

Flexible cables for submersible products



Flygt



ITT Industries
Engineered for life

Standards

SUBCAB cables complies with the following general standards:

IEC 60245 (general)
IEC 60228 class 5 (conductor)
IEC 60811-1-1 CLAUSE 9 (oil resistant)
IEC 60811-2-1 CLAUSE 10 (oil resistant)
IEC 60332-1 (flame retardant)
IEC 60332-2 (flame retardant)
IEC 60364-5-523 (current)

VDE 0207 part 20 (material)
VDE 0250 (material)
VDE 0282 part 810 (material)
VDE 0472 part 803-A (oil resistant)
VDE 0472 part 804-B (flame retardant)
VDE 0295 (conductor)
VDE 0298 (current)
VDE 0472 (testing)

HD 22.4 (general)
HD 22. 16 annexes A & B (cables for submersible use)

CSA C22.2 No.49-1992 (general)
UL 1581 (general)

General

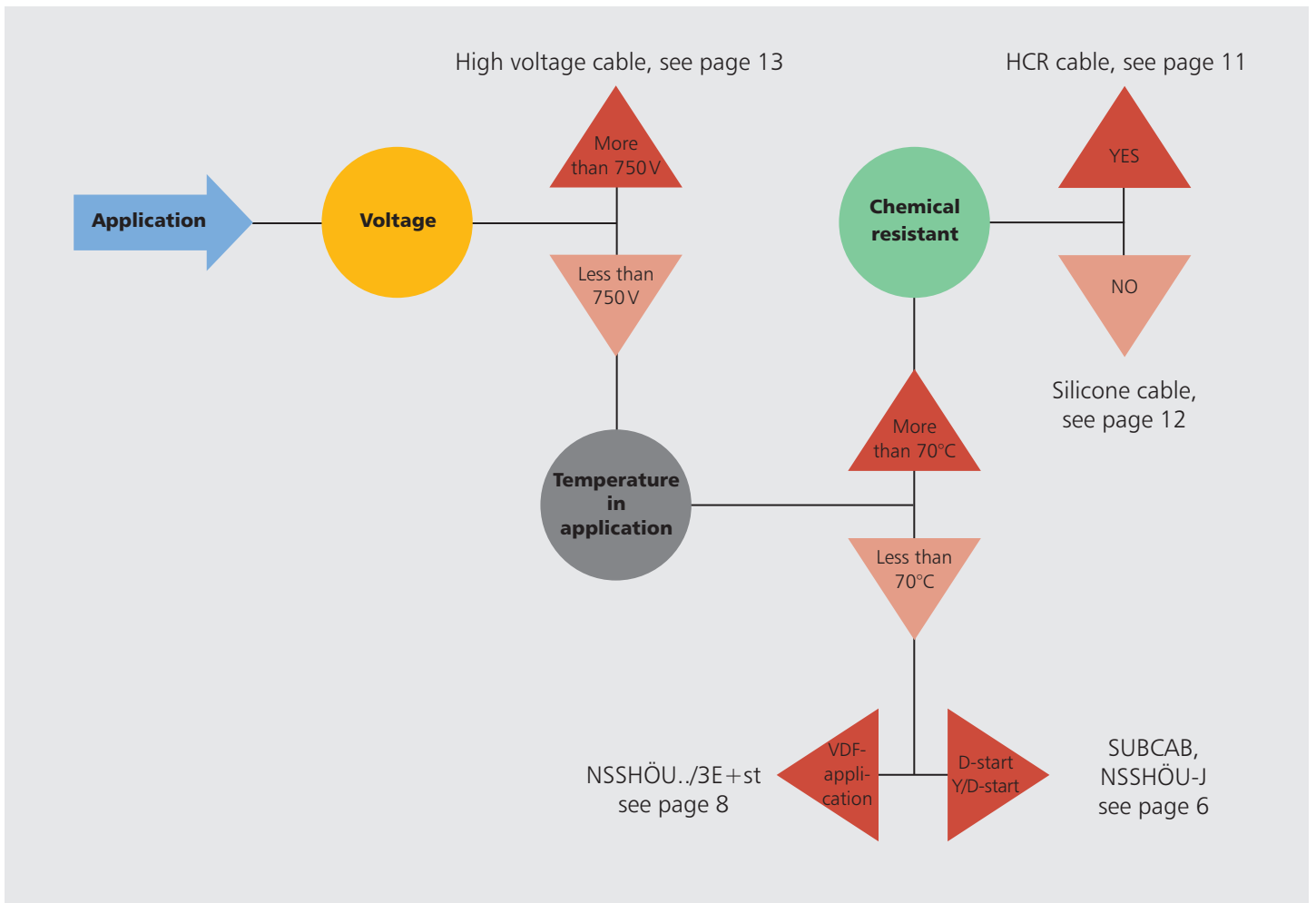
ITT Flygt has put thousands of man hours into researching the best materials available for our flexible cables, which are specially designed for use with heavy duty submersible products. The reason is to make sure that the cable attached to your submersible product will never let you down, whatever your application is.

