

TYPE APPROVAL CERTIFICATE

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

with type designation(s)

**PETROBUS 2 Pairs 0.34 mm² (150 ohms) + 2 x 1 mm²,
PETROBUS ROBOCABLE 1 Pair 0.34 mm² (150 ohms) + 2 x 1 mm²,
PETROBUS ROBOCABLE 1 Pair 0.34 mm² (150 ohms) + 2 x 1 mm² Aramid braid. Double sheath.**

Issued to

**LAPP Norway AS
DRAMMEN, Norway**

is found to comply with

Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards**Application :****PROFIBUS COMPATIBLE CABLES. Mud resistant according to NEK 606 Ed.5****Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.**Issued at **Høvik** on **2019-06-24**This Certificate is valid until **2023-12-31**.DNV GL local station: **Marseille**for **DNV GL**Approval Engineer: **Ivar Bull****Trond Sjøvåg
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.



Name & place of manufacturer

Lapp Muller SAS
83310 GRIMAUD
FRANCE

Product description

PETROBUS 2 Pairs 0.34 mm² (150 ohms) + 2 x 1 mm².

Conductors:	Plain stranded copper
Core insulation:	Foamed PE
Screen:	Aluminium backed PE tape + Tinned drain wire
Power conductors:	Tinned stranded copper
Insulation:	TPE
Overall screen:	Aluminium backed PE tape + Tinned copper spinning shield
Outer sheath:	Polyurethane. Mud resistant.

PETROBUS ROBOCABLE 1 Pair 0.34 mm² (150 ohms) + 2 x 1 mm².

PETROBUS ROBOCABLE 1 Pair 0.34 mm² (150 ohms) + 2 x 1 mm² Aramid braid. Double sheath.

Conductors:	Extra flexible tinned stranded copper
Core insulation:	Foamed PP
Screen:	Aluminium backed PE tape + Tinned copper spinning shield
Power conductors:	Tinned stranded copper
Insulation:	TPE
Overall screen:	Aluminium backed PE tape + Tinned copper spinning shield
Inner sheath:	Polyurethane. Mud resistant.
Extra strength member (if any)	Aramid fiber braid
Outer sheath	Polyurethane. Mud resistant.

Table 107-Cable specifications:

Cable parameter	Type A (for reference only)	PROFIBUS COMPATIBLE 1	PROFIBUS COMPATIBLE 2	PROFIBUS COMPATIBLE 3
Impedance	135 to 165 Ω (f = 3 to 20 MHz)	150+/-20 Ω (f = 3 to 20 MHz)	150+/-10% (f = 3 to 20 MHz)	150+/-10% (f = 3 to 20 MHz)
Capacity	< 30 pF/m	30±5 pF/m	30± pF/m	30± pF/m
Resistance	< 110 Ω/km	< 60 Ω/km	< 62,8 Ω/km	< 62,8 Ω/km
Conductor cross-sectional area	≥ 0,34 mm ²	≥ 0,34 mm ²	≥ 0,34 mm ²	≥ 0,34 mm ²
Colour of sheath non-IS	Violet	Violet	Violet	Violet
Colour of inner cable conductor A (RxD/TxD-N)	Green	Green	Green	Green
Colour inner cable conductor B (RxD/TxD-P)	Red	Red	Red	Red

Dynamic properties of Robocable:

Cable 73932 was tested 111.000 dynamic cycles / 63 weeks in outdoor test rig in Southern Norway.
Inner parts of Cables 72088 and 77445 are similiar construction as 73932.

Table 108-Maximum cable length for the different transmission speeds

Item	Unit	Value								
Data rate	kbit/s	9,6	19,2	93,75	187,5	500	1500	3000	6000	12000
Cable type A	m	1200	1200	1200	1000	400	200	100	100	100
Cable type B	m	1200	1200	1200	600	200	70	Not permissible		

Application/Limitation

By the termination of the cables the total strings of the cable to be kept through into the termination point as for coax cables.

Type Approval documentation

Tests carried out

Standard	Release	General description	Limitation
IEC 60332-1	2004-07	Tests on electric and optical fibre cables under fire conditions – Part 1-1:Test for vertical flame propagation for a single insulated wire or cable – Apparatus	Flame retardant small scale
IEC 60754-1	1994-01	Test on gases evolved during combustion of materials from cables – Determination of the amount of halogen acid gas	Low Halogen: <0,5% Halogen
IEC 61158-2 ed. 6	2014-07	Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition	Cable specifications as per item 22.1.2.2 and table 113.
NEK TS 606 Ed5	2016	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test: Required Max variations ±: IRM902 & 903 100°C 7d. TS & E@B, weight & vol.: ±30% Calc. Bromide 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%

Marking of product

PETROBUS 1031 L2/DP 2P0.34+2x1mm² – OF <Lot n° – LAPP MULLER <metermarking> MUD NEK 606
PETROBUS 1001 L2/DP 1P0.34+2x1mm² – OF <Lot n°> – LAPP MULLER <metermarking> MUD NEK 606
PETROBUS 1051 L2/DP ARAMIDE 1P0.34+2x1mm² – OF <Lot n°> – LAPP MULLER <metermarking> MUD NEK 606

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)



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Certificate No: **TAE000031T**

- 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