DNV·GL

Certificate No:
TAE000031E

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Flexible cable

with type designation(s)
ÖLFLEX® PETRO FD 865 CP. Voltage class 150/250V.

Issued to
U.I. Lapp GmbH
Stuttgart, Germany

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

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Issued at **Hamburg** on **2018-10-10**

This Certificate is valid until **2023-10-09**.
DNV GL local station: **Augsburg**

Approval Engineer: **Carsten Hunsalz**

for **DNV GL**

Digitally Signed By: Schaarmann, Arne
Location: DNV GL SE Hamburg, Germany
Signing Date: 2018-10-18

Arne Schaarmann
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.

Job Id: **262.1-015579-2**
Certificate No: **TAE000031E**

Product description

Type ÖLFLEX® PETRO FD 865 CP 150/250V.

Construction:

Conductors:	Extra fine stranded copper Class 6
Core insulation:	TPE
Inner covering:	Non woven wrapping
Inner sheath:	TPE
Metal covering:	Tinned copper braid screen
Sheath:	Robust special polymer

Dynamic properties:

Maximum speed	3 [m/s]
Maximum acceleration	3 [m/s2]
Maximum travel length	---- [m]
Number of cycles at bending radius 7,5 OD. Temperature +20**°C** Travel length 5m	At least 1.127.000
Acceptance criteria dynamic tests: increased resistance of onductor or braid	Maximum 10% referred to start of test.
Minimum bending radius: For flexible use: For fixed installation:	up from 7,5 x outer diameter 4 x outer diameter
Suitable for torsion (Yes/No)	No

List of variants:

Number of cores x conductor cross-section	Overall diameter Nominal
mm^2	mm
2 X 0,5	6.7
3 G 0,5	7.1
4 G 0,5	7.6
5 G 0,5	8.2
7 G 0,5	9.5
12 G 0,5	10.9
18 G 0,5	12.9
20 G 0,5	13.5
25 G 0,5	15.6
30 G 0,5	15.8
36 G 0,5	16.9
2 X 0,75	7.2
3 G 0,75	7.6
4 G 0,75	8.3
5 G 0,75	8.9
7 G 0,75	10.6
12 G 0,75	12.1
18 G 0,75	14.6
20 G 0,75	15.5
25 G 0,75	17.7

Number of cores x conductor cross-section	Overall diameter Nominal
mm^2	mm
30 G 0,75	17.7
36 G 0,75	19.5
2 X 1,0	7.6
3 G 1,0	8.1
4 G 1,0	8.8
5 G 1,0	9.6
7 G 1,0	11.3
12 G 1,0	13.2
18 G 1,0	15.9
20 G 1,0	16.6
25 G 1,0	19.2
30 G 1,0	19.6
36 G 1,0	21.2
50 G 1,0	24,9
2 X 1,5	8.3
3 G 1,5	8.9
4 G 1,5	9.8
5 G 1,5	10.8
7 G 1,5	12.5
12 G 1,5	14.9

Number of cores x conductor cross-section	Overall diameter Nominal
mm^2	mm
18 G 1,5	17.4
20 G 1,5	18.3
25 G 1,5	21.4
30 G 1,5	21.4
36 G 1,5	23.4
2 X 2,5	9.8
3 G 2,5	10.7
4 G 2,5	11.7
5 G 2,5	12.8
7 G 2,5	15.6
12 G 2,5	18.0
18 G 2,5	21.5
20 G 2,5	22.7
25 G 2,5	26.5
4 G 4	13.9
5 G 4	15.4
4 G 6	16.2
5 G 6	17.8
4 G 10	20.4
5 G 10	22.3

G = with yellow green protective earth conductor
X = without earth conductor

Application / Limitation

Flexible instrumentation cable. Suitable for long horizontal drag chain travel distances.
Halogen free. Weather, UV and resistant to hydrolysis.
Oil resistant. Mud resistant according to NEK606.