Flygt cables can handle liquid temperatures of up to 70°C and water depths of 50 metres. They are made from a special tear and abrasion resistant compound with a higher tensile strength than standard cables.

Our cables have low absorption properties, which means that when submerged, they retain mechanical and electrical properties over a long period of time. They also have excellent insulation properties and are oil resistant for use in many types of liquid and as a part of ITT Flygt's environmental program all cables meet our stringent guidelines.

Flygt's SUBCAB cables are manufactured in accordance with CSA, MSHA and VDE standards for mechanical qualities and temperature and are explosion proof according to FM (US) and INERIS (Europe).

Cable selection guide



SUBCAB

Properties

The cable is designed for use with standard and explosion proof submersible products in applications where the ambient temperature does not exceed 70°C.

It complies with IEC 60245, CSA.22.2 No 49 and UL 62, is oil resistant according to IEC 60811-1-1 and flame retardant according to IEC 60332-1 and IEC 60332-2.

The cable is also EX-approved according to INERIS No.15499/00, IEC 60679-14.

The SUBCAB design has higher mechanical strength and lower water absorption than a standard cable, and high settlement to withstand the pressure at the cable entry unit point.

Construction data

1. *Outer sheathing*: black chlorinated polyethylene rubber (CPE).
2. For SUBCAB 50-185 mm²:
Outer sheathing: black chlorinated polyethylene rubber (CPE, type: 5GM5).
3. *Conductor insulation*: Ethyleneprophylene rubber (EPR).
4. *Conductors*: copper strands.

Rated voltage

Europe:	450/750 V
North America and Canada:	600 V

Technical data

Current rating:

Europe, according to IEC 60364-5-523 table 52-C11/E

North America, according to NEC 310.16, 400-5B and CSA C 22.2 No.49.

Max. conductor temperature: 90°C

Max. continuous ambient temperature: 70°C, AWG 60°C according to CSA.

Approvals

The European version exceeds the requirements for Harmonized Cable "HAR".

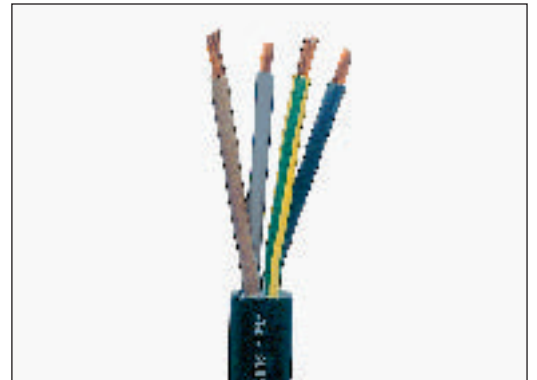
The North American version SUBCAB AWG, is MSHA (Mine Safety & Health Administration) and FM (Factural Mutural) certified and approved.

The cable SUBCAB mm² and SUBCAB AWG are also approved according to CSA C22.2, No. 49-1992, No.108-M89 and UL 62 for SOW.

More information

For more detailed information about SUBCAB see Flygt standards M1997.47.0009, M1947.47.0004, M1947.47.0007 and M1947.47.0010.

Product assortment on next page.



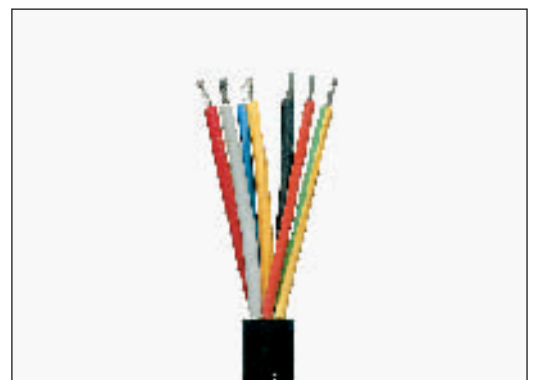
SUBCAB 4 G X



SUBCAB 4 G X+2x15



SUBCAB S12x1,5



SUBCAB AWG

The table below shows the product assortment with overall diameter and nominal current capacity at 30°C according to IEC 60364-5-523. For SUBCAB AWG according to NEC 310.16 and 400-5B.

