

TYPE APPROVAL CERTIFICATE

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

with type designation(s)

TKSEA FIRE RESISTANT ARMoured PROFIBUS LSZH CABLE

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 :****Data communication cable. Armoured. Fire resistant.****Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.**Issued at **Høvik** on **2020-03-22**This Certificate is valid until **2025-03-21**.DNV GL local station: **Milan**for **DNV GL**Approval Engineer: **Ivar Bull**

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.



Product description

TKSEA FIRE RESISTANT ARMoured PROFIBUS LSZH CABLE

Rated voltage peak: 100 V
Conductor: Stranded bare copper
Insulation: Foam-Skin polyethylene +Mica tape on conductors
Screen: A. Al/PE tape
B. Tinned copper wire braid >60% coverage
Inner sheath: SHF1
Armour: GSWB (Galvanized steel wire braid) or TCWB (Tinned copper wire braid) or BWB (Bronze wire braid). Coverage $\geq 85\%$
Outer sheath: SHF1 or SHF2 or SHF2 MUD
Number of cores: 2 Cross-section: 0,35 mm² (AWG22)

Application/Limitation

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 Bundles 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)

Type Approval documentation

Tests carried out

Standard	Issued	General description	Limitation
IEC 61158-2	2014-07	Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition	Standard test cable 12.8.2 a) to g)
IEC 60332-1-2	2004-07	Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame	
IEC 60332-3-22	2018-07	Tests on electric cables under fire conditions - Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables - Category A	Charred portion of sample does not exceed 2,5m above bottom edge of burner.
IEC 60331-23	1999-04	Tests for electric cables under fire conditions - Circuit integrity - Part 23: Procedures and requirements - Electric data cables	Minimum 180 + 15 min. At 180 minutes and after 15 minutes cooling, the change in impedance and attenuation shall not change more than +/- 20% of start value.
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: <0,5% Halogen
IEC 60754-2	2011-11	Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH	Halogen free: pH > 4,3 Conductivity <

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Certificate No: **TAE00003VX**

Standard	Issued	General description	Limitation
		measurement) and conductivity	10µS/mm
IEC 61034-1/2	2013-07 2013-09	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
ASTM-D-2565-16 Cycle 1		ASTM D 2565 – 16 SUNLIGHT RESISTANCE (XENON ARC TEST)	41,5 W/m ² 300-400nm. Temp. 63 °C. 18min spray/102min dry Duration 720 h. Max change in E@B +40%
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.	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
CAN/CSA C 22-2 N. 210.2 M90	2005	Cold bend test	-40 °C

Marking of product

TECHNIKABEL (V) – ITALY – month/year – TKSEA ARMoured (**) FIRE RESISTANT PROFIBUS 1x2x0,35 mm² LSZH CABLE SHF1 or SHF2 or SHF2 MUD – DNV GL approval TAE00003VX – IEC 60331-23[180+15min] – IEC 60332-3-22 – metric marking

(**) = Type of armouring.

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 material

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