Manufacturers installation instructions to be followed.
Cable to be installed to prevent cable damage due to movement or external impact.
All conductor ends shall be provided with suitable pressured sockets or ferrules, or cable lugs.

Type Approval documentation

Data sheet: LAPP DB0023300 dated 18.07.2018
Test reports: Dynamic test report. report nr.:P-173/11TZ dated 25.04.2018.
Acceptance certificate P-173/2011 dated 16.02.2012
Test report nr.: P-173/11 dated 09.09.2011 and P-202/16 dated 30.05.2016

Tests carried out

Standard	Release	General description	Limitation
VDE 0472-815	:1989	Test for Halogen	< 0,2 % Clorine < 0,1 % Flourine
NEK TS 606	:2016	Cables for offshore installations - halogen-free low smoke flame-retardant/fire-resistant (HFFR-LS). Technical specification.	Mud resistance test: IRM 903 100° C 7 d. Calcium Bromide 70° C 56 d. Oil based test fluid: EDC 95/11 70°C 56d
IEC 60811-506	:2012	Cold impact test, Cable	Impact energy 400 g @ Temperature -50° C
IEC 60811-504	:2012	Cold bend test, Cable	< 12,5 mm cable Ø @ Temperature -50° C
IEC 60811-505	:2012	Cold elongation test, Cable	@ Temperature -50° C, > 30 % @ Temperature -60° C, > 30 % @ Temperature -70° C, > 30 %
IEC 60811-509	:2012	Heat shock, Cable	1h @ Temperature +150° C
IEC 60811-508	:2012	Heat pressure, Cable	4h @ Temperature +100° C
WN00-3009 IEC 60811-501 IEC 60811-401 IEC 60811-401 IEC 60811-504	:2018 :2012 :2012 :2012 :2012	Mechanical properties of insulation Unaged Aged (7d @ 135°C) Interacting (7d @ 100°C) Cold bend test (-50 °C)	Tensile strength > 10,0 N/mm² Elongation @ break > 300 % Tensile strength > 10,0 N/mm² Elongation @ break > 300 % Variation ± 30% and Elongation @ break > 300 % No cracks
WN0023300 IEC 60811-501 IEC 60811-401 IEC 60811-401 IEC 60811-504 IEC 60811-506 IEC 60811-505	:2018 :2012 :2012 :2012 :2012 :2012 :2012	Mechanical properties of inner sheath Unaged Aged (7d @ 135°C) Interacting (7d @ 100°C) Cold bend test (-50 °C) Cold impact test (-50°C) Cold bend test test (-50°C, < 12,5 mm Ø) Cold elongation test (-50 °C)	 Tensile strength > 9,0 N/mm² Elongation @ break > 300 % Tensile strength > 9,0 N/mm² Elongation @ break > 300 % Variation ± 30% and Elongation @ break > 300 % No cracks No cracks No cracks > 30%

VDE 0207-363-10-2 EN 50363-20-2 IEC 60811-401	: 2006 : 2005 :2012	Mechanical properties of outer sheath Unaged Aged (7d @ 110°C) Oil aging (7d @ 100°C) Hydrolysis (7d @ 80°C) Interacting (7d @ 100°C)	 Tensile strength > 25,0 N/mm² Elongation @ break > 300 % Tensile strength ± 30% Elongation @ break ± 30% Variation ± 30% and Elongation @ break > 300 %
		Power chain test, 5 m chain actual cycles at bending radius 7,5 x OD @ 20°C	7.538.177
EN 60228 IEC 60228	:2005 :2004	Conductor resistance	Table 4
EN50395 A1	:2005 :2011	Insulation resistance	> 20 GΩ x cm
EN50395 A1	:2005 :2011	High voltage test	5 minutes @ 3000 V

Marking of product

LAPP KABEL STUTTGART - ÖLFLEX® PETRO FD 865 CP – Size

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) 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