

TF ***Kable***

Connecting globally



TFCrane

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Leading producer of cables and cable systems

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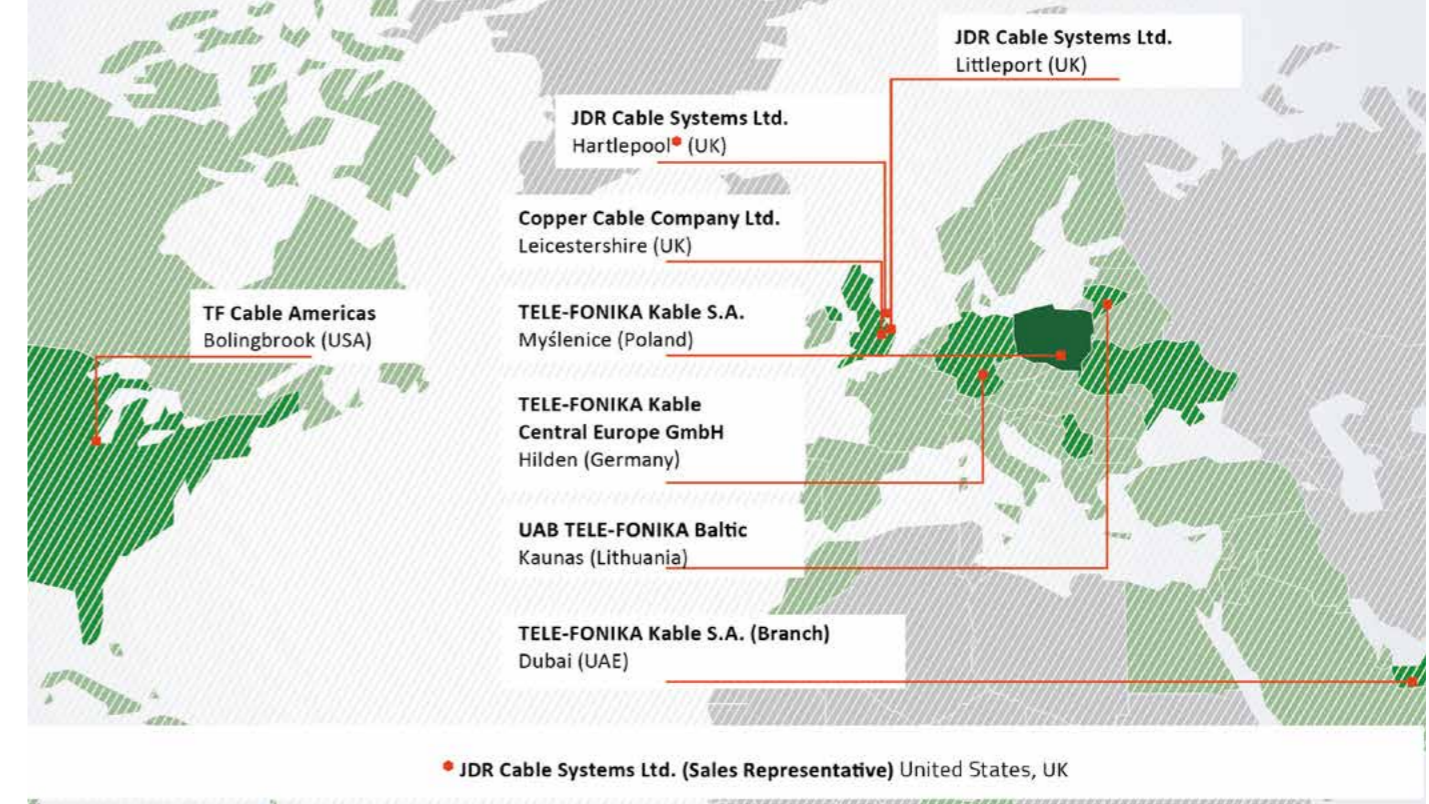
The TELE-FONIKA Kable Group has been present on the domestic and international cable industry market for more than 25 years. A stable development strategy based on full diversification of outlets enabled the strengthening of the position of our company among world's leading cable companies with significant development potential.

Services and products provided by TF Kable have numerous applications in the most important industry sectors – they include more than 25,000 proven standard constructions. Furthermore, they include specialist assortment tailored to the individual needs of business partners.

Additionally, our production facilities (in Poland, Serbia and Ukraine), the Bukowno-Poland recycling plant and commercial companies (responsible for the geo-regional distribution of products) demonstrate a significant development potential. This is also true in the case of our modern fire test laboratory in Krakow-Wielicka plant, which performs several hundred flammability pre-tests annually, and a laboratory of high and extra high voltages in Bydgoszcz.

As a result of implementation of our growth strategy, in August 2017 TFKable Group acquired JDR Cable Systems Ltd, the leading manufacturer of submarine umbilicals and power cables to the global offshore energy industry.

In the world's harshest environments and ever-increasing water depths, JDR's world-leading products and services bring power and control to offshore oil, gas and renewable energy systems.



