

# ÖLFLEX® 408 P/409 P

Power and control cables with polyurethane outer sheath



**LAPP GROUP**

# ÖLFLEX® power and control cables for harsh conditions

The diverse range of cables in the ÖLFLEX® 400 and 500 series is composed of numbered control cables and colour-coded power cables for harsh areas of application. In applications with increased mechanical requirements, in particularly oily environments and even at very low temperatures, where conventional cables such as those with a PVC outer sheath quickly reach their limits, ÖLFLEX® polyurethane cables come into their own. According to the area of application, this cable range offers tailored solutions with staggered product performance. We optionally provide a number of versions with or without copper screening to maintain the EMC (electromagnetic compatibility). See our latest main catalogue for more details.

Power and control cables for harsh conditions																		
	Black cores - numbered	Coloured cores	Copper braiding	Co-extruded functional layer	Enhanced oil resistance	Drilling fluid resistant IEC 61892-4	Drilling fluid resistant NEK TS 606	Flexible at temperatures as low as -40 °C	Temperature-resistant to +90 °C	Halogen-free	Flame-retardant IEC 60332-1-2	No flame propagation IEC 60332-3-22	VDE certification	HAR certification	UL/CSA certification	Nominal voltage 300/500 V	Nominal voltage 450/750 V	Nominal voltage 600/1000 V
Enhanced mechanical and chemical resistance																		
ÖLFLEX® PETRO C HFFR single core	•		•		•	•	•	•	•	•	•	•			•		•	•
ÖLFLEX® PETRO C HFFR multi core	•	•	•		•	•	•	•	•	•	•	•			•	•	•	•
ÖLFLEX® CLASSIC 400 P	•				•											•		
ÖLFLEX® CLASSIC 400 CP	•		•		•											•		
ÖLFLEX® CLASSIC 415 CP	•		•		•											•		
ÖLFLEX® 408 P (NEW, page 6)	•			•	•								•			•		
ÖLFLEX® 409 P (NEW, page 7)	•			•	•						•				•	•		•
ÖLFLEX® 440 P	•				•	•		•	•	•	•		•			•		
ÖLFLEX® 440 CP	•		•		•	•		•	•	•	•		•			•		
ÖLFLEX® 491 P	•				•						•				•	•		•
ÖLFLEX® 450 P		•			•						•					•		
ÖLFLEX® 500 P		•			•	•		•		•	•					•		
ÖLFLEX® 540 P	•	•			•	•		•	•	•	•		•			•	•	
ÖLFLEX® 540 CP	•	•	•		•	•		•	•	•	•		•			•	•	
ÖLFLEX® 550 P		•			•			•	•				•			•	•	

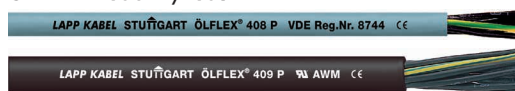
## ÖLFLEX® PETRO C HFFR



## ÖLFLEX® CLASSIC 400 P / 400 CP / 415 CP



## ÖLFLEX® 408 P / 409 P



## ÖLFLEX® 440 P / 440 CP



## ÖLFLEX® 491 P



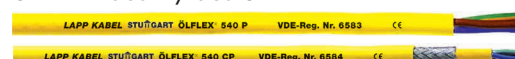
## ÖLFLEX® 450 P



## ÖLFLEX® 500 P



## ÖLFLEX® 540 P / 540 CP



## ÖLFLEX® 550 P (H07BQ-F)



NEW

# Versatile and tough

## Mechanically robust

ÖLFLEX® PUR cables are used wherever harsh processing in the course of indoor and outdoor use demands a high level of resistance to notches, cuts and abrasion. It doesn't matter whether the cables are used on an abrasive surface, are sometimes driven over by vehicles or have to deal with sharp-edged machine parts or other shear forces – specially selected sheath compounds made of high-resistance polyurethane emphasise the characteristics of robustness and durability. Certain versions like the ÖLFLEX® 500 P and 540 P also feature outer sheaths in the signal colours of yellow and orange, making them easier to see in dark environments or in outdoor use and thereby ensuring enhanced safety.