The nominal current must be adjusted according to the actual ambient temperature (see correction factor for ambient temperature, page 12) and installation.

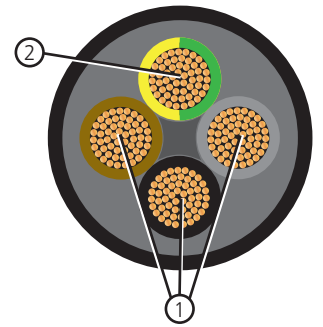
European version SUBCAB	Outer diameter mm	Nominal current capacity Amp	FLYGT Part No.
3 G 1,5	10,0 – 11,0	23	942040
4 G 1,5	10,5 – 11,5	23	942041
4 G 2,5	12,5 – 13,5	32	942042
7 G 2,5	18,0 – 20,0	32	942054
4 G 4	16,0 – 17,0	42	942043
4 G 6	18,0 – 19,0	54	942044
4 G 10	23,5 – 25,5	75	942045
4 G 16	26,0 – 28,0	100	942046
4 G 25	32,5 – 34,5	127	942047
4 G 35	36,5 – 38,5	157	942048
4 G 50	41,0 – 45,0	192	942066
4 G 70	45,0 – 49,0	246	942067
4 G 95	54,0 – 58,0	298	942068
4 G 120	56,0 – 60,0	346	942069
53x185+3x95/3	65,0 – 69,0	475	941923

SUBCAB with control cores			
7 G 2,5 + 2x1,5	20,0 – 23,0	32	942082
7 G 4 + 2x1,5	22,0 – 26,0	42	942080
7 G 6 + 2x1,5	24,3 – 28,3	54	942081
4 G 1,5 + 2x1,5	15,0 – 16,0	23	942061
4 G 2,5 + 2x1,5	17,0 – 18,0	32	942059
4 G 4 + 2x1,5	20,0 – 22,0	42	942060
4 G 6 + 2x1,5	23,0 – 25,0	54	942056
4 G 10 + 2x1,5	26,0 – 28,0	75	942057
4 G 16 + 2x1,5	26,0 – 28,0	100	942058
4 G 25 + 2x1,5	32,5 – 34,5	127	942062
4 G 35 + 2x1,5	36,5 – 38,5	157	942063

SUBCAB control cables			
2x1,5 *	10,0 – 11,0	23	942076
7x1,5 *	15,0 – 17,0	23	941922
12x1,5 *	18,2 – 21,2	23	941920
24x1,5 *	24,9 – 28,9	23	941921
S12x1,5*	29,0 – 31,0	23	940894
S24x1,5*	35,0 – 37,0	23	940895

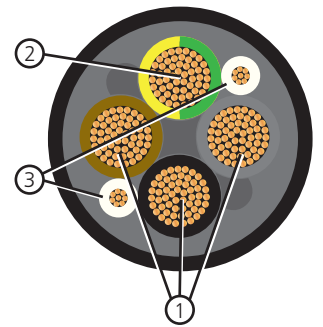
North American version SUBCAB AWG	Outer diameter mm	Nominal current capacity Amp	FLYGT Part No.
14 AWG/3	13,2 – 14,2	25	942100
14 AWG/4	14,2 – 15,2	25	942101
14 AWG/7	18,0 – 20,0	25	942102
12 AWG/4	17,0 – 18,0	30	942103
12 AWG/7	20,0 – 22,0	30	942104
10 AWG/4	18,0 – 19,7	40	942105
8 AWG/4	24,0 – 26,0	65	942107
SUBCAB AWG with control cores			
10 AWG/3-2-1-GC	20,3 – 22,3	40	942106
8 AWG/3-2-1-GC	27,2 – 29,2	65	942108
6 AWG/3-2-1-GC	30,0 – 32,0	87	942109
4 AWG/3-2-1-GC	32,8 – 34,8	114	942110
1 AWG/3-2-1-GC	40,7 – 42,7	177	942111

* No green/yellow ground core. "S" = screened cable.



