined power and data cable. Please refer to guidelines in IEC 60533(2015) Table B.1.

Type Approval documentation

Data sheets: Datasheets for Part numbers 8MG1555101 & FH0020134B (examples).
 Test reports: Please refer to TAC numbers listed above.
 IEC 60332-3-22 test reports dated 12.10.2017 and 22.10.2017.

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 60092-360	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	Charred portion of sample does not exceed 2,5m above bottom edge of burner.
MUD test according to NEK 606 Ed. 5	2016-01	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test: IRM903 100°C 7d. Calcium Bromide 70°C 56d. <u>Oil based mud:</u> EDC 95/11 70°C 56d

Please refer to DNV GL TAC numbers listed for details on test standards of individual cable elements.

Job Id: **262.1-025553-2**
Certificate No: **TAE00001UV**
Revision No: **5**

Marking of product

TELDOR Armored Hybrid cable - DNV GL Type Approval TAE00001UV - Number & Type of cable elements
- Voltage class - IEC 60332-3-22 - P/N, B/N, METER MARK

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