## Chemical resistance

When they come into contact with mineral oil-based lubricants and many other chemical media, all ÖLFLEX® PUR cables from the 400 and 500 product series can be awarded top marks for their chemical resistance. The entire ÖLFLEX® polyurethane range is therefore perfectly suited to applications in particularly oily areas of industrial machinery, machine tools, production lines and CNC processing centres. Even aggressive drilling fluids used in the offshore sector are no match for ÖLFLEX® PETRO C HFFR single cores or multi-core cables and other selected ÖLFLEX® PUR cables.

## Wide temperature range

When used in cooling technology or in the case of outdoor use in particularly cold geographical climatic zones, control cables such as the ÖLFLEX® 440 P featuring special core insulation stand out thanks to their flexibility at temperatures as low as -40°C. This even extends as far as -50°C for fixed installation. If hotter conditions are expected, certain ÖLFLEX® PUR cables from Lapp can handle temperatures of up to +90°C depending on the core insulation material.

In addition to providing resistance to microbes and hydrolysis, the PUR sheath compounds feature UV and ozone resistance in line with international standards. This further increases the area of application and the durability of the cables in the context of outdoor use.





NEW



## The new models are a hit with installers

### New assembly products available

The addition of the new control cables ÖLFLEX® 408 P and ÖLFLEX® 409 P extends the cable range for applications with increased mechanical and chemical requirements in harsh conditions.

The polyurethane outer sheath material is abrasion-resistant and notch-resistant and provides both cables with an outstanding level of oil resistance.

### Integrated functional layer

For more efficient stripping, both PUR cables are produced with an interstice filler functional layer on a special PVC base. This features optimised tear characteristics that make it simpler and safer to perform mechanical and manual cutting and removal of the sheath.

The special cable design can considerably reduce damage to the core insulation, subsequent processing of improperly stripped cable sections and material waste.

### Tested and certified quality

The cable design and the assured properties of the ÖLFLEX® 408 P and ÖLFLEX® 409 P have been tested and certified by the VDE test institute and UL (Underwriters Laboratories).

To ensure the highest quality standards, the cables are also subject to regular factory surveillance.

### Areas of application

- Device and apparatus construction
- Industrial machines and machine tools
- Assembly lines and production lines
- Measuring technology, control engineering and electrical engineering
- In dry, damp or wet interiors
- Outdoor use in accordance with the temperature range
- In the oily wet area of industrial machinery
- For fixed installation or applications with occasional flexing

