DNV·GL

Certificate No:
TAE000041U

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Fiber optical cable

with type designation(s)
TKSEA FIRE RESISTANT ARMOURED BREAKOUT LSZH OPTICAL CABLE. Tight buffered.

Issued to
TecniKabel S.p.A.
Torino, TO, Italy

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

Fiber optical breakout cable. Fire resistant and armoured.
Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.

Issued at **Høvik** on **2020-08-14**
This Certificate is valid until **2025-08-13**.
DNV GL local station: **Milan**

Approval Engineer: **Ivar Bull**

for **DNV GL**

Marta Alonso Pontes
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.

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

Product description

TKSEA FIRE RESISTANT ARMOURED BREAKOUT LSZH OPTICAL CABLE. Tight buffered.

CONSTRUCTION:

Core: Tight buffered fiber

Protection: Aramidic yarns

Inner sheath: SHF1

Assembly: 2 to 24 cores assembled in concentric layer around a central member fiber glass reinforced plastic (FRP) with Mica tape

Outer sheath: SHF1 or SHF2 or SHF2 MUD

Armour: Galvanized steel wire braid (GSWB) or
Tinned copper wire braid (TCWB) or
Bronze wire braid (BWB)

Outer sheath: SHF1 or SHF2 or SHF2 MUD RESISTANT

Available fiber types:

Single Mode fibers	Multi Mode fibers
SM-LWP ITU-T G.652.0	MM62.5 OM1
SM ITU-T G.657.A1	MM62.5 OM1+
SM ITU-T G.657.A2	MM50 OM2
SM 200µm ITU-T G.657.A1	MM50 OM3
SM NZD ITU-T G.655.D	MM50 OM4
	MM50 OM5

Application/Limitation

This type of cable is fire resistant according to IEC 60331-25.

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.

Operation Temperature Window -40°C + 70°C (SHF1)
-40°C + 90°C (SHF2 & SHF2 MUD resistant)

Minimum bending radius: Static: 10 x Ø
Dynamic: 15 x Ø

Type Approval documentation

Tests carried out

Standard/ req. reference	Year of release	Description	
DNVGL-CP-0402	2016-02	Class Programme DNVGL-CP-0402 Type approval of optical fibre cables	Includes attenuation test, tensile strength test, crush test, impact test, torsion test, kink test and cable bend test.
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 60811-202	2017-07	Electric and optical fibre cables - Test methods for non-metallic materials - Part 202: General tests - Measurement of thickness of non-metallic sheath	
IEC 60811-403	2012-03	Electric and optical fibre cables - Test methods for non-metallic materials - Part 403: Miscellaneous tests - Ozone resistance test on cross-linked compounds	
IEC 60793-1-40	2019-03	Optical fibres - Part 1-40: Attenuation measurement methods	
IEC 60794-1-21	2020-03	Optical fibre cables - Part 1-2: Generic specification - Basic optical cable test procedures, selected test E1, E3, E4, E7, E10, E11	
IEC 60794-1-22	2017-10	Optical fibre cables - Part 1-22: Generic specification - Basic optical cable test procedures - Environmental test methods, selected test F1	
IEC 60794-1-23	2019-10	Optical fibre cables - Part 1-23: Generic specification - Basic optical cable test procedures - Cable element test methods, selected test G1	
IEC 60794-1-24	2014-05	Optical fibre cables - Part 1-24: Generic specification - Basic optical cable test procedures - Electrical test methods, selected test H3	
IEC 60332-1-2	2015-07	Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulatedwire or cable - Procedure for 1 kW pre-mixed flame	
IEC 60332-3-22	2018-07	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	
IEC 60331-25	1999-09	Tests for fibre optic cables under fire conditions - Circuit integrity - Fire alone at a flame temperature of at least 750 °C.	750 °C 3 hours Attenuation increase ≤1,5 dB/fiber
IEC 60754-1	2019-11	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	2019-11	Test on gases evolved during	

Standard/ req. reference	Year of release	Description	
		combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity	
IEC 61034-1/2	2019-11 2019-11	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance ≥60%
NEK 606 Ed. 5	2016	Cables for offshore installations - halogen-free low smoke flame-retardant / fire-resistant (HFFR-LS). Technical specification.	Mud resistance test: Max variations ±: IRM902/903 100°C 7d. TS & E@B, weight & vol.: ±30% Calc. Brom. 70°C 56d. TS & E@B: ±25%, weight: ±15%, vol.: ±20% Oil based mud: EDC 95/11 70°C 56d TS & E@B ±30%, weight & vol.: ±25%
ASTM-D2565-16	2016-09	UV Resistance. Standard Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications	720 hours, cycle 1. Maximum change allowed in eleongation after the test ±40 %
CEI EN 50305:2003 - 9.2	2003-06	Railway applications - Railway rolling stock cables having special fire performance - Test methods - Toxicity	In accordance with specification (toxicity of evolved gas ≤3)
CAN/CSA-C22.2 No. 210.2-M90:2005 CAN/CSA-C22.2 No. 0.3-01:2014	2005 2014	Appliance Wiring Material Products Test methods for electrical wires and cables. Cold bend.	In accordance with specification (-40 °C)

Marking of product

TECNIKABEL (A) – ITALY - month/year - TKSEA ARMOURED(**) FIRE RESISTANT OPTICAL CABLE - BREAKOUT G n° and type of fibres SHF1 or SHF2 or SHF2 MUD RESISTANT - DNV GL approval N° TAE000041U - IEC 60331-25 [180+15min] IEC 60332-3-22 metric marking

(A) = Manufactured at Almese plant

(**) Type of armour: GSWB=Galvanized steel wire braid, TCWB=Tinned copper wire braid, BWB =Bronze wire braid

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