TYPE APPROVAL CERTIFICATE

Certificate no.:
TAE00000EG
Revision No:
4

This is to certify:

that the Data transmission cables and systems

with type designation(s)
Eltorque CHMS (i) 250V 3G2,5mm2 + 1x0,75mm2 + 1x2x0,75mm2

issued to
Eltorque AS
TRONDHEIM, **Norway**

is found to comply with
DNV rules for classification – Ships, offshore units, and high speed and light craft

Application:

CAN bus cable with integrated power specially designed and tested for Eltorque electric actuators. Mud resistant.
Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Issued at **Høvik** on **2025-09-04**
This Certificate is valid until **2030-03-29**.
DNV local unit: **Trondheim**

for **DNV**

Approval Engineer: **Ivar Bull**

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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.

Manufactured by :
DNV Id. 10058877

Product description
Can bus cable with integrated power specially designed and tested for Eltorque electric actuators.
Two options on outer sheathing: SHF1 and SHF2 Mud resistant.

With screen (S):
Eltorque CHMS (i) 250V 3G2,5mm2 + 1x0,75mm2 + 1x2x0,75mm2 – IEC 60092-376

Can bus

Conductors:	Plain or tinned stranded copper class 5
Core insulation:	XLPE
Screen:	AL/PET foil
Braid:	Tinned wire
Conductor for equal earth potential:	
Conductor:	Plain or tinned stranded copper class 5
Core insulation:	XLPE
Power conductors:	
Conductors:	Plain or tinned stranded copper class 5
Insulation:	XLPE
Laying up elements	
Inner covering (if any)	PET or textile foil
Outer sheath:	SHF1
	SHF2 Mud resistant

Table 107-Cable specifications as per IEC 61158-2:
Industrial communication networks. Fieldbus specifications. Part 2: Physical layer specifications and service definition

Cable parameter	Type A	Type B	CANBUS HYBRID HF
Impedance	135 to 165 Ω (f = 3 to 20 MHz)	100 to 130 Ω (f > 100kHz)	120 Ω
Capacity	< 30 pF/m	< 60 pF/m	50 pF/m
Resistance	< 110 Ω/km	not specified	<26 Ω / km (plain copper)
Conductor cross-sectional area	≥ 0,34 mm^2	≥ 0,22 mm^2	0,75 mm^2
Colour of sheath non-IS	Violet	Not specified	SHF1: Green with violet stripe SHF2 Mud res: Orange with violet stripe
Colour of inner cable conductor A (RxD/TxD-N)	Green	Not specified	White
Colour inner cable conductor B (RxD/TxD-P)	Red	Not specified	Orange

Table 108-Maximum cable length for the different transmission speeds

Item	Unit	Value								
Data rate	kbit/s	9,6	19,2	93,75	187,5	500	1500	3000	6000	12000
Cable type A	m	1200	1200	1200	1000	400	200	100	100	100
Cable type B	m	1200	1200	1200	600	200	70	Not permissible		

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.

Signal integrity of CAN bus Hybrid cable is tested together with actuators for robustness against electromagnetic noise. Noise is injected into power wire and screen as well as from nearby VFD cable laid along hybrid cable. No communication errors observed.

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
IEC 60332-3-24	2018-07	Tests on electric and optical fibre cables under fire conditions - Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables - Category C	Charred portion of sample does not exceed 2,5m above bottom edge of burner.
IEC 60754-1	2019-11	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	2019-11	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/mm
IEC 61034-1/2	2019-11 2019-11	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Light transmittance > 60%
61158-2 Ed. 7	2023-03	Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition	Item 22.1.2.2 Cable. Table 144 – Cable specifications
IEC 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test Clause 45.1 Methods of determination of low levels of chlorine, and/or Bromine and/or iodine Clause 45.2 Methods of determination of low levels of fluorine	HCl + HBr + HJ max 0,5% [0,014% can be detected] HF max 0,1% [0,02% can be detected]
EMC test	2016-09-15	Robustness measurement on Hybrid Marin cable issued by Sintef Energi AS ver. 1.0 dated 2016-09-15	No communication errors observed at CAN bus cable during test.
NEK TS606 Ed7	2025-03	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. Oil based mud must be added to IEC requirement: EDC 95/11 70°C 56d
EN ISO 4892-2	2013-06	Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps (ISO 4892-2:2013)	750h. Max tensile strength and elongation @break decay 30%.

Marking of product

Eltorque CHMS (i) 250V 3G2,5mm2 + 1x0,75mm2 + 1x2x0,75mm2 – IEC 60092-376 –
IEC 60332-3-24 – Year – Week - Meter or

Eltorque CHMS (i) 250V 3G2,5mm2 + 1x0,75mm2 + 1x2x0,75mm2 MUD RESISTANT – IEC 60092-376 –
IEC 60332-3-24 – Year – Week - Meter

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