### ÖLFLEX® 408 P

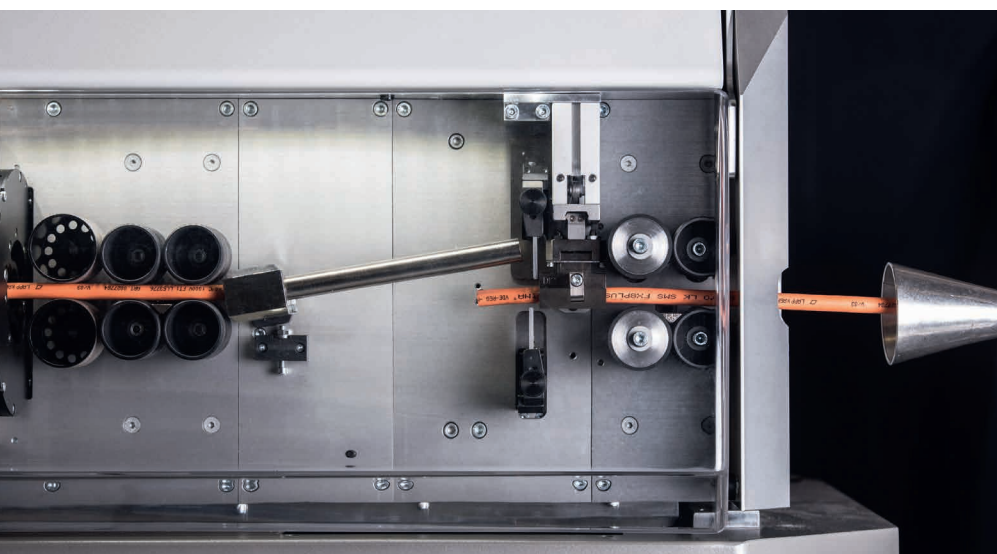
The all-rounder in industrial machinery

- Abrasion-resistant and notch-resistant
- Enhanced oil resistance
- Hydrolysis-resistant and microbe-resistant
- Enhanced flexibility at temperatures as low as -15°C
- Outer sheath colour grey (RAL 7001)
- Nominal voltage  $U_0/U$  300/500 V
- VDE-certified under reg. no. 8744

### ÖLFLEX® 409 P

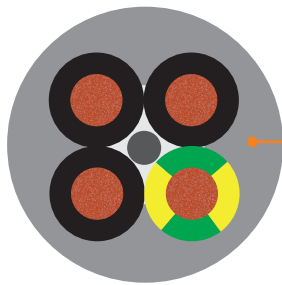
Tailored to North America

- Abrasion-resistant and notch-resistant
- Enhanced oil resistance
- Hydrolysis-resistant and microbe-resistant
- Flame-retardant according to IEC 60332-1-2 and UL VW-1, CSA FT1
- Outer sheath colour black
- Nominal voltage  $U_0/U$  300/500 V (IEC) 1000 V (UL/CSA)
- UL and cUL tested and certified AWM Style 20234 (USA) AWM II A/B FT1 (Canada)





# It's what's inside that counts



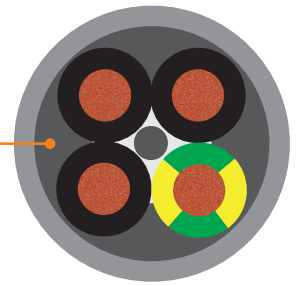
## Press extruded with interstice filler

In order to produce a cable that is as round and as stable under pressure as possible, the sheath plastic in control cables is mostly 'press' extruded along the conductor bunch under high pressure. In the process, the gaps – known as the interstices – are filled with sheath material between the cores of the external stranding layer.

If the sheath material consists of highly robust, cut-resistant and notch-resistant polyurethane, the filled interstices can make it more difficult to remove the outer sheath. The tear-resistant interstice filler cannot be caught up when cutting the circular sheath. This means, for example, that the blade setting of the processing equipment must be aligned with even greater precision in order to cut as deep as possible and thereby prevent 'stringing' or excessive tensile forces acting on the remaining interstice material when tearing off the tough sheath.

It is not uncommon for the core insulation to be damaged by blades with a setting that is too deep. On the other hand, a reduced cutting depth presents the risk that the sheath can only be torn off under very high tensile forces and in an uncontrolled manner, or that the blades will slip off during the removal process and only scrape along the surface of the sheath.

The consequences of this often cost time and money, specifically in terms of machine downtime, subsequent manual processing and material waste.



## ÖLFLEX® 408 P / 409 P with functional layer

As is standard with higher-quality control cables, these versions also feature press extrusion with interstice filler for the purpose of optimum cable design.

However, the secret of the new ÖLFLEX® 408 P and 409 P control cables is the application of co-extrusion technology in sheath production. The abrasion-resistant and notch-resistant polyurethane outer sheath is inseparably connected to the interstice filler functional layer made of special PVC. The improved mechanical tear characteristics of the new interstice filler via the core stranding can counteract problems that typically occur during sheath processing. The cut depth can be reduced in order to protect the core insulation. The optimised tear characteristics of the functional layer prevent 'stringing', which often occurs with PUR interstices, as well as the occurrence of frayed cable sheaths in the event that the sheath casing is torn off in an uncontrolled manner.