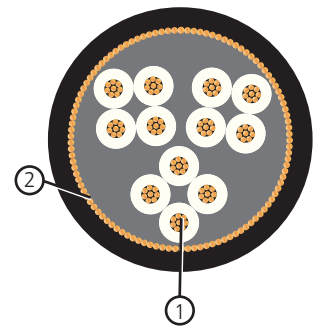
4 G X

1. Motor cores
2. Ground core, green/yellow



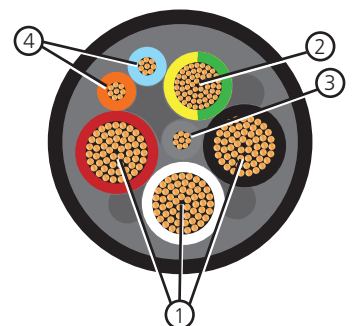
4 G X + 2x1,5

1. Motor cores
2. Ground core, green/yellow
3. Control cores, creme white, T1, T2



S 12x1,5

1. Control cores, creme white, no 1-12
2. Screen concentric between inner and outer sheath



x AWG/3-2-1-GC

1. Motor cores
2. Ground core
3. GC: Ground check core
4. Control cores, blue, orange

Rubber cable type: NSSHÖU-J

Properties

The NSSHÖU-J is a heavy duty rubber cable suitable for use with Flygt EX pumps and mixers.

Typical applications for the cable include mines, quarries, and industrial areas.

Construction data

1. *Outer sheathing*: yellow chlorinated polyethylene rubber (CPE type: 5GM5).
2. *Conductor insulation*: Ethylenepropylene rubber (ER).
3. *Conductors*: copper strands.

Rated voltage

Europe:	600/1000 V
North America and Canada:	600 V

Technical data

Current rating according to DIN VDE 0298 part 4, for mining according to DIN VDE 0118.

Max. conductor temperature: 90°C

Max. continuous ambient temperature: 70°C

Approvals

The cable is designed in accordance with DIN VDE 0250 part 812.

More information

For more detailed information about the NSSHÖU-J cable see Flygt standard M1997.47.0002.

Product assortment on next page.



NSSHÖU-J Power cable



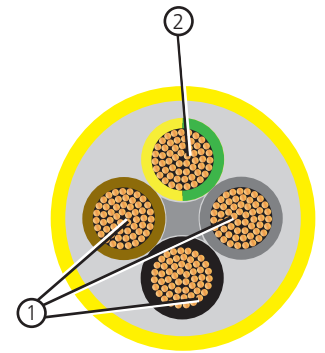
NSSHÖU-J Control cable

Product assortment

The table below shows the product assortment with overall diameter and nominal current capacity at 30°C according to VDE 0298 part 4 tab.9.

The nominal current must be adjusted according to the actual ambient temperature (see correction factor for ambient temperature, page 14) and installation.

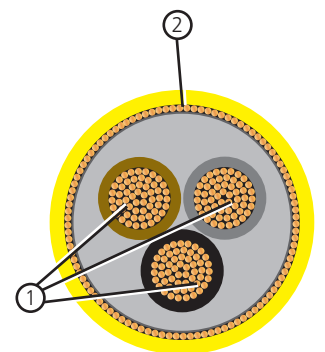
Designation NSSHÖU-J	Outer diameter mm	Nominal current capacity Amp	FLYGT Part No.
7x2,5	19,1 – 19,9	32	94 11 59
12x2,5	23,0 – 25,0	32	94 11 60
3x1,5	12,1 – 12,5	23	94 11 17
4x1,5	13,0 – 14,0	23	94 11 56
4x2,5	15,6 – 16,6	32	94 11 58
4x4	17,3 – 18,5	42	94 11 15
4x6	19,2 – 20,5	54	94 11 16
4x10	22,7 – 24,4	75	94 11 55
4x16	26,8 – 30,0	100	94 11 57
4x25	32,1 – 37,0	127	94 11 52
4x35	35,3 – 42,5	157	94 11 53
4x50	41,3 – 44,3	192	94 11 61
3x70/35	43,2 – 47,1	246	94 11 62
3x95/50	50,1 – 56,0	298	94 11 63



NSSHÖU-J

1. Motor cores
2. Ground core, green/yellow

NSSHÖU.. KON			
5x4/4 KON	20,4 – 21,3	42	94 09 25
3x16+3x16/3E KON+2x1,5ÜL	20,6 – 24,6	100	94 09 35



NSSHÖU../KON

1. Motor cores
2. Ground core, (screen)
Ground conductor, concentric between inner and outer sheath

Screened rubber cable type: NSSHÖU../3E + ST

Properties

The screened cable NSSHÖU../3E+St is used with Variable Frequency Drives (VFD) applications where CE-marking (EMC) is a demand and also to limit unwanted electromagnetic radiation. Typical applications for the cable include mines, quarries, and industrial areas.