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Experience and competence of the TELE-FONIKA Kable Group

Kraków-Wielicka plant – production of PVC or XLPE insulated 1 kV cables with copper or aluminium conductor, screened or armoured types, fire resistant and halogen free cables, overhead conductors as well as rubber insulated and/or rubber sheathed cables with voltage up to 30kV for heavy industry, signaling and control cables for special applications

Kraków-Bieżanów plant – production of PCV or XLPE insulated copper wires and cables up to 1 kV, halogen free and fire resistant types and copper or silver-copper (Cu-Ag) overhead conductors for railway traction.

Bydgoszcz plant – the largest in Europe production center of medium, high and extra high voltage cables with voltage up to 500 kV

Myślenice plant – production copper and fiber optic telecommunication cables, data telecommunication cables and automotive wires

Zajecar plant (Serbia) – production of low and medium voltage cables, signaling and control cables, telecommunication cables, as well as halogen-free cables and wires

Czernihiv plant (Ukraine) – production of copper wires and cables up to 1 kV, fire resistant and flame retardant cables as well as insulated overhead aluminum conductors

Bukowno-Poland plant (recycling of cable waste) – with the recycling capacity of approx. 10 thousand tons of cable waste per year. This allows for the recovery of fractions from individual materials with purity of over 99.5%


Fire Test Laboratory in the Krakow-Wielicka production plant – equipped with special apparatus that enables to provide flame propagation test on bundled cables, smoke density test as well as circuit integrity test with water or mechanical shock, test for corrosive gases emission

Laboratory of High and Extra Voltages in the production plant in Bydgoszcz – equipped with 4 Faraday cages and research filed for qualification tests for cables and systems up to 500kV

JDR Cable Systems – As a result of acquiring JDR Cable Systems Limited, TFKable has expanded its assets with two UK production facilities. JDR manufactures submarine power cables as well as subsea umbilical cables consisting of components for power distribution, data transfer, monitoring and remote control, of offshore facilities. Additionally, our sales portfolio has been extended by offshore installation and maintenance services, located in JDR's service centres in the United States, UK, ensuring constant support for our business partners.

Application

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	Max speed m/min	Rated Voltage	Monospiral Drum	Vertical Drum	Festoon
TFCrane NSHTÖU -I/O	180	0,6/1kV			
TFCrane (N)SHTÖU -J + FO	180	0,6/1kV			
TFCrane R-(N)TSCGEWÖU	180	3,6/6kV - 12/20kV			
TFCrane R-(N)TSCGEWÖU + FO	180	3,6/6kV - 12/20kV			
TFCrane R-(N)TSKCGEWÖU KN	180*	3,6/6kV - 12/20kV			
TFCrane R-(N)TSKCGEWÖU + FO KN	180*	3,6/6kV - 12/20kV			
TFCrane (N)SHTÖU -I/O VR	100*	0,6/1kV			
TFCrane (N)SHTÖU -I/O VR S	100*	0,6/1kV			
TFCrane (N)GRDGÖU -O/I	240	0,6/1kV			
TFCrane (N)GRDGCÖU -J	240	0,6/1kV			
TFCrane (N)GFLCGÖU -O	180	300/500V			
TFCrane NGFLGÖU -I/O	180	300/500V			
TFCrane M(Std)HÖU -I/O	180	0,6/1kV			

MAIN APPLICATION
SUITABLE
NO APPLICATION

* Speeds above specified to be consulted with manufacturer.

Additional parameters

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	Rated Voltage	Test Voltage (kV)	Max. working temperature On The Conductor (°C)	Short Circuit Temperature (°C)	Oil Resistance	Ozone Resistance	UV Resistance	Flame resistance
TFCrane NSHTÖU -I/O	0,6/1kV	AC/5min:3kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane (N)SHTÖU -J + FO	0,6/1kV	AC/5 min:3 kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane R-(N)TSCGEWÖU	3,6/6 kV 6/10 kV 8,7/15 kV 12/20kV	AC/5 min:3 kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane R-(N)TSCGEWÖU + FO	3,6/6 kV 6/10 kV 8,7/15 kV 12/20kV	AC/5 min: 3,6/6 kV -11kV 6/10 kV -17 kV 8,7/15 kV - 24 kV 12/20kV- 29 kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane R-(N)TSKCGEWÖU KN	3,6/6 kV 6/10 kV 8,7/15 kV 12/20kV	AC/5 min: 3,6/6 kV -11kV 6/10 kV -17 kV 8,7/15 kV - 24 kV 12/20kV- 29 kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane R-(N)TSKCGEWÖU + FO KN	3,6/6 kV 6/10 kV 8,7/15 kV 12/20kV	AC/5 min: 3,6/6 kV -11kV 6/10 kV -17 kV 8,7/15 kV - 24 kV 12/20kV- 29 kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane (N)SHTÖU -I/O VR	0,6/1 kV	AC/5 min:3 kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane (N)SHTÖU -I/O VR S	0,6/1 kV	AC/5 min:3 kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane (N)GRDGÖU -O/I	0,6/1 kV	AC/5 min:3 kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane (N)GRDGCÖU -J	0,6/1 kV	AC/5 min:3 kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane (N)GFLCGÖU -O	300/500V	AC/5 min:2,5kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane NGFLGÖU -I/O	300/500V	AC/5 min:2,5kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010
TFCrane M(Std)HÖU -I/O	0,6/1kV	AC/5 min:2,5 kV	90	250	✓	✓	✓	PN - EN 60332-1-2:2010 IEC 60332-1-2:2010