The positive effect of the new functional inner layer is clear not only with regard to mechanical stripping, but also manual stripping. There are considerable improvements in separation and removal of the sheath in relative terms.

## The processing benefits in detail

The innovative functional layer of the new ÖLFLEX® 408 P and ÖLFLEX® 409 P provides a range of benefits, particularly in the context of mechanical processing:

- Improved stripping characteristics
- Reduction of damage to core insulation
- Less subsequent manual processing
- Reduced material waste
- Saves time and costs



## ÖLFLEX® 408 P

Abrasion- and oil-resistant control cable with PUR sheath for increased application requirements - VDE certified

### Info

- High mechanical strength
- Good oil resistance
- Interstice-filling functional layer

### Benefits

- Increased durability under harsh conditions thanks to robust PUR outer sheath
- Resistant to contact with many mineral oil-based lubricants, diluted acids, aqueous alkaline solutions and other chemical media
- Interstice-filling functional layer ensures more safety and efficiency during industrial jacket stripping
- VDE-tested characteristics

### Application range

- Appliance and apparatus construction
- Industrial machinery and machine tools
- Measurement, control and electrical applications
- Outdoor use is possible within the indicated operating temperature range
- Very suitable for oily wet areas within machinery and production lines that are subject to normal mechanical stress

### Product features

- High oil-resistance
- Abrasion and notch-resistant
- Low-adhesive surface
- Resistant to hydrolysis and microbes

### Norm references / Approvals

- VDE Reg.No. 8744

### Product Make-up

- Fine-wire, bare copper conductor
- Core insulation: special PVC
- Cores twisted in layers
- Special outer sheath of polyurethane with interstice-filling functional layer
- Sheath colour: silver grey (RAL 7001)

### Technical data



#### Classification

ETIM 5.0 Class-ID: EC000104  
ETIM 5.0 Class-Description:  
Control cable



#### Core identification code

Black with white numbers acc. to VDE 0293-1



#### Conductor stranding

Fine wire according to VDE 0295, class 5/IEC 60228 class 5



#### Minimum bending radius

Flexible use: 12.5 x outer diameter  
Fixed installation: 4 x outer diameter



#### Nominal voltage

U<sub>0</sub>/U: 300/500 V



#### Test voltage

4000 V



#### Protective conductor

G = with GN-YE protective conductor  
X = without protective conductor



#### Temperature range

Occasional flexing: -15°C to +70°C  
Fixed installation: -40°C to +80°C

Article number	Number of cores and mm <sup>2</sup> per conductor	Outer diameter (mm)	Copper index (kg/km)	Weight (kg/km)
<b>ÖLFLEX® 408 P</b>				
1308802	2 X 0,5	4,8	9,6	32
1308003	3 G 0,5	5,1	14,4	39
1308803	3 X 0,5	5,1	14,4	39
1308004	4 G 0,5	5,7	19,2	49
1308804	4 X 0,5	5,7	19,2	49
1308005	5 G 0,5	6,2	24	59
1308805	5 X 0,5	6,2	24	59
1308007	7 G 0,5	6,7	33,6	73
1308807	7 X 0,5	6,7	33,6	73
1308010	10 G 0,5	8,6	48	116
1308012	12 G 0,5	8,9	57,6	129
1308018	18 G 0,5	10,5	86,4	184
1308025	25 G 0,5	12,4	120	256
1308852	2 X 0,75	5,4	14,4	42
1308103	3 G 0,75	5,7	21,6	51
1308853	3 X 0,75	5,7	21,6	51
1308104	4 G 0,75	6,2	28,8	62
1308854	4 X 0,75	6,2	28,8	62
1308105	5 G 0,75	6,7	36	75
1308855	5 X 0,75	6,7	36	75
1308107	7 G 0,75	7,3	50,4	95
1308857	7 X 0,75	7,3	50,4	95
1308110	10 G 0,75	9,6	72	153
1308112	12 G 0,75	9,9	86,4	170
1308118	18 G 0,75	11,7	129,6	245
1308125	25 G 0,75	13,8	180	340
1308902	2 X 1,0	5,7	19,2	49
1308203	3 G 1,0	6,0	28,8	60
1308903	3 X 1,0	6,0	28,8	60
1308204	4 G 1,0	6,5	38,4	74
1308904	4 X 1,0	6,5	38,4	74
1308205	5 G 1,0	7,1	48	90
1308905	5 X 1,0	7,1	48	90

