DNV·GL

Certificate No:
TAE0000177

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Fiber optical cable

with type designation(s)
AT-VD(ZN)HH 5K200/230 + 10G62.5/125

Issued to
Leoni Fiber Optics GmbH
Roth Bayern, Germany

is found to comply with
DNV GL rules for classification – Ships and offshore units

Application :

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

This Certificate is valid until **2021-06-26**.
Issued at **Hamburg** on **2016-06-27**
DNV GL local station: **Augsburg** for **DNV GL**

Approval Engineer: **Carsten Hunsalz**

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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

Flame retardant, halogen free (*1) universal fibre optic cable with FRNC outer jacket

Type: AT-VD(ZN)HH 5K200/230 + 10G62.5/125 (*2)

Design:

Single element:
- Polymer cladded optical fibre 200/230 µm (step index) with Tefzelbuffer (ETFE), buffer diameter: approx. 0.5 mm
- Strain relief elements: aramid
- Subcable-jacket of halogen-free and flame-retardant material (FRNC) wall thickness approx. 0.4 mm
- Colours: orange, numeral marking
- Diameter: nominal 2.2 mm

Loose tube:
- Gel-filled loose tube outer diameter 2.4 mm with 2-12 optical fibres
- Tube colour: yellow (E9/125), green (G50/125), blue (G62.5/125)
- Fibre colours (1-10): red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink

Stranding:
- Loose tube and the breakout subcable elements are stranded around a central strength member (GFR)
- Fleece tape

Outer jacket:
- Flame-retardant, halogen free material (SHF1, IEC 60092 Part 360), with approx. 1.2 mm wall
- Outer diameter 9.4 mm

Type of fibres

Part – No.	Type	Optical quality	Definition in IEC	Definition in ISO 11801	Definition ITU-T
84######A	E9/125	0.38F3.5 / 0.22H18	60793-2-50 B1.3	OS2	G.652D/ G.657A1
84######B	E9/125	0.36F3.5 / 0.22H18	60793-2-50 B1.3	OS2	G.652D
84######C	E9/125	0.38F3.5 / 0.22H18	60793-2-50 B1.3	OS2	G.652D
84######E	E9/125	0.38F3.5 / 0.22H18	60793-2-50 B6_a1	OS2	G.657A1
84######U	E9/125	0.38F3.5 / 0.22H18	60793-2-50 B6_a2	OS2	G.657A2/B2
84######K	E9/125	0.38F3.5 / 0.22H18	60793-2-50 B6_b3	OS2	G.657B3
84######X	G50/125 BIMF	3.0B500 / 1.0F500	60793-2-10 A1a.1	OM2	G.651.1
84######G	G50/125	2.7B500 / 0.8F1000	60793-2-10 A1a.1	OM2	G.651.1
84######H	G50/125	2.7B600 / 0.7F1200	60793-2-10 A1a.1	OM2	G.651.1
84######V	G50/125 BIMF	2.5B1500 / 0.7F500	60793-2-10 A1a.2	OM3	G.651.1
84######S	G50/125 BIMF	2.5B1500 / 0.7F500	60793-2-10 A1a.2	OM3	G.651.1
84######W	G50/125 BIMF	2.5B3500 / 0.7F500	60793-2-10 A1a.3	OM4	G.651.1
84######R	G50/125 BIMF	2.5B3500 / 0.7F500	60793-2-10 A1a.3	OM4	G.651.1
84######L	G62.5/125	3.2B200 / 0.9F500	60793-2-10 A1b	OM1	without
84######M	G62.5/125	3.0B300 / 0.8F800	60793-2-10 A1b	OM1	without
84######T	K200/230	8.0B20	60793-2-30 A3e	without	without

Application/Limitation

Temperature Window

Installation:	-20°C to +50°C
Operation:	-20°C to +85°C
Storage:	-30°C to +85°C

Maximum Tensile Load 800N

Minimum Bend Radius

Installation:	150 mm
Operation:	100 mm

(*1) The ETFE (Tefzel-) Buffer is not halogen free but can be disregarded because of only 1,5% mass content.
(*2) 10G62.5/125 fibres may be replaced by 2-12 fibres from table "Type of fibre"

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
DNVGL-CP-0402	2016-02	DNV GL Type approval program for optical fiber cables	
IEC 60794-1-2	2014-07	Optical fibre cables – Part 1-2: Generic specification – Basic optical cable test procedures	E1 Tensile Strength F1 Temperature Cycling E3 Crush
IEC 60794-1-21	2015-04	Optical fibre cables - Part 1-21: Generic specification - Basic optical cable test procedures - Mechanical tests methods	E4 Impact E7 TorsionE10 Kink E11 Cable bend E11 Cold bend G1 Bend E6 Repeated bending
IEC 60793-2-10	2015-12	Optical fibres - Part 2-10: Product specifications - Sectional specification for category A1 multimode fibres	
IEC 60793-2-30	2015-06	Optical fibres - Part 2-30: Product specifications - Sectional specification for category A3 multimode fibres	
IEC 60793-2-50	2015-12	Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres	
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.	

Standard	Release	General description	Limitation
IEC 60811-201/202/203	2012-04	Electric and optical fibre cables Test methods for non-metallic materials Part 201/202/203: General tests Measurement of insulation thickness of thickness of non-metallic sheath of overall dimensions	Dimensions
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	2009-04	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
IEC60754-1	2011-12	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	2011-12	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
IEC 60684-2	2011-08	Clause 45.2 Methods of determination of low levels of fluorine	HF max 0,1% [0,02% can be detected]
IEC 61034-1/2	2013-07/09	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke

Marking of product

ABB Marine Interface Cable LEONI AT-VD(ZN)HH 5K200/230 10A17 / 8B20 + 10G62,5/125 - IEC 60332-3-22 - IEC 60332-3-24 - DNV GL TAE0000177- ABS Product Design Assessment - Certificate 16-HG1476111 - PDA (Order No.), (Reel No.), (sequential length in meters)

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.

Assessment to be performed at least every second year.
END OF CERTIFICATE