

TYPE APPROVAL CERTIFICATE

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

with type designation(s)

**Cat 3 Fire resistant, armoured,
Cat 5, Cat 5e Fire resistant, armoured,
Cat 6, Cat 6A Fire resistant, armoured,
Cat 7, Cat 7A Fire resistant, armoured,
1200MHz Fire resistant, armoured**

Issued to

**Belcom Cables Ltd.
Elsenham, Essex, United Kingdom**

is found to comply with

DNV GL rules for classification – Ships and offshore units**Application :****Fire resistant category cable suitable for horizontal floor wiring where metallic armouring is required.****Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.**Issued at **Høvik** on **2019-04-23**This Certificate is valid until **2024-04-15**.DNV GL local station: **Manchester**for **DNV GL**Approval Engineer: **Ivar Bull**

**Trond Sjøvåg
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.



Name and place of manufacturer

DNVGL Id 10096273.

Product description

Category cables suitable for horizontal floor wiring.

Cable types	Design standards	Cross section	Conductor type ref IEC 60228	Shielding
Cat 3, 5	IEC 61156-2	24 AWG(0.204mm ²)	Class 1 or 2	F/UTP, U/FTP, F/FTP, S/FTP, SF/UTP, SF/FTP
Cat 5e	IEC 61156-5	24 AWG(0.204mm ²)	Class 1 or 2	F/UTP, U/FTP, F/FTP, S/FTP, SF/UTP, SF/FTP
Cat 6	IEC 61156-5	23 AWG(0.246mm ²) 22 AWG(0.324mm ²)	Class 1 or 2	F/UTP, U/FTP, F/FTP, S/FTP, SF/UTP, SF/FTP
Cat 6A, 7, 7A	IEC 61156-5	23 AWG(0.246mm ²) 22 AWG(0.324mm ²)	Class 1 or 2	U/FTP, F/FTP, S/FTP, SF/FTP
1200MHz	IEC 61156-7	23 AWG(0.246mm ²) 22 AWG(0.324mm ²)	Class 1 or 2	U/FTP, F/FTP, S/FTP, SF/FTP

Construction

Conductor	Bare annealed or tinned copper solid or stranded
Insulation	Solid or cellular Polyolefine + fire resistant tape
Individual screen	*/FTP cables have individual foil screen
Common screen	S/*TP cables have a common braid screen F/*TP cables have a common foil screen SF/*TP cables have a common foil screen and a braid screen
Inner sheath	SHF1 or SHF2
Metallic covering	DG = Steel Wire Braid SW = Steel Wire Armour TW = Tinned Copper Braid CW = Copper Braid BW = Bronze Braid CS = Steel Tape
Outer sheath	SHF1 or SHF2 or SHF2 MUD, single or double layer.

Electrical data at 20°C

Category 3		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.6	41
4	5.6	32
10	9.8	26
16	13.1	23

Category 5		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.1	62
4	4.3	53
10	6.6	47
16	8.2	44

20	9.2	42
31.25	11.8	40
62.50	17.1	35
100	22.0	32

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
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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

Category 7A		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	2.1	78.0
4	3.7	78.0
10	5.8	78.0
16	7.3	78.0
31.25	10.3	78.0
62.5	14.6	78.0
100	18.5	78.0
150	22.8	76.0
200	26.5	74.0
250	29.7	72.5
300	32.7	71.2
400	38.0	69.4
500	42.8	67.9
600	47.1	66.7
1000	61.9	63.4

1200 MHz		
Frequency MHz	Attenuation dB/100m	NEXT dB
1	1.9	78.0
4	3.5	78.0
10	5.4	78.0
16	6.8	78.0
31.25	9.6	78.0
62.5	13.7	78.0
100	17.5	76.0
200	25.3	71.5
250	28.5	70.0
300	31.5	68.8
400	36.9	67.0
500	41.8	65.5
600	46.3	64.3
1000	62.0	61.0
1200	69.0	59.8

Application/Limitation

Temperature window

Operation : -40°C to +85 °C

Installation: -15°C to +50°C

This type of cable is fire resistant according to IEC 60331-23.

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.

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

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 60331-23	1999-04	Tests for electric cables under fire conditions – Circuit integrity – Part 23: Procedures and requirements – Electric data cables	180 minutes flame application + 15 minutes cooling down. Additional testing of transmission properties under fire ref Table

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.
IEC 60092-350	2014-08	Annex E: Cold bend test and impact test for low temperature behaviour	Cold bend: -40°C Cold impact: -35°C

Transmission properties during fire:

Cable Category	Typical transmission performance	Minimum transmission performance
3	Category 3	Category 3
5	Category 5	Category 5
5e	Category 5e	Category 5
6	Category 6	Category 5
6A	Category 6A	Category 5
7	Category 6A	Category 5
7A	Category 6A	Category 5
1200	Category 6A	Category 5

Job Id: **262.1-030251-1**
Certificate No: **TAE00003EM**

Marking of product

Armada® P/N - No. of Pairs - Size - LSZH FireFighter® FFCi IEC 60331-23 - IEC 60332-3-22 / IEC 60332-3-24 - Batch Number - Metre Marking

Family	Transmission Type	Shield Configuration	Conductor Size AWG	Armor type	Jacket material
AMS	3=CAT3 5=CAT5 E=CAT5e B=CAT 6 C=CAT 6A D=CAT 7 F=CAT 7A G=1200MHz	FU=F/UTP SFU=SF/UTP UF=U/FTP FF=F/FTP SF=S/FTP SFF=SF/FTP	26=26AWG 24=24AWG 23=23AWG 22=22AWG	DG = Steel Wire Braid SW = Steel Wire Armour TW = Tinned Copper Braid CW = Copper Braid BW = Bronze Braid CS = Steel Tape	UAF1 = SHF-1 UAF2 = SHF-2 UAFM = SHF 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) and selected type tests (ref. to applicable class programs) checked (if not available these tests shall 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