



# DET NORSKE VERITAS

## TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. E-12720

This is to certify that the  
**Flexible cable**

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

Issued to  
**Miltronic 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**  
**IEC 60754-1 (2011-11)**

Application  
**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.**

This Certificate is valid until **2017-12-31**.

Issued at **Høvik** on **2013-11-21**

DNV local station: **Essen CMC Southern Germany**

Approval Engineer: **Ivar Bull**



for **Det Norske Veritas AS**

Digitally Signed By: **Laumann, Marit**

Location: **DNV Høvik, Norway**

Signing Date: **2013-11-21**

**Marit Laumann**  
**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.  
If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

**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/s <sup>2</sup> ]
Maximum travel length	--- [m]
Number of cycles at bending radius 7,5 OD. Temperature +20°C	At least 1.127.000
Travel length 5m	
Acceptance criteria dynamic tests: increased resistance of conductor or braid	Maximum 10% referred to start of test.
Minimum bending radius:	For flexible use: 7,5 x outer diameter For fixed installation: 4 x outer diameter
Suitable for torsion (Yes/No)	No

**List of variants:**

Number of cores x conductor cross-section	Overall diameter Nominal
mm <sup>2</sup>	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 <sup>2</sup>	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 <sup>2</sup>	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**

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**

Certificate No.: E-12720  
 File No.: 827.13  
 Job Id.: 262.1-015579-1

Data sheet: LAPP\_PRO205879EN.pdf dated 12.09.2012  
 Test reports: Dynamic test report. report nr.:P-173/11TZ dated 24.04.2013.  
 Acceptance certificate P-173/2011 dated 16.02.2012  
 Test report nr.: P-173/11 dated 09.09.2011

**Tests carried out**

Standard	Release	General description	Limitation
IEC60754-1	: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
VDE 0472-815	:1989	Test for Halogen	< 0,2 % Chlorine < 0,1 % Flourine
NEK 606 Ed. 4	:2009-05	Cables for offshore installations. Halogen-free and/or mud resistant. Technical specification.	Mud resistance test: IRM 903 100° C 7 d. Calcium Bromide 70° C 56 d. Carbo Sea 70° C 56 d.
IEC 60811-1-4 +A2	: 2001	Cold impact test, Cable	Impact energy 400 g @ Temperature -50° C
IEC 60811-1-4 +A2	: 2001	Cold bend test, Cable	< 12,5 mm cable Ø @ Temperature -50° C
IEC 60811-1-4 +A2	: 2001	Cold elongation test, Cable	@ Temperature -50° C, > 30 % @ Temperature -60° C, > 30 % @ Temperature -70° C, > 30 %
IEC 60811-3-1 +A2	: 2001	Heat shock, Cable	1h @ Temperature +150° C
IEC 60811-3-1 +A2	: 2001	Heat pressure, Cable	4h @ Temperature +100° C
WN00-3009 IEC 60811-1-1 +A1 IEC 60811-1-2 +A2 IEC 60811-1-2 +A2 IEC 60811-1-4 +A2	:2006 :2001 :2000 :2001 :2001	Mechanical properties of insulation Unaged Aged (7d @ 135°C) Interacting (7d @ 100°C) Cold bend test (-50 °C)	Tensile strength > 10,0 N/mm <sup>2</sup> Elongation @ break > 300 % Tensile strength > 10,0 N/mm <sup>2</sup> Elongation @ break > 300 % Variation ± 30% and Elongation @ break > 300 % No cracks
WN0023300 IEC 60811-1-1 +A1 IEC 60811-1-2 +A2 EN 60811-1-2 +A2 IEC 60811-1-2 +A2 IEC 60811-1-4 +A2	: 012 :2001 :2000 :2000 :2000 :2001	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/mm <sup>2</sup> Elongation @ break > 300 % Tensile strength > 9,0 N/mm <sup>2</sup> Elongation @ break > 300 % Variation ± 30% and Elongation @ break > 300 % No cracks No cracks No cracks > 30%

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Standard	Release	General description	Limitation
VDE 207-363-10-2 EN 50363-10-2	: 2006 : 2006	Mechanical properties of outer sheath Unaged	Tensile strength > 25,0 N/mm <sup>2</sup> Elongation @ break > 300 % Tensile strength ± 30% Elongation @ break ± 30%
EN 60811-1-2 +A2 IEC 60811-1-2 +A2	:2000 :2000	Aged (7d @ 110°C) Oil aging (7d @ 100°C) Hydrolysis (7d @ 80°C) Interacting (7d @ 100°C)	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 – RoHS – Lot No.

#### Certificate retention survey

The scope of the retention/renewal survey 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 survey 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.

Survey to be performed at least every second year.

END OF CERTIFICATE