

TYPE APPROVAL CERTIFICATE

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

with type designation(s)

Maritime LAN hybrid cable S/FTP Cat.7+2 OS2 single mode fibres

Issued to

**Sohome AS
Bergen, Norway**

is found to comply with

Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards**Type Approval Programme No. 6-827.50-1****Type Approval Programme No. 6-827.50-2****IEC 60794-1-1 (2011-09)****IEC 61156-5 Ed. 2.1 (2012-12)****IEC 60332-3-24 (2009-02)****IEC 60754-1 (2011-11)****IEC 60754-2 (2011-11)****IEC 61034-1/2 Ed. 3.1 (2013-06)****Application :****Hybrid Cat. 7/fiber cable. Flame retardant in bunch; cat. C. Halogen free. Low smoke****In order to achieve a transmission link compliant with Category 7, cables shall be installed with suitable termination equipment according to manufacturer's recommendations.****Voltage (kV)****Temp. class (°C)**This Certificate is valid until **2019-07-07**.Issued at **Høvik** on **2015-07-08**for **DNV GL**DNV GL local station: **Bergen**Approval Engineer: **Ludovico Gullifa**

**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

Type(s):	Bergen Cabling Maritime LAN hybrid cable S/FTP Cat.7 + 2 OS2 single mode fibres
Category spec	Category 7
Conductors:	Solid copper (Class 1) (AWG23/ \varnothing 0,56 mm)
Core insulation:	Polyethylene (PE) foamskin
Screen:	Al/polyester tape
Fibre spec	
No. of Fibres	2
Relief	Strain relief element; aramid yarn
Fiber sheath	Kevlar braid
Overall	
Metal covering:	Tinned copper wire braid
Outer sheath:	SHF1

Cat. 7 general information

Number of cores x conductor diameter [mm]	Overall diameter [mm]
4 x 2 x 0,56	7,8

Electrical data at 20°C

Frequency MHz	Attenuation, nom [dB/100m]	NEXT [dB]
1	1,8	100
4	3,4	100
10	5,4	100
16	6,8	100
20	7,7	100
31,25	9,6	100
62,5	13,7	100

Frequency MHz	Attenuation, nom [dB/100m]	NEXT [dB]
100	17,4	100
155	21,9	94
200	25,0	92
250	28,1	90
300	30,9	89
600	44,8	85

Characteristic impedance	:100 Ohm
DC-loop resistance:	$\leq 150 \Omega/\text{km}$

Fibre general information

Number of strands	2
Type	OS2 / OS1 Type B.6.a1&b1
Cladding diameter	$125.0 \pm 0.7 \mu\text{m}$
Cladding non-circularity	$\leq 0.7 \%$
Core (MDF) -cladding concentricity error	$\leq 0.5 \mu\text{m}$
Primary coating diameter	$\mu\text{m } 242 \pm 7$
Chromatic dispersion coefficient:	
Interval 1285 nm – 1330 nm	$\leq 3.7 \text{ ps/km} \cdot \text{nm}$
At 1550 nm	$\leq 18.5 \text{ ps/km} \cdot \text{nm}$
At 1625 nm	$\leq 23.0 \text{ ps/km} \cdot \text{nm}$
Zero dispersion wavelength, λ_0	1300 - 1324 nm
Zero dispersion slope	$\leq 0.092 \text{ ps}/(\text{nm}^2 \cdot \text{km})$
Cut-off wavelength	$\leq 1260 \lambda_{\text{cc}} \text{ nm}$
Mode field diameter at 1310 nm	$8.8 \pm 0.4 \mu\text{m}$
Mode field diameter at 1550 nm	$9.8 \pm 0.5 \mu\text{m}$

Manufactured by

DNV GL ref no. 10082991

Application/Limitation

Temperature window

Operation: - 40°C to +85°C
 Installation: - 15°C to +50°C

Since this cable is a hybrid product, the physical strains on the cable must be adjusted to the weakest link, installation shall be done in accordance with the manufacturers recommendations.

The information related to EN certification from recognised test institution is taken as information only

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

Datasheet cable: BC 10 003 Bergen Cabling DNV approved Maritime LAN
 Hybrid cable S/FTP Cat.7 + 2 OS2 single mode fibres dated 18/11-2013

Test report: Test report dated 04.06.2010, electrical tests, batch no E909640
 3P reports
 FR/LS test report for test no 2719 and 10-12; dated 17.06.2010
 Fiber test report as preformed in Copenhagen 2011-04-26

Tests carried out

Standard	Release	General description	Limitation
DNV TAP 6-800 827.50-2	2010	DNV Type approval program for data communication cables	Test acc to cat. cable TAP only cat. cable qualities were taken into account.
DNV TAP 6-800; 827.50-1	2010	DNV Type approval program for fiber cables	Physical tests were performed acc. to fiber TAP; only the fiber qualities were taken into account.
IEC 61156-5	2013-01	Symmetrical pair/quad cables for digital communications – Symmetrical pair/quad cables with transmission characteristics up to 1000MHz horizontal floor wiring.	Cat. 7 – 600MHz
IEC 60793-2-50	2013-01	Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres	
IEC 60794-1-1	2011-10	Optical fibre cables - Part 1-1: Generic specification - General	
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 Category C
IEC 60754-1	2011-11	Test on gases evolved during combustion of materials from cables - Part 1: Determination of the halogen acid gas content	Low Halogen: <0,5% Halogen
IEC 60754-2	2011-11	Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity	Halogen free: pH > 4,3 Conductivity < 10µS/mm

Job Id: **262.1-010028-4**
Certificate No: **TAE000000A**

IEC 61034-1/2	2005-04	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance $\geq 60\%$
ISO/IEC 11801	2010-04	Information technology – Generic cabling for customer premises, incl. Amd. 1 and 2.	Ref. to requirement for category cable: 7 (600MHz) Ref. to requirement for fiber cable Single mode fiber type B1.3 and B6.A&B
EN 50173-1	2011-06	Information technology – Generic cabling systems – Part 1. General requirements.	
EN 50288-4-1	2013-06	Multi-element metallic cables used in analogue and digital communication and control - Part 4-1: Sectional specification for screened cables characterised up to 600MHz – Horizontal and building backbone cables	

Marking of product

Bergen Cabling - Maritime LAN DNV approved Cat.7 S/FTP 4x2/0.56 + 2 OS2 fibres - IEC 60332-3-24 - factory code - <part no > - order no - date - meter marking

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 periodical 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.

Periodical assessment to be performed at least every second year.

END OF CERTIFICATE