

TYPE APPROVAL CERTIFICATE

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

with type designation(s)

Texiline Canbus Marine, TEXILine Canbus Hybrid Marine, TEXILine Canbus Hybrid Marine EMC

Issued to

**amo specialkabel AB
ALSTERMO, Sweden**

is found to comply with

Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards**IEC 60332-3-24 (2009-02)****IEC 60754-1/2 (2011-11)****IEC 61034-1/2 Ed. 3.1 (2013-06)****Application :****Can Bus cable or combined Can bus with integrated power cable for ship building applications.****Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.**Issued at **Høvik** on **2018-02-12**This Certificate is valid until **2019-06-30**.DNV GL local station: **Malmö**for **DNV GL**Approval Engineer: **Ivar Bull**

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**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: **262.1-018619-1**
 Certificate No: **TAE000007D**
 Revision No: **1**

Product description

TEXILINE CANBUS MARINE,
 TEXILINE CANBUS HYBRID MARINE,
 TEXILINE CANBUS HYBRID MARINE EMC

Can bus

Conductors: Tinned stranded copper class 5
 Core insulation: XLPE
 Screen: AL/PET foil
 Braid(if any): Tinned wire

Power conductors (Hybrid versions):

Conductors: Plain or tinned copper class 5
 Insulation: XLPE

Conductor for equal earth potential:

Conductor: Plain stranded copper class 5
 Core insulation: XLPE

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	$\geq 0,34$ mm ²	$\geq 0,22$ mm ²	0,75 mm ²
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								
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.

According to IEC 60533 Annex B (informative) it is good practice to separate cables of different categories (ie power and Control cables). Recommended physical separation is not possible in a hybrid cable. However, signal integrity of this CAN bus Hybrid cable is tested for robustness against electromagnetic noise injected into power wire and screen as well as from nearby VFD cable laid along hybrid cable. For best results it is recommended to connect signal ground, signal screen and overall braid screen to ground at both ends. System designer should verify suitability of hybrid cable in each application.

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Type Approval documentation

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, and/or Bromine and/or iodine Clause 45.2 Methods of determination of low levels of fluorine	HCl + HBr + HI 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 Marine cable issued by Sintef Energi AS ver. 1.0 dated 2016-09-15	No communication errors observed at CAN bus cable during test.

Marking of product

amo specialkabel AB -TEXILine Canbus Marine nX2X0,75+1x0,75 YYWW meter – IEC 60332-3-24 – YYWW – meter

OR

amo specialkabel AB -TEXILine Canbus Hybrid Marine 3Xsize+1X0,75+1X2X0,75 - IEC 60332-3-24 – YYWW – meter OR amo specialkabel AB - TEXILine Canbus Hybrid Marine 2x2,5+1x2x2,5+1X2x0,75 - DNV-GL - IEC 60332-3-24 –YYWW – meter


OR amo specialkabel AB -TEXILine Canbus Hybrid-Marine EMC 3Xsize+1X0,75+1X2X0,75 IEC 60332-3-24 – YYWW – 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 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



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- Ensuring traceability between manufacturer's product type marking and Type Approval Certificate.

Assessment to be performed at least every second year.

END OF CERTIFICATE