

**TYPE APPROVAL CERTIFICATE****This is to certify:****That the Data transmission cables and systems**

with type designation(s)

**Eltorque CHMS ( i ) 250V 3G2,5mm<sup>2</sup> + 1x0,75mm<sup>2</sup> + 1x2x0,75mm<sup>2</sup>**

Issued to

**Eltorque AS  
Vanvikan, Norway**

is found to comply with

**Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards****Application :****Can bus cable with integrated power specially designed and tested for Eltorque electric actuators.****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**Issued at **Høvik** on **2018-02-28**for **DNV GL**This Certificate is valid until **2019-09-05**.DNV GL local station: **Trondheim**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.



Job Id: **262.1-019407-1**  
 Certificate No: **TAE00000EG**  
 Revision No: **1**

## Name & place of manufacturer

DNV Id. 10058877

## Product description

With screen (S):

Eltorque CHMS ( i ) 250V 3G2,5mm<sup>2</sup> + 1x0,75mm<sup>2</sup> + 1x2x0,75mm<sup>2</sup> – 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

Table 107-Cable specifications as per IEC 61158-2 ed. 1 (2010-10):

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 <sup>2</sup>	≥ 0,22 mm <sup>2</sup>	0,75 mm <sup>2</sup>
Colour of sheath non-IS	Violet	Not specified	Green with violet stripe
Colour of inner cable conductor A (RxD/TxD-N)	Green	Not specified	
Colour inner cable conductor B (RxD/TxD-P)	Red	Not specified	

Table 108-Maximum cable length for the different transmission speeds

Item	Unit	Value								
		9,6	19,2	93,75	187,5	500	1500	3000	6000	12000
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.

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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

Data sheet: See approval letter  
 Test reports: See approval letter

### Tests carried out

Standard	Release	General description	Limitation
IEC 60332-3-24	2009-02	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	Bunch test
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/mm
IEC 61034-1/2	2013-07 2013-09	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Light transmittance > 60%
IEC 61158-2 ed. 1	2010-10	Industrial communication networks. Fieldbus specifications. Part 2: Physical layer specifications and service definition.	Cable specifications as per item 22.1.2.2
IEC 60684-2	2011-08	Flexible insulating sleeving – Part 2: Methods of test Clause 45.1 Methods of determination of low levels of chlorine, ans/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.

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### **Marking of product**

Eltorque CHMS ( i ) 250V 3G2,5mm<sup>2</sup> + 1x0,75mm<sup>2</sup> + 1x2x0,75mm<sup>2</sup> – IEC 60092-376 – Year – Week - Meter

### **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 survey 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