TFCrane NSHTÖU -J/O

DIN VDE 0250-814, VDE MARKS APPROVAL

Low Voltage Rubber Flexible Cable for Reeling Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded tinned copper conductor class 5 acc. to IEC 60228.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	EPDM rubber, halogen-free, lead-free compound, type 3GI3 acc. to DIN VDE 0207/20, developed by TF Kable
Circuit identification	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 -J version: 3 - core: Green-yellow, blue, brown 4 - core: Green-yellow, brown, black, grey or green-yellow, blue, brown, black 5 - core: Green-yellow, blue, brown black, grey Above 5 cores: Green-yellow, other cores black with white numbering -O version: 3 - core: Brown, black, grey or blue, brown, black 4 - core: Blue, brown, black, grey 5 - core: Blue, brown, black, grey, black Above 5 cores: Black with white numbering
Inner sheath	A synthetic thermosetting compound type Gm1b acc. to DIN VDE 0207/21, Black
Anti-torsion braid	Braid of polyamide threads between inner and outer sheath
Outer sheath	Special synthetic thermosetting compound, type 5GM3 acc. to DIN VDE 0207/21, developed by TF Kable, Black



FEATURES

Rated Voltage U ₀ /U	0,6/1 kV
Max. operating voltage Um	1,2 kV
AC test voltage	3 kV

- Current carrying capacity: DIN VDE 0298-4
- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C
- Minimum bending radius acc. to DIN VDE 0298-3:

OD of cable[mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
- Reeling test
- Twist limits: 25°/m
- Travel speed up to: 180m/min
- Tensile load: 20N/mm²
- Oil resistant: PN-EN 60811-404, IEC 60811-404
- UV resistant: UL 2556, ISO 4892-2
- Ozone resistant: PN-ISO 1431-1
- Example of standard sheath marking:
 <VDE>TF KABLE 3 NSHTÖU -J 3x10 0,6/1kV CE year + meter
 TFCrane
- Excellent tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2

APPLICATIONS

Flexible cable designed for high mechanical stresses, especially for applications with frequent winding and unwinding with co-occurrent tensile and torsion stress. The cable is used for conveyors, container cranes, harbour cranes, building machinery, handling machines in mining and tunnelling equipment. For use in wet or dry conditions, in industrial units, in underground and open-cast mining, in explosion-risk areas.

Standard length cable packing 500 m on drums.
 Other forms of packing and delivery are available on request

Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3x1,5	1,5	11,9	198	90
3x2,5	2,1	13,5	264	150
3x4	2,7	16,9	408	240
3x6	3	17,6	477	360
3x10	4,1	21,6	750	600
3x16	5,1	23,8	992	960
3x25	6,6	28,7	1477	1500
3x35	7,5	32,2	1944	2100
3x50	9,3	38,3	2732	3000
3x70	11,1	42,1	3519	4200
3x95	13	48,8	4682	5700
3x120	14,5	52	5655	7200
3x150	16,2	56,6	6903	9000
3x185	18,3	63,8	8459	11100

Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3x240	20,7	71,6	11086	14400
4x1,5	1,5	12,7	232	120
4x2,5	2,1	15,7	354	200
4x4	2,7	18,1	484	320
4x6	3	19	572	480
4x10	4,1	23,3	910	800
4x16	5,1	26,8	1278	1280
4x25	6,6	32,6	1923	2000
4x35	7,5	34,9	2405	2800
4x50	9,3	41,5	3385	4000
4x70	11,1	45,8	4393	5600
4x95	13	53,1	5839	7600
4x120	14,5	58,6	7335	9600
4x150	16,2	63,6	8965	12000
4x185	18,3	71,5	10924	14800
5x1,5	1,5	13,6	269	150
5x2,5	2,1	16,8	412	250
5x4	2,7	19,5	570	400
5x6	3	21,3	716	600
5x10	4,1	25,2	1086	1000
5x16	5,1	29	1532	1600
5x25	6,6	35,3	2310	2500
5x35	7,5	39,3	3031	3500
5x50	9,3	45,2	4096	5000
5x70	11,1	51,7	5553	7000
7x1,5	1,5	16,9	405	210
7x2,5	2,1	19,4	549	350
7x4	2,7	23,5	814	560
12x1,5	1,5	22,6	715	360
12x2,5	2,1	26,2	990	600
12x4	2,7	32,1	1490	960
18x1,5	1,5	24,9	882	540
18x2,5	2,1	30,1	1305	900
18x4	2,7	37,1	1984	1440
24x1,5	1,5	25,9	1016	720
24x2,5	2,1	31,3	1511	1200

Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
30x1,5	1,5	29,8	1318	900
30x2,5	2,1	36,3	1980	1500
36x1,5	1,5	32,4	1531	1080
36x2,5	2,1	39,4	2300	1800
42x1,5	1,5	34,8	1777	1260
42x2,5	2,1	42,0	2646	2100
44x1,5	1,5	34,8	1799	1320
44x2,5	2,1	42,0	2679	2200
50x1,5	1,5	36,7	2012	1500
50x2,5	2,1	44,4	3002	2500

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C Tinned wires
mm ²	Ω/km
1,5	13,7
2,5	8,21
4	5,09
6	3,39
10	1,95
16	1,24
25	0,795
35	0,565
50	0,393
70	0,277
95	0,21
120	0,164
150	0,132
185	0,108
240	0,0817
300	0,0654
400	0,0495

TFCrane NSHTÖU -J

3+3PE symmetrical construction

DIN VDE 0250-814, VDE MARKS APPROVAL

Low Voltage Rubber Flexible Cable for Reeling Applications

DESIGN FEATURES

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Conductors	Annealed flexible stranded tinned copper conductor class 5 acc. to IEC 60228.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	EPDM rubber, halogen-free, lead-free compound, type 3GI3 acc. to DIN VDE 0207/20, developed by TFCable
Color of insulation*	Colour coding of power conductors compliant to HD 308, DIN VDE 0293-308 Power cores: 3-core circuit identification: Brown, black, grey Earth cores: Green-yellow
Earth conductor	Tinned copper conductor, rubber insulated
Core arrangement	Three power cores twisted together, earth conductor split into 3 parts and placed into the interstices
Inner sheath	A synthetic thermosetting compound type Gm1b acc. to DIN VDE 0207/21, Black
Anti-torsion braid	Braid of polyamide threads between inner and outer sheath
Outer sheath	Special synthetic thermosetting compound, type 5GM3 acc. to DIN VDE 0207/21, developed by TFCable, Black

* other core identification available on request



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FEATURES

Rated Voltage U_0/U	0,6/1 kV
Max. operating voltage U_m	1,2 kV
AC test voltage	3 kV

▪ Current carrying capacity: DIN VDE 0298-4

- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

▪ Minimum bending radius acc. to DIN VDE 0298-3:

OD of cable[mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
- Reeling test
- Twist limits: 25°/m
- Travel speed up to: 180m/min
- Tensile load: 20N/mm²

Oil resistant: PN-EN 60811-404, IEC 60811-404
UV resistant: UL 2556, ISO 4892-2
Ozone resistant: PN-ISO 1431-1
Example of standard sheath marking:
<VDE>TF KABLE 3 NSHTÖU -J
3x70+3x35/3 0,6/1kV CE year + meter TFCrane

- Tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2

APPLICATIONS

Specially designed flexible cable for power mobile connections, for extremely high mechanical stresses. The cable is used in cable winding reels for winding and unwinding with co-occurrent tensile and torsion stress. Other applications include installation on conveyors, container cranes, harbour cranes, building machinery, handling machines. For use in wet or dry conditions, in industrial units, in underground and open-cast mining, in explosion-risk areas.

Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
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Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3x35+3x16/3	7,5	31,2	2073	2100
3x50+3x25/3	9,3	37,3	2935	3000
3x70+3x35/3	11,1	42,1	3911	4200
3x95+3x50/3	13	47,8	5148	5700
3x120+3x70/3	14,5	51,0	6309	7200
3x150+3x70/3	16,2	56,6	7724	9000
3x185+3x95/3	18,3	62,8	9408	11100
3x240+3x120/3	20,7	69,8	12167	14400
3x300+3x150/3*	24,2	80,0	15419	18000

*Based on standard as (N)SHTÖU

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C Tinned wires
mm ²	Ω/km
16	1,24
25	0,795
35	0,565
50	0,393
70	0,277
95	0,21
120	0,164
150	0,132
185	0,108
240	0,0817
300	0,0654
400	0,0495

TFCrane (N)SHTÖU -J + FO 3+2PE+FO

Based on: DIN VDE 0250-814

Low Voltage Rubber Flexible Cable with Integrated Fiber-Optics for Reeling Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded tinned or bare copper conductor class 5 to IEC 60228. Special construction ensuring higher flexibility.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	EPDM rubber, halogen-free, lead-free compound, type 3GI3 acc. to DIN VDE 0207/20, developed by TF Kable
Color of insulation*	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 Power cores: 3-core circuit identification: Brown, black, grey Earth cores: Green-yellow
Earth conductor	Tinned or bare copper conductor rubber insulated
Fiber Optic Module	A-D(ZN)13Y 6, 12, 18 or 24 fibers G50/125, G62,5/125 or E9/125
Identification of the fibers	Color coded fibres and tubes
Fiber covering	Loose buffered tubes with filling compound
Core arrangement	Three power cores twisted together, earth conductor split into 2 parts and FO placed into the interstices
Inner sheath	A special synthetic thermosetting compound type 5GM3 acc. to DIN VDE 0207/21, Yellow
Anti-torsion braid	Braid of polyamide threads between inner and outer sheath
Outer sheath	Special synthetic thermosetting compound, 5GM5 quality acc. to DIN VDE 0207/21 developed by TF Kable, Yellow

