DNV·GL

Certificate No:
TAE00001M4

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Data transmission cables and systems

with type designation(s)
Armada® Cat 5e, Cat 6, Cat 6A, Cat 7

Issued to
Belcom Cables Ltd.
Elsenham Essex, United Kingdom

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft
DNV GL class programme DNVGL-CP-0403 – Type approval – Data communication cables - category cables

Application :

Ethernet cables for horizontal wiring in marine environments.
Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **2021-12-20**.

Issued at **Høvik** on **2016-12-21**

for **DNV GL**

DNV GL local station: **Southampton**

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.

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Product description

Cables suitable for horizontal wiring.

Cable Types	Design std.	Cross section	Conductor type ref IEC 60228	Shielding type
Cat 5e	IEC 61156-5	24 AWG (0.20mm^2)	Solid class 1	S/FTP
Cat 6	IEC 61156-5	23 AWG(0.25mm^2)	Solid class 1	U/FTP, F/UTP, S/FTP
Cat 6a	IEC 61156-5	23 AWG(0.25mm^2)	Solid class 1	F/FTP, S/FTP
Cat 7	IEC 61156-5	23 AWG(0.25mm^2)	Solid class 1	F/FTP, S/FTP

Construction

Conductor	Bare annealed copper or tinned copper class 1
Insulation	Polyolefin
Individual screen	Aluminum foil
Common screen	Aluminum foil or tinned copper wire screen
Outer sheath	SHF1, SHF2 (single layer) or SHF2 MUD (double layer)

Electrical data at 20°C

Category 5e		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.1	65
4	4.1	56
10	6.5	50
16	8.3	47
20	9.3	46
31.25	11.7	43
62.50	17.0	38
100	22.0	35

Category 6		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.0	75.3
4	3.8	66.3
10	6.0	60.3
16	7.6	57.2
31.25	10.7	52.9
62.5	15.4	48.4
100	19.8	45.3
150	24.7	42.7
200	29.0	40.8
250	32.8	39.3

Category 6A		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.0	75.3
4	3.8	66.3
10	5.9	60.3
16	7.5	57.2
31.25	10.5	52.9
62.5	15.0	48.4
100	19.1	45.3
150	23.7	42.7
200	27.6	40.8
250	31.1	39.3
300	34.3	38.1
400	40.1	36.3
500	45.3	34.8

Category 7		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.0	78.0
4	3.7	78.0
10	5.9	78.0
16	7.4	78.0
31.25	10.4	78.9
62.5	14.9	75.5
100	19.0	72.4
150	23.6	69.8
200	27.5	67.9
250	31.0	66.4
300	34.2	65.2
400	40.0	63.4
500	45.3	61.9
600	50.1	60.7

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Application/Limitation

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

In order to achieve a transmission compliant with Category 7and above, cables shall be installed with suitable termination equipment according to manufacturer's recommendations.

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
IEC 61156-1	2007-06	Multicore and symmetrical pair/quad cables for digital communications – Part 1: Generic specification	
IEC 61156-2	2010-04	Multicore and symmetrical pair/quad cables for digital communications – Part 2: Symmetrical pair/quad cables with transmission characteristics up to 100 MHz - Horizontal floor wiring - Sectional specification	
IEC 61156-5	2009-05	Multicore and symmetrical pair/quad cables for digital communications – Part 5: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Horizontal floor wiring – Sectional specification	Reference to requirement for category cable: 6 (250MHz), 6A (500 MHz), 7 (600MHz), 7A (1000 MHz)
IEC 61156-7	2003-05	Multicore and symmetrical pair/quad cables for digital communications – Part 7: Symmetrical pair cables with transmission characteristics up to 1 200 MHz - Sectional specification for digital and analog communication cables	
IEC 60092-360	2014-04	Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables.	
IEC 60332-3-22	2009-02	Tests on electric and optical fibre cables under fire conditions – Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A	Bunch test Category A
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:
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	2005-04	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke
NEK 606 Ed. 4	2009-05	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test: IRM903 100°C 7d. Calcium Bromide 70°C 56d or Carbo Sea 70°C 56d.

Marking of product

Armada® *Part number* Category Type - acc. to Design Standard - LSZH FireFighter® SHF1 - IEC60332-3-22 / IEC60332-3-24 - DNVGL Certified TAE000001M4 – YoM - *BATCH*

Family	Category type	Shield type	Conductor type	Conductor Size	Sheath material
AML	5e = CAT 5e 6 = CAT 6 6A = CAT 6A 7 = CAT 7	UF = U/FTP FU = F/UTP FF = F/FTP SF = S/FTP	BS = BC Solid (bare copper) TS = TC Solid (Tinned copper) BS = BC Solid (bare copper)	24 = 24 AWG 23 = 23 AWG	ZF1 = SHF-1 ZF2 = SHF-2 ZFM = SHF2 MUD

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) checked (if not available tests according to 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 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