Construction data

1. *Outer sheathing*: yellow chlorinated polyethylene rubber (CPE type: 5GM5).
2. *Conductor insulation*: Ethylenepropylene rubber (EPR).
3. *Conductors*: copper strands.
4. Screen tinned copper wires.

Rated voltage

Europe: 600/1000 V
North America and Canada: 600 V

Technical data

Current rating according to DIN VDE 0298 part 4, for mining according to DIN VDE 0118.

Max. conductor temperature: 90°C

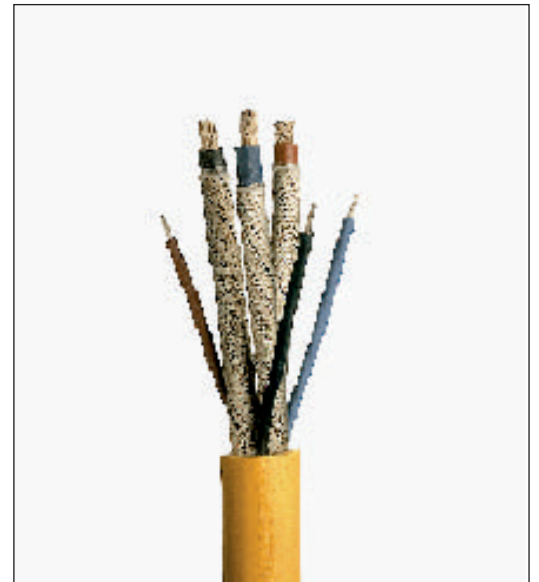
Max. continuous ambient temperature: 70°C

Approvals

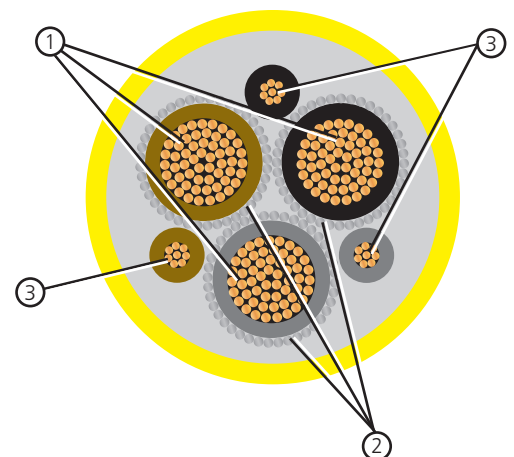
The cable is designed in accordance with DIN VDE 0250 part 812.

More information

For more detailed information about the NSSHÖU cable see Flygt standard M1997.47.0002.



NHSSHÖU../3E + St



NHSSHÖU../3E + St

1. Motor cores
2. Ground core (screen)
Ground conductor concentric around each core
3. Control cores, T1 (black), T2 (brown), grey (unused, cut)

Designation mm ² NSSHÖU../3E + St	Outer diameter mm	Nominal current capacity Amp	FLYGT Part No.
3x2,5+3x2,5/3E+3x1,5 St	18,0 – 22,0	32	94 09 37
3x6+3x6/3E+3x1,5 St	18,0 – 22,0	54	94 09 31
3x10+3x10/3E+3x2,5 St	22,0 – 26,0	75	94 09 06
3x16+3x16/3E+3x2,5 St	24,0 – 28,0	100	94 09 32
3x25+3x16/3E+3x2,5 St	28,0 – 32,5	127	94 09 27
3x35+3x16/3E+3x2,5 St	31,0 – 35,5	157	94 09 07
3x50+3x25/3E+3x2,5 St	37,0 – 41,0	192	94 09 29
3x70+3x35/3E+3x2,5 St	44,0 – 47,0	246	94 09 30
3x95+3x50/3E+3x2,5 St	47,0 – 52,0	298	94 09 08
3x120+3x70/3E+3x2,5 St	52,5 – 57,0	346	94 09 09

FGB screened rubber cable

Properties

The screened rubber cable (FGB) available especially for the UK market is a cable with individual screen around each core without green/yellow conductor. The screen is used as PE (protected earth). Typical applications for the cable include mines, quarries, and industrial areas.

Construction data

1. *Outer sheathing*: black CPE material.
2. *Conductor insulation*: Ethylenepropylene rubber (EPR).
3. *Conductors*: copper strands.
4. Screen tinned copper wires.

