Certificate No:
TAE000048N

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Data transmission cables and systems

with type designation(s)
Profibus Armoured cable 1&2 pairs 0.35mm2 SHF2

Issued to
APS Cables & Connectors Oy
Helsinki, **Finland**

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

Application :

Profibus cable.
Products approved by this certificate are accepted for installation on all vessels classed by DNV.

Issued at **Høvik** on **2021-03-19**

This Certificate is valid until **2021-06-21**.
DNV local station: **Helsinki FIS**

Approval Engineer: **Ivar Bull**

for **DNV**

Digitally Signed By: Low, Hanwee
Location: DNV Høvik, Norway
on behalf of

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

Profibus Armoured cable 1&2 pairs 0.35mm2 SHF2

Conductors:	Solid or stranded bare copper 0,35mm2
Flame protection:	Wrapping tape
Core insulation:	Polyolefin
Screen:	Aluminium/polyester tape (100%) with tinned copper braid (coverage ⩾60%)
Inner sheath:	SHF1
Armour:	Braid of galvanized steel, tinned copper or bronze
Outer sheath:	SHF2

Table 113- Fieldbus cable specifications (IEC 61158-2 ed.6)

Cable parameter	**Type A**	**Type B**	**Flame retardant Profibus Armoured cable**
Impedance	135 to 165 Ω (f = 3 to 20MHz)	100 to 130 Ω (f > 100kHz)	150 +/- 15 Ω @ f = 1 MHz
Capacitance	< 30 pF/m	< 60 pF/m	30pF/m @ 800 Hz
Resistance	< 110 Ω/km	Not specified	≤ 55 Ω/km @ 20C
Conductor cross-sectional area	≥ 0,34 mm^2	≥ 0,22 mm^2	0,35 mm^2
Color of sheath non-IS	Violet	Not specified	Violet or Black
Color of inner cable conductor A (RxD/TxD-N)	Green	Not specified	Red
Color inner cable conductor B (RxD/TxD-P)	Red	Not specified	Green

Application/Limitation

The requirements of SOLAS Amendments 1981 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

Data sheet: APS MOG Profibus 1&2 pairs, Fire Retardant, Armoured, SHF2 dated 17.2.2021
Test reports: See approval letter

Tests carried out

Standard	**Release**	**General description**	**Limitation**
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	Charred portion of sample does not exceed 2,5m above bottom edge of burner.
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 measurement) 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 Light transmittance >60% Result 93%
EN50305	2002	Item 9.2 Toxicity index	Measured value: 2,4 Outer sheath only
UV Test	2008	ASTM D 2565 – 99 SUNLIGHT RESISTANCE (XENON ARC TEST)	41,5 W/m^2 300-400nm. Temp. 63 °C. 18min spray/102min dry Duration 720 h.

Standard	Release	General description	Limitation
IEC 60092-350 & CSA C22.2	2008-02	Annex E: Procedure 8.9.1: Temperature requirements	Cold bend: -40°C Cold impact: -35°C

Marking of product

APS Finland – week/year - ARMOURED PROFIBUS MARINE no of pairs x0.35 mm² LSZH SHF2 – IEC 60332-3-22 Cat A - Lot - CE - meter

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 periodical 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 shall be performed at least every second year.