* other identification available on request



FEATURES

Rated Voltage U_0/U	0,6/1 kV
Max. operating voltage U_m	1,2 kV
AC test voltage	3 kV

▪ Current carrying capacity: DIN VDE 0298-4

- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

▪ Minimum bending radius acc. to DIN VDE 0298-3:

OD of cable[mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
 - Reeling test
 - Twist limits: 50°/m
 - Travel speed up to: 180m/min
 - Tensile load: 20N/mm²
- Oil resistant: PN-EN 60811-404, IEC 60811-404
 UV resistant: UL 2556, ISO 4892-2
 Ozone resistant: PN-ISO 1431-1
- Example of standard sheath marking:
 TF KABLE 3 TFCrane (N)SHTÖU-J
 3x35+2x16/2+FO 0,6/1kV CE year + meter
- Excellent tear, impact and abrasion resistant outer sheath
 - Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2

APPLICATIONS

Specially designed flexible cable for power mobile connections, for extremely high mechanical stresses. The cable is used in cable winding reels for winding and unwinding with co-occurrent tensile and torsion stress. Other applications include installation on conveyors, container cranes, harbour cranes, building machinery, handling machines. For use in wet or dry conditions, in industrial units, in underground and open-cast mining, in explosion-risk areas.

Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
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Number of cores x cross-section mm ²	Conductor diameter mm	Approx. overall diameter mm	Approx. weight kg/km	Max. tensile load N
3x35+2x16/2+FO	7,5	41,4	2987	2100
3x50+2x25/2+FO	9,3	41,7	3395	3000
3x70+2x35/2+FO	11,1	45,5	4318	4200
3x95+2x50/2+FO	13	49,6	5372	5700
3x120+2x70/2+FO	14,5	57,2	7131	7200
3x150+2x70/2+FO	16,2	57,4	7849	9000
3x185+2x95/2+FO	18,3	66,8	10006	11100
3x240+2x120/2+FO	20,7	72,8	12649	14400
3x300+2x150/2+FO	24,2	81,7	15382	18000

POWER CONDUCTOR RESISTANCE

Cross-section mm ²	Max. conductor resistance at 20°C	
	Plain wires Ω/km	Tinned wires Ω/km
16	1,21	1,24
25	0,78	0,795
35	0,554	0,565
50	0,386	0,393
70	0,272	0,277
95	0,206	0,21
120	0,161	0,164
150	0,129	0,132
185	0,106	0,108
240	0,0801	0,0817
300	0,0641	0,0654

FIBER DATA

Parameter	G50/125 multimode	G62,5/125 multimode	E9/125 singlemode
Attenuation at 850 nm	≤2.5 dB/km	≤3.0	-
Attenuation at 1300 nm	≤0.6 dB/km	≤1.0	-
Attenuation at 1550 nm	-	-	≤0.21 / ≤0.19 dB/km
Bandwidth at 850 nm	≥700 MHz*km	220 MHz*km	-
Bandwidth at 1300 nm	≥500 MHz*km	500 MHz*km	-
Numerical Aperture at 850 nm	0.200 ±0.010	≤0.275 ±0.015	-
Group refractive index at 850 nm	1.483	1.496	-
Group refractive index at 1300 nm	1.479	1.491	-
Group refractive index at 1550 nm	-	-	1.468

TFCrane R-(N)TSCGEWÖU

Based on: DIN VDE 0250-813

Medium Voltage Rubber Flexible Cable for Reeling Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded tinned or bare copper conductor class 5 to IEC 60228. Type of conductor design: opposite-lay with special length of lay.
Separator	Semi-conductive tape between the power conductor and insulation and between earth conductor and semi-conductive layer
Conductor screen	Semi-conductive layer of special rubber, developed by TFKable
Insulation	Special EPDM rubber, halogen-free, lead-free compound, exceeding type 3GI3, developed by TFKable, White
Insulation screen	Semi-conductive, special strippable layer over insulation of power cores. Maximum resistivity of semi-conductive layers $\approx 200 [\Omega \times m]$
Earth conductor	Tinned or bare copper conductor class 5 to IEC 60228 with extruded special semi-conductive rubber compound
Core arrangement	Power conductors and earth conductor (split into 3 parts) laid up around central semi-conductive filler. Anti-adhesion graphite over assembled conductors.
Inner sheath	A special synthetic thermosetting compound type 5GM3 acc. to DIN VDE 0207/21, Red
Anti-torsion braid	Braid of polyamide threads between inner and outer sheath
Outer sheath	Special synthetic thermosetting compound, 5GM5 quality acc. to DIN VDE 0207/21 developed by TFKable, Red



FEATURES

Rated Voltage U_0/U	3,6/6 kV	6/10 kV	8,7/15 kV	12/20 kV
Max. operating voltage U_m	7,2 kV	12 kV	18 kV	24 kV
AC test voltage	11 kV	17 kV	24 kV	29 kV

- Partial discharge: $1,25U_0/\max 20 \text{ pC}$
- Current carrying capacity: DIN VDE 0298-4

- Max. conductor operating temperature: $+90^\circ\text{C}$
- Max. conductor temperature during short circuit: $+250^\circ\text{C}$
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