Rated voltage

600/1000 V

Technical data

According to british standard BS 6360 and BS 6899.

Max. conductor temperature: 90°C

Max. continous ambient temperature: 70°C

Design

The cable is fully in compliance with BS standard.

More information

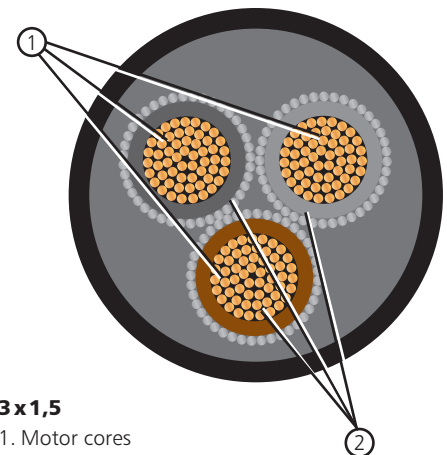
For more detailed information about the FGB cable see Flygt standard M1997.47.0012.

Product assortment

The table below shows the product assortment.



Screened rubber cable FGB



3 x 1,5

1. Motor cores
2. Ground conductors (screen) around each core

Designation mm ²	Outer diameter mm	Nominal current capacity at 30°C Amp	FLYGT Part No.
3x1,5	13,5 – 14,9	16	94 17 22
3x2,5	13,5 – 14,9	21	94 17 23
6x2,5+2x1,5	18,1 – 19,9	21	94 17 24

PUR control cable

Properties

The screened, halogen free flexible control cable of PUR (polyurethane) Elproflex S200 C is a cable with very good mechanical properties. The cable is only used in the combination with mid-range pumps and the Monitoring & Status unit (MAS). Halogen free according to IEC 60754-1.

Construction data

1. *Outer sheathing*: PUR material.
2. *Conductor insulation*: TPE-E, black conductor with white marking.
One conductor green/yellow.
3. *Conductors*: Bare copper strands IEC 60228 class 6.

Rated voltage

300/500 V

Technical data

Max. ambient temperature: 70°C

Design

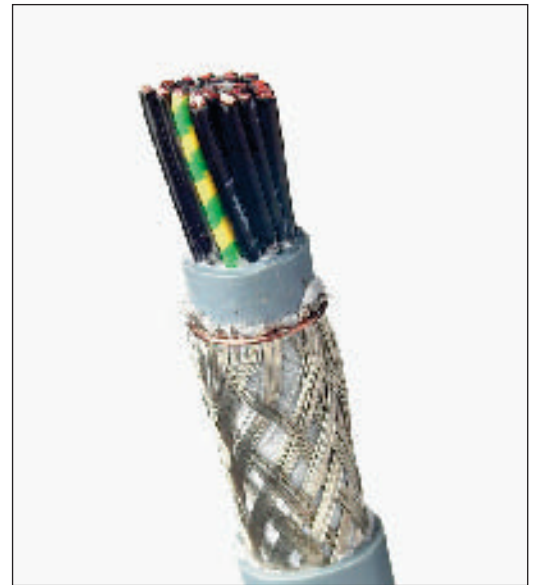
The cable is fully in compliance with VDE 0295, IEC 60228 and HD 383 class 6.

More information

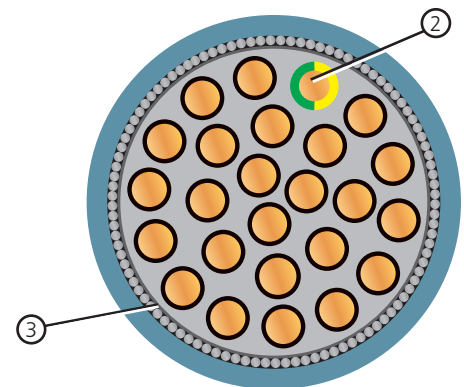
See Flygt standard M1997.47.0018 for more details.

Product assortment

The table below shows the product assortment.



Control cable PUR Elproflex S200 C



25 x 1,5

1. Control cores, numbered 1-24, black
2. Ground conductors, green/yellow around each core
3. Screen, concentric between inner and outer sheath

Designation mm ²	Conductors	Outer diameter	FLYGT Part No.
25x1,5	1,5x25	20,4 ± 5%	94 19 30

HCR cable

Properties

The HCR cable (Heat and Chemical Resistant) is designed for use in severe conditions. The HCR cable is resistant to chemicals and solvents, high temperature and mechanical stress, that often cause rapid deterioration of other cables. A HCR cable should be used in hot liquid applications where temperatures exceed 70°C and high chemical resistance is required.

