

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 compatible cable for ship building applications.

Flame retardant in bunch Cat. C. Halogen free. Low smoke.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Type	Voltage (kV)	Temp. class (°C)
Texiline Canbus Marine	Canbus 100V	90
TEXILine Canbus Hybrid Marine	Canbus 100V - Power 150/250V	90
TEXILine Canbus Hybrid Marine EMC	Canbus 100V - Power 150/250V	90

This Certificate is valid until **2019-06-30**.

Issued at **Høvik** on **2015-07-27**

DNV GL local station: **Malmö**

Approval Engineer: **Marta Alonso Pontes**

for **DNV GL**

Marit Laumann
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.

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: Tinned wire

Power conductors:

Conductors: Plain or tinned stranded copper class 5
 Insulation: XLPE

Conductor for equal earth potential:

Conductor: Plain stranded copper class 5
 Core 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	$\geq 0,34$ 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.

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
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Job Id: **262.1-018619-1**
Certificate No: **TAE000007D**

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]

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

Assessment to be performed at least every second year.

END OF CERTIFICATE