- Minimum bending radius acc. to DIN VDE 0298-3:

Fixed installation	6D
On drums	12D
On deflection pulleys	15D
Moving freely	10D

- Roller bending test
- Reeling test
- Twist limits: $100^\circ/\text{m}$
- Travel speed up to: $180\text{m}/\text{min}$
- Tensile load: $20\text{N}/\text{mm}^2$
- Oil resistant: PN-EN 60811-404, IEC 60811-404
- UV resistant: UL 2556, ISO 4892-2
- Ozone resistant: PN-ISO 1431-1
- Example of standard sheath marking:
TF KABLE 3 TFCrane R-(N)TSCGEWÖU
3x50+3x16/3 6/10kV year + meter
- Excellent tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2

APPLICATIONS

Specially designed flexible reeling cable with optimised dimensions for extremely high mechanical stresses occur in applications with monospiral reels and cylindrical reels, very high reeling speed, torsional stress. Also for connection of large material handling machines such as excavators, dumpers, crushers in open-cast mines. For use in wet or dry conditions, in industrial units, in underground and open-cast mining, in explosion-risk areas.

Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
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Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3,6/6 kV				
3x25+3x25/3	6,5	39,9	2466	1500
3x35+3x25/3	7,5	42,0	2876	2100
3x50+3x25/3	9,3	45,8	3540	3000
3x70+3x35/3	11,1	51,5	4662	4200
3x95+3x50/3	13	55,6	5731	5700
3x120+3x70/3	14,5	58,8	6886	7200
3x150+3x70/3	16,2	64,3	8320	9000
3x185+3x95/3	18,3	68,8	9738	11100
6/10 kV				
3x25+3x25/3	6,5	41,6	2617	1500
3x35+3x25/3	7,5	43,7	3035	2100
3x50+3x25/3	9,3	47,5	3712	3000
3x70+3x35/3	11,1	53,2	4856	4200
3x95+3x50/3	13	57,3	5940	5700
3x120+3x70/3	14,5	60,6	7106	7200
3x150+3x70/3	16,2	66,0	8560	9000
3x185+3x95/3	18,3	70,5	9993	11100
8,7/15 kV				
3x25+3x25/3	6,5	45,1	2949	1500
3x35+3x25/3	7,5	47,1	3370	2100
3x50+3x25/3	9,3	52,7	4296	3000
3x70+3x35/3	11,1	56,7	5261	4200
3x95+3x50/3	13	60,7	6374	5700
3x120+3x70/3	14,5	65,8	7841	7200
3x150+3x70/3	16,2	69,4	9060	9000
3x185+3x95/3	18,3	75,8	10844	11100

Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
12/20 kV				
3x25+3x25/3	6,5	48,1	3244	1500
3x35+3x25/3	7,5	52,0	3908	2100
3x50+3x25/3	9,3	55,7	4639	3000
3x70+3x35/3	11,1	59,7	5644	4200
3x95+3x50/3	13	65,6	7061	5700
3x120+3x70/3	14,5	68,8	8286	7200
3x150+3x70/3	16,2	72,5	9526	9000

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C	
	Plain wires Ω/km	Tinned wires Ω/km
25	0,78	0,795
35	0,554	0,565
50	0,386	0,393
70	0,272	0,277
95	0,206	0,21
120	0,161	0,164
150	0,129	0,132
185	0,106	0,108

TFCrane R-(N)TSCGEWÖU + FO

Based on: DIN VDE 0250-813

Medium Voltage Rubber Flexible Cable with Integrated Fiber-Optics for Reeling Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded tinned or bare copper conductor class 5 to IEC 60228. Type of conductor design: opposite-lay with special length of lay.
Separator	Semi-conductive tape on power and earthing conductors and insulation and between earth conductor and semi-conductive layer
Conductor screen	Semi-conductive layer of special rubber, developed by TF Kable
Insulation	Special EPDM rubber, halogen-free, lead-free compound, exceeding type 3GI3, developed by TF Kable, White
Insulation screen	Semi-conductive, special strippable layer over insulation of power cores. Maximum resistivity of semi-conductive layers -200 [$\Omega \times m$]
Earth conductor	Tinned or bare copper conductor class 5 to IEC 60228 with extruded special semi-conductive rubber compound
Fiber Optic Module	A-D(ZN)13Y 6, 12, 18 or 24 fibers G50/125, G62,5/125 or E9/125
Identification of the fibers	Color coded fibres and tubes
Fiber covering	Loose buffered tubes with filling compound
Core arrangement	Power cores, earth conductor (split into 2 parts) and FO laid up around conductive filler in the centre. Anti-adhesion graphite over assembled conductors.
Inner sheath	A special synthetic thermosetting compound type 5GM3 acc. to DIN VDE 0207/21, Red



DESIGN FEATURES

Anti-torsion braid	Braid of polyamide threads between inner and outer sheath
Outer sheath	Special synthetic thermosetting compound, 5GM5 quality acc. to DIN VDE 0207/21 developed by TF Kable, Red