Article number	Number of cores and mm <sup>2</sup> per conductor	Outer diameter (mm)	Copper index (kg/km)	Weight (kg/km)
1308207	7 G 1,0	8,0	67,2	118
1308907	7 X 1,0	8,0	67,2	118
1308210	10 G 1,0	10,2	86	184
1308212	12 G 1,0	10,5	115,2	204
1308218	18 G 1,0	12,7	172,8	303
1308225	25 G 1,0	14,7	240	412
1308952	2 X 1,5	6,3	28,8	64
1308303	3 G 1,5	6,7	43,2	81
1308953	3 X 1,5	6,7	43,2	81
1308304	4 G 1,5	7,2	57,6	99
1308954	4 X 1,5	7,2	57,6	99
1308305	5 G 1,5	8,1	72	125
1308955	5 X 1,5	8,1	72	125
1308307	7 G 1,5	8,9	100,8	161
1308957	7 X 1,5	8,9	100,8	161
1308312	12 G 1,5	12,0	172,8	286
1308318	18 G 1,5	14,4	259,2	419
1308325	25 G 1,5	16,9	360	580
1308403	3 G 2,5	8,1	72	125
1308404	4 G 2,5	8,9	96	158
1308405	5 G 2,5	10,0	120	198
1308407	7 G 2,5	11,1	168	259
1308412	12 G 2,5	14,8	288	454
1308504	4 G 4	10,8	153,6	241
1308505	5 G 4	12,1	192	302
1308507	7 G 4	13,4	268,8	394
1308604	4 G 6	13,0	230,4	356
1308605	5 G 6	14,5	288	443
1308607	7 G 6	16,0	403,2	579
1308514	4 G 10	16,2	384	571
1308615	5 G 10	18,1	480	714
1308617	7 G 10	20,0	672	935
1308624	4 G 16	18,8	614,4	843

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.  
Copper price basis: EUR 150 / 100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: [www.lappkabel.de/en/cable-standardlengths](http://www.lappkabel.de/en/cable-standardlengths)

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

Photographs are not to scale and do not represent detailed images of the respective products.



## ÖLFLEX® 409 P

Abrasion- and oil-resistant PUR control cable for increased application requirements - certified for North America



### Info

- Substitutes previous ÖLFLEX® 491 P
- UL/cUL certified for North America
- Interstice-filling functional layer



### Benefits

- Increased durability under harsh conditions thanks to robust PUR outer sheath
- Resistant to contact with many mineral oil-based lubricants, diluted acids, aqueous alkaline solutions and other chemical media
- Interstice-filling functional layer ensures more safety and efficiency during industrial jacket stripping
- Certified for the USA and Canada for export-oriented appliance and apparatus manufacturers

### Application range

- Appliance and apparatus construction
- Industrial machinery and machine tools
- Measurement, control and electrical applications
- Under consideration of the temperature range also suitable for outdoor use
- Very suitable for oily wet areas within machinery and production lines that are subject to normal mechanical stress

### Product features

- High oil-resistance
- Flammability:  
UL/CSA: VW-1, FT1  
IEC/EN: 60332-1-2
- Abrasion and notch-resistant
- Low-adhesive surface
- Resistant to hydrolysis and microbes

### Norm references / Approvals

- UL AWM Style 20234
- CUL AWM II A/B FT1

### Product Make-up

- Fine-wire, bare copper conductor
- Core insulation: special PVC
- Cores twisted in layers
- Special outer sheath of polyurethane with interstice-filling functional layer
- Sheath colour: black (RAL 9005)