Construction data

1. *Outer sheathing*: black fluorethylene propylene FEP.
2. *Conductor insulation*: black fluorethylene propylene FEP.
3. *Control wires insulation*: etylenetetrafluorethylene ETFE.
4. *Conductors*: copper strands.

Rated voltage

450/750V

Technical data

Current rating according to IEC 60287.

Max. conductor temperature: 150°C

Max. continuous ambient temperature: 90°C

Approvals

The HCR cable is SEMKO approved.
Flame retardant IEC 60332-3 Cat A.

More information

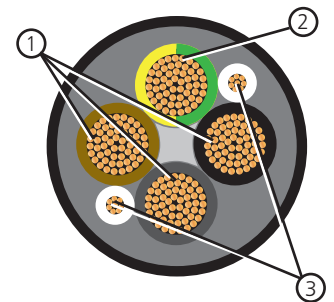
See Flygt standard M1997.47.0015 for more details.

Product assortment

The table below shows the product assortment with overall diameter and nominal current capacity at 40 and 90°C according to IEC 60287.

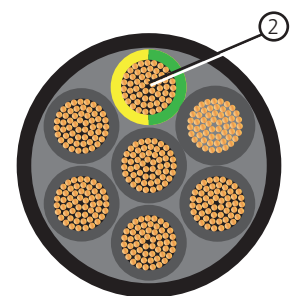


SO7E6E5-F 4x16 + 2x1,5



SO7E6E5-F 4x16 + 2x1,5

1. Motor cores
2. Ground core, green/yellow
3. Control cores, white, T1, T2



SO7E6E5-F 7x2,5

1. Motor cores, black no. 1-6
2. Ground core, green/yellow

Designation mm ² SO7E6E5-F	Outer diameter mm	Nominal current capacity at 40°C Amp	Nominal current capacity at 90°C Amp	FLYGT Part No.
7x2,5	11,4 ± 0,4	28	20	94 20 91
7x6	16,7 ± 0,5	50	35	94 20 94
4x16+2x1,5	20,5 ± 1	125	87	94 20 96
4x25+2x1,5	25,5 ± 1	170	118	94 20 97

Silicone cable

Properties

The silicone cable can be used instead of a HCR cable in hot liquid applications where the ambient temperature exceeds 70°C. This is a flexible cable with a wide temperature range of -40°C to +180°C.

The water absorption rate is very low and the material is halogen free. An application where a silicone cable can be used is hot water without special requirements for chemical resistance.

Compared to HCR and SUBCAB the silicone cable has limited mechanical properties such as resistance to abrasion and lower tensile strength, therefore it is recommendable to use some protection around the cable if it is exposed to mechanical wear.

The cable complies with VDE 0250 part 1 and part 816.

The cable is halogen free and flame retardant according to IEC 60332-1.

Construction data

1. *Outer sheathing*: red-brown silicone rubber sheath SI.
2. *Conductor insulation*: red-brown silicone rubber SI.
3. *Conductors*: copper strands.
4. Halogen free.

Rated voltage

300/500 V

Technical data

Current rating according to VDE 0100 part 523.

Max. conductor temperature: 180°C

Max. continuous ambient temperature: 145°C

Approvals

The cable is designed in accordance with DIN/VDE 0250 part 1 and part 816.

More information

See Flygt standard M1997.47.0014 for more details.

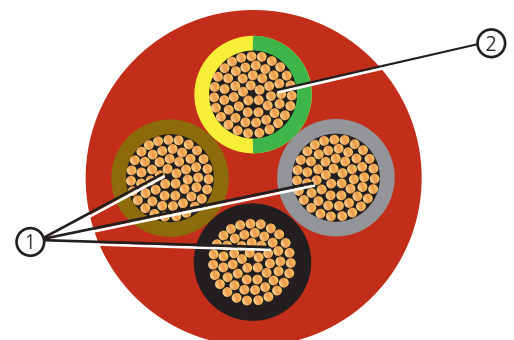
Product assortment

The table below shows the product assortment with overall diameter and nominal current capacity at 145°C according to VDE 0100 part 523.