FEATURES

Rated Voltage U_0/U	3,6/6 kV	6/10 kV	8,7/15 kV	12/20 kV
Max. operating voltage U_m	7,2 kV	12 kV	18 kV	24 kV
AC test voltage	11 kV	17 kV	24 kV	29 kV

- Partial discharge: $1,25U_0/\max 20 \text{ pC}$
- Current carrying capacity: DIN VDE 0298-4
- Max. conductor operating temperature: $+90^\circ\text{C}$
- Max. conductor temperature during short circuit: $+250^\circ\text{C}$
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

- Minimum bending radius acc. to DIN VDE 0298-3:

Fixed installation	6D
On drums	12D
On deflection pulleys	15D
Moving freely	10D

- Roller bending test
- Reeling test
- Twist limits: 100°/m
- Travel speed up to: 180m/min
- Tensile load: 20N/mm²
- Oil resistant: PN-EN 60811-404, IEC 60811-404
- UV resistant: UL 2556, ISO 4892-2
- Ozone resistant: PN-ISO 1431-1
- Example of standard sheath marking:
TF KABLE 3 TFCrane R-(N)TSCGEWÖU + FO
3x35+2x25/2+12FO 6/10kV year + meter
- Excellent tear, impact and abrasion resistant
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2

APPLICATIONS

Specially designed flexible reeling cable with reduced dimensions for extremely high mechanical stresses occur in applications with monospiral reels and cylindrical reels, very high reeling speed, torsional stress. Also for connection of large material handling machines such as excavators, dumpers, crushers in open-cast mines. For use in wet or dry conditions, in industrial units, in underground and open-cast mining, in explosion-risk areas.

Standard length cable packing 500 m on drums.
Other forms of packing and delivery are available on request

Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3,6/6 kV				
3x25+2x25/2+FO	6,5	39,9	2479	1500
3x35+2x25/2+FO	7,5	42,0	2882	2100
3x50+2x25/2+FO	9,3	45,8	3534	3000
3x70+2x35/2+FO	11,1	51,5	4653	4200
3x95+2x50/2+FO	13	55,6	5689	5700
3x120+2x70/2+FO	14,5	58,8	6842	7200
3x150+2x70/2+FO	16,2	64,3	8259	9000
3x185+2x95/2+FO	18,3	68,8	9624	11100
6/10 kV				
3x25+2x25/2+FO	6,5	41,6	2624	1500
3x35+2x25/2+FO	7,5	43,7	3035	2100
3x50+2x25/2+FO	9,3	47,5	3699	3000
3x70+2x35/2+FO	11,1	53,2	4840	4200
3x95+2x50/2+FO	13	57,3	5890	5700
3x120+2x70/2+FO	14,5	60,6	7054	7200
3x150+2x70/2+FO	16,2	66,0	8490	9000
3x185+2x95/2+FO	18,3	70,5	9871	11100
8,7/15 kV				
3x25+2x25/2+FO	6,5	45,1	2933	1500
3x35+2x25/2+FO	7,5	47,1	3359	2100
3x50+2x25/2+FO	9,3	52,7	4270	3000
3x70+2x35/2+FO	11,1	56,7	5231	4200
3x95+2x50/2+FO	13	60,7	6309	5700
3x120+2x70/2+FO	14,5	65,8	7772	7200
3x150+2x70/2+FO	16,2	69,4	8971	9000
3x185+2x95/2+FO	18,3	75,8	10702	11100

Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
12/20 kV				
3x25+2x25/2+FO	6,5	48,1	3229	1500
3x35+2x25/2+FO	7,5	52	3885	2100
3x50+2x25/2+FO	9,3	55,7	4600	3000
3x70+2x35/2+FO	11,1	59,7	5584	4200
3x95+2x50/2+FO	13	65,6	6961	5700
3x120+2x70/2+FO	14,5	68,8	8181	7200
3x150+2x70/2+FO	16,2	72,5	9401	9000

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C	
	Plain wires	Tinned wires
mm ²	Ω/km	Ω/km
25	0,78	0,795
35	0,554	0,565
50	0,386	0,393
70	0,272	0,277
95	0,206	0,21
120	0,161	0,164
150	0,129	0,132
185	0,106	0,108

FIBER DATA

Parameter	G50/125 multimode	G62,5/125 multimode	E9/125 singlemode
Attenuation at 850 nm	≤2.5 dB/km	≤3.0	–
Attenuation at 1300 nm	≤0.6 dB/km	≤1.0	–
Attenuation at 1550 nm	–	–	≤0.21 / ≤0.19 dB/km
Bandwidth at 850 nm	≥700 MHz*km	220 MHz*km	–
Bandwidth at 1300 nm	≥500 MHz*km	500 MHz*km	–
Numerical Aperture at 850 nm	0.200 ±0.010	≤0.275 ±0.015	–
Group refractive index at 850 nm	1.483	1.496	–
Group refractive index at 1300 nm	1.479	1.491	–
Group refractive index at 1550 nm	–	–	1.468

