Certificate No:
TAE0000460

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Data transmission cables and systems

with type designation(s)
TKSEA ARMOURED FIRE RESISTANT LAN S/FTP 23AWG FLEX LSZH CABLE Cat 6A,
TKSEA ARMOURED FIRE RESISTANT LAN S/FTP 23AWG FLEX LSZH CABLE Cat 7

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

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

Application :

Data communication cable. Fire resistant. Installation / Horizontal cable
Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Issued at **Høvik** on **2022-05-04**
This Certificate is valid until **2027-05-03**.
DNV local station: **Milan**

Approval Engineer: **Ivar Bull**

for **DNV**

Trond Sjåvåg
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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.

Product description

Type(s): **TKSEA FIRE RESISTANT LAN S/FTP 23AWG FLEX LSZH CABLE Cat 6A,**
TKSEA FIRE RESISTANT LAN S/FTP 23AWG FLEX LSZH CABLE Cat 7

Conductors:	Stranded or solid bare copper conductor 0,28mm2
Core insulation:	Fire resistant material
Individual Screen:	Pairs assembled with Aluminum/Polyester or Aluminum/Polyester/Aluminum Tape
Common screen:	Tinned, Copper wire braid Coverage ⩾80%.
Fire barrier:	Fire resistant material
Outer sheath:	SHF1 or SHF2 or SHF2 MUD RESISTANT

Conductor resistance @20C ≤69,5 Ohm/km
Characteristic impedance 100±5 Ohm @ 100MHz

For further technical data please see datasheet.

Application/Limitation

This type of cable is fire resistant in accordance with IEC Publication 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 link compliant with Category 6A or 7, and to prevent break of conductors, cables shall be installed with suitable termination equipment according to manufacturer's recommendations.

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

Minimum bending radius: 10x OD (static)
15x OD (Dynamic)
Pull maximum: 100 N

Note regarding Safe Return to Port of passenger vessels: When DNV Rules Part 6.2.11 items 3.3.4.2 and 5.3.2.1 require fire resistant cables, these have to be tested according to IEC 60331-1/2 not exceeding stated maximum attenuation during/after fire.

Type Approval documentation

Tests carried out

Standard	Issued	General description	Limitation
DNV-CP-0403	2021-09	CLASS PROGRAMME Type Approval. Data communication cables – category cables	
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: Cat 6A (500MHz) or Cat 7 (600MHz)
IEC 60331-23	1999	Tests for electric cables under fire conditions - Circuit integrity - Part 23: Procedures and requirements - Electric data cables	180 min test + 15 min cooling down successfully maintaining ISO IEC 11801 Channel F requirements (Minimum performance guaranteed Channel Ea)
IEC 60332-3-22	2018-07	Flame retardant in bunch, cat. A	Charred portion of sample does not exceed 2,5m above bottom edge of burner.

Standard	Issued	General description	Limitation
IEC 60754-1	2019-11	Test on gases evolved during combustion of materials from cables – Determination of the amount of halogen acid gas	Low Halogen: <0,5% Halogen
IEC 60754-2	2019-11	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	2019-11	Measurement of smoke density of cables burning under defined conditions – Test apparatus, procedure and requirements	Low smoke Light transmittance >60%
EN 50305 9.2	2002	Railway applications - Railway rolling stock cables having special fire performance - Test methods	Toxicity of evolved gas <3
UL 2565-99 Cycle 1		ASTM D 2565 – 99 SUNLIGHT RESISTANCE (XENON ARC TEST)	41,5 W/m2 300-400nm. Temp. 63 °C. 18min spray/102min dry Duration 720 h. Max change in E@B +40%
IEC 60092-360	2021-01	Electrical installations in ships - Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables.	SHF1. SHF2: IRM 902 _ 100° C 24 h
NEK TS 606 Ed5	2016	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	SHF2 MUD versions: IRM902 100°C 7d. IRM903 100°C 7d. Calcium Bromide 70°C 56d. EDC 95/11 70°C 56d
CSA C 22-2 N. 0.3-01; n. 210.2 M90		Cold bend test	-40 °C

Marking of product

TECNIKABEL (V) – ITALY - month/year - TKSEA FIRE RESISTANT LAN S/FTP 23AWG FLEX LSZH CABLE Cat 6a SHF1 or SHF2 or SHF2 MUD RESISTANT - DNV GL TAE00002X1 - IEC 60331-23 (180+15min) – IEC 60332-3-22 - metric marking

TECNIKABEL (V) – ITALY - month/year - TKSEA FIRE RESISTANT LAN S/FTP 23AWG FLEX LSZH CABLE Cat 7 SHF1 or SHF2 or SHF2 MUD RESISTANT - DNV GL TAE00002X1 - IEC 60331-23 (180+15min) – IEC 60332-3-22 - metric 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 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