Designation mm ² SI-SL-BIHFSIH-J	Outer diameter mm	Nominal current capacity at 145°C Amp	FLYGT Part No.
3 G 1,5	7,1 ± 5%	18	94 19 74
4 G 2,5	11 ± 5%	26	94 19 75
7 G 2,5	11,8 ± 5%	26	94 19 79
4 G 4	11,3 ± 5%	34	94 19 76
4 G 6	12,7 ± 5%	44	94 19 77
4 G 10	18,8 ± 5%	61	94 19 78



SI 4GX



Silicone cable

1. Motor cores
2. Ground core, green/yellow

High voltage pump cable 10 kV

Properties

The high voltage cable, NTSCGEWTOEUS, is a heavy duty cable suitable for use with ITT Flygt high voltage products.

Especially for high and extreme mechanical stress, e.g. torsional stress and high reeling speed.

Only authorised ITT Flygt personnel may connect these cables to products because of the semi-conductive layers over the insulation. The ground core must be marked with a green/yellow shrink tube when assembling the cable to the product.

Construction data

According to DIN VDE 0250 part 813

1. *Outer sheathing*: red PCP compound.
2. *Conductor insulation*: Ethylene-propylene rubber (EPDM).
3. *Conductors*: copper strands.

Rated voltage

6/10 kV

Technical data

Current rating according to DIN VDE 0298 part 4.

Max. conductor temperature: 90°C

Max. continual ambient temperature: 70°C

Design

The cable is fully in compliance with DIN VDE 0250 part 813.

More information

See Flygt standard 47.0005 and A3440.00 for more details.

Product assortment

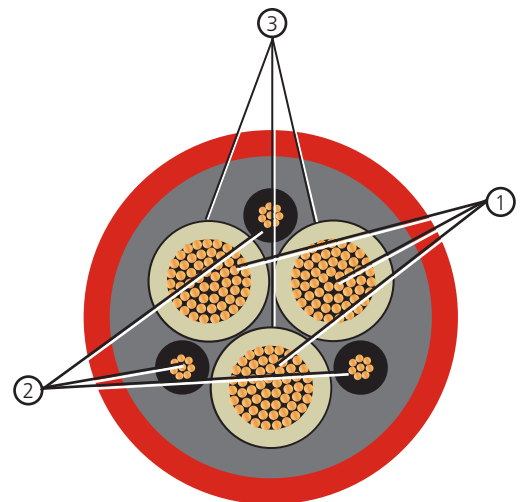
The table below shows the product assortment with overall diameter and nominal current capacity at 30°C according to DIN VDE 0298 part 4. The nominal current must be adjusted according to the actual ambient temperature (see correction factor for ambient temperature, page 12) and installation if over 30°C.

Designation NTSCGEWÖU	Outer diameter mm	Nominal current Amp	FLYGT Part No.
3x25+3x25/3 *	39 – 42	131	94 19 67
3x35+3x25/3 *	42 – 45	162	94 19 68
3x50+3x25/3 *	46 – 49	202	94 19 65

* The 4th conductor is split up in 3 parts. These 3 parts should be used as ground core. They have the same total cross section area as the non split conductors.



NTSCGEWTOEUS



High voltage cable

1. Motor cores
2. Ground cores
3. Conductive layer

Temperature correction factors for ITT Flygt power cables

The current capacities for ITT Flygt cables are designed for duty at 30°C ambient temperature. If the ambient temperature exceeds 30°C, the maximum current rating the conductors can handle has to be taken into consideration.

The current rating must be adjusted (lowered) according to the table.

Example

Select cable for:

Pump_{current} 33 A
Temp_{ambient} 52°C

- Select cable for 33 A in the table, page 5.
(4 G 4, nominal current capacity at 30°C = 42 A).
- Select correction factor for 52°C in the table (0,76).
- Calculate the maximum current rate at 52°C:
 $42 \times 0,76 = 31,9 \text{ A}$
- Recalculate with a bigger cable dimension, to get a current rate exceeding 33 A, in this case 4 G 6.
 $54 \times 0,76 = 41.0 \text{ A}$
- Choose 4 G 6 mm² at 52°C.

Ambient temperature correction factors

According to
IEC 60364-5-523 table 52-D1
and
NEC table 310-16 in air
(USA/Canada)

Ambient temp °C	Correction factor	Ambient temp °F
21 – 25	1.04	70 – 77
26 – 30	1.00	79 – 86
31 – 35	0.96	88 – 95
36 – 40	0.91	97 – 104
41 – 45	0.87	106 – 113
46 – 50	0.82	115 – 122
51 – 55	0,76	124 – 131
56 – 60	0.71	133 – 140
61 – 70	0.58	142 – 158