### Technical data



#### Classification

ETIM 5.0 Class-ID: EC000104  
ETIM 5.0 Class-Description:  
Control cable



#### Core identification code

Black with white numbers acc. to VDE 0293-1



#### Conductor stranding

Fine wire according to VDE 0295, class 5/IEC 60228 class 5



#### Minimum bending radius

Flexible use: 12.5 x outer diameter  
Fixed installation: 4 x outer diameter



#### Nominal voltage

U<sub>0</sub>/U: 300/500 V  
UL/CSA: 1000 V



#### Test voltage

4000 V



#### Protective conductor

G = with GN-YE protective conductor  
X = without protective conductor



#### Temperature range

Occasional flexing: -5 °C to +70 °C  
(UL: +80 °C)  
Fixed installation: -40 °C to +80 °C

Article number	Number of cores and mm² per conductor	Outer diameter (mm)	Copper index (kg/km)	Weight (kg/km)
<b>ÖLFLEX® 409 P</b>				
1311852	2 X 0,75	6,9	14.4	61
1311103	3 G 0,75	7,2	21.6	71
1311104	4 G 0,75	7,7	28.8	84
1311105	5 G 0,75	8,3	36	100
1311107	7 G 0,75	8,9	50.4	122
1311110	10 G 0,75	10,8	72	180
1311112	12 G 0,75	11,1	86.4	198
1311118	18 G 0,75	12,8	129.6	275
1311125	25 G 0,75	14,5	180	364
1311902	2 X 1.0	7,2	19.2	69
1311203	3 G 1.0	7,5	28.8	81
1311204	4 G 1.0	8.0	38.4	97
1311205	5 G 1.0	8,7	48	117
1311207	7 G 1.0	9,3	67.2	142
1311210	10 G 1.0	11,4	96	212
1311212	12 G 1.0	11,7	115.2	234
1311218	18 G 1.0	13,5	172.8	327
1311225	25 G 1.0	15,4	240	437
1311952	2 X 1,5	7,8	28.8	87

Article number	Number of cores and mm² per conductor	Outer diameter (mm)	Copper index (kg/km)	Weight (kg/km)
1311303	3 G 1,5	8,2	43.2	104
1311304	4 G 1,5	8,8	57.6	126
1311305	5 G 1,5	9,5	72	151
1311307	7 G 1,5	10,2	100.8	188
1311312	12 G 1,5	13.0	172.8	314
1311318	18 G 1,5	15.0	259.2	441
1311325	25 G 1,5	17,2	360	596
1311403	3 G 2,5	9,5	72	151
1311404	4 G 2,5	10,2	96	184
1311405	5 G 2,5	11,1	120	224
1311407	7 G 2,5	12.0	168	282
1311412	12 G 2,5	15,5	288	480
1311504	4 G 4	11,8	153.6	266
1311505	5 G 4	12,9	192	325
1311604	4 G 6	13,1	230.4	359
1311605	5 G 6	14,3	288	438
1311704	4 G 10	16,5	384	585
1311705	5 G 10	18,2	480	722
1311804	4 G 16	19,1	614.4	861
1311805	5 G 16	22,1	768	1107

Unless specified otherwise, the shown product values are nominal values. Detailed values (e.g. tolerances) are available upon request.  
Copper price basis: EUR 150/100 kg. Refer to catalogue appendix T17 for the definition and calculation of copper-related surcharges.

Please find our standard lengths at: [www.lappkabel.de/en/cable-standardlengths](http://www.lappkabel.de/en/cable-standardlengths)

Packaging size: coil ≤ 30 kg or ≤ 250 m, otherwise drum

Please specify the preferred type of packaging (e.g. 1 x 500 m drum or 5 x 100 m coils).

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**ÖLFLEX®**  
Power and control cables



**UNITRONIC®**  
Data communication systems



**ETHERLINE®**  
Data communication systems  
for ETHERNET technology



**HITRONIC®**  
Optical transmission systems



**EPIC®**  
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