TFCrane R-(N)TSKCGEWÖU KN

Based on: DIN VDE 0250-813

Medium Voltage Rubber Flexible Cable with Cradle Separator for Reeling Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded tinned or bare copper conductor class 5 to IEC 60228. Type of conductor design: opposite-lay with special length of lay.
Separator	Semi-conductive tape on power and earthing conductors and insulation and between earth conductor and semi-conductive layer
Conductor screen	Semi-conductive layer of special rubber, developed by TFKable
Insulation	Special EPDM rubber, halogen-free, lead-free compound, exceeding type 3GI3, developed by TFKable, White
Insulation screen	Semi-conductive, special strippable layer over insulation of power cores. Maximum resistivity of semi-conductive layers -200 [$\Omega \times m$]
Earth conductor	Tinned or bare copper conductor class 5 to IEC 60228 with extruded special semi-conductive rubber compound
Core arrangement	Power cores and earth conductor (split into 3 parts) laid up around semi-conductive cradle separator. Anty-adhesion graphite over assembled conductors.
Inner sheath	A special synthetic thermosetting compound type 5GM3 acc. to DIN VDE 0207/21, Red
Anti-torsion braid	Braid of polyamide threads between inner and outer sheath
Outer sheath	Special synthetic thermosetting compound, 5GM5 quality acc. to DIN VDE 0207/21 developed by TFKable, Red



FEATURES

Rated Voltage U_0/U	3,6/6 kV	6/10 kV	8,7/15 kV	12/20 kV
Max. operating voltage U_m	7,2 kV	12 kV	18 kV	24 kV
AC test voltage	11 kV	17 kV	24 kV	29 kV

- Partial discharge: $1,25U_0/\max 20 \text{ pC}$
- Current carrying capacity: DIN VDE 0298-4

- Max. conductor operating temperature: $+90^\circ\text{C}$
- Max. conductor temperature during short circuit: $+250^\circ\text{C}$
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

- Minimum bending radius acc. to DIN VDE 0298-3:

Fixed installation	6D
On drums	12D
On deflection pulleys	15D
Moving freely	10D

- Roller bending test
 - Reeling test
 - Twist limits: 25°/m
 - Travel speed up to: 180 m/min (Speeds above 180 m/min to be consulted with manufacturer)
 - Tensile load: See table (Increased tensile load due to additional support elements)
 - Excellent tear, impact and abrasion resistant outer sheath
 - Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2
- Oil resistant: PN-EN 60811-404, IEC 60811-404
UV resistant: UL 2556, ISO 4892-2
Ozone resistant: PN-ISO 1431-1
- Example of standard sheath marking:
TF KABLE 3 TFCrane R-(N)TSKCGEWÖU KN
3x50+3x25/3 6/10kV year + meter

APPLICATIONS

Specially designed flexible reeling cable with reduced dimensions for high mechanical stresses occur in applications with monospiral reels and cylindrical reels, extreme high reeling speed, torsional stress. Also for connection of large material handling machines such as excavators, dumpers, crushers in open-cast mines. For use in wet or dry conditions, in industrial units, in underground and open-cast mining, in explosion-risk areas.

Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
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Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3,6/6 kV				
3x25+3x25/3	6,5	41,6	2552	2205
3x35+3x25/3	7,5	43,7	2957	2955
3x50+3x25/3	9,3	48,1	3644	4080
3x70+3x35/3	11,1	53,8	4793	5580
3x95+3x50/3	13	57,9	5879	8125
3x120+3x70/3	14,5	63,5	7328	10000
3x150+3x70/3	16,2	67,2	8527	12250
3x185+3x95/3	18,3	71,7	9948	14875
6/10 kV				
3x25+3x25/3	6,5	43,4	2696	2205
3x35+3x25/3	7,5	45,4	3122	2955
3x50+3x25/3	9,3	51,6	4039	4080
3x70+3x35/3	11,1	55,5	4992	5580
3x95+3x50/3	13	59,6	6078	8125
3x120+3x70/3	14,5	65,2	7564	10000
3x150+3x70/3	16,2	68,9	8777	12250
3x185+3x95/3	18,3	75,2	10532	14875
8,7/15 kV				
3x25+3x25/3	6,5	46,8	3028	2205
3x35+3x25/3	7,5	48,9	3454	2955
3x50+3x25/3	9,3	55	4430	4080
3x70+3x35/3	11,1	59	5414	5580
3x95+3x50/3	13	64,9	6801	8125
3x120+3x70/3	14,5	68,7	8054	10000
3x150+3x70/3	16,2	72,3	9273	12250
3x185+3x95/3	18,3	78,7	11074	14875

Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
12/20 kV				
3x25+3x25/3	6,5	51,6	3548	2205
3x35+3x25/3	7,5	53,7	4010	2955
3x50+3x25/3	9,3	58,1	4785	4080
3x70+3x35/3	11,1	63,8	6062	5580
3x95+3x50/3	13	67,9	7218	8125
3x120+3x70/3	14,5	71,7	8493	10000
3x150+3x70/3	16,2	77,1	10060	12250

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C	
	Plain wires	Tinned wires
mm ²	Ω/km	Ω/km
25	0,78	0,795
35	0,554	0,565
50	0,386	0,393
70	0,272	0,277
95	0,206	0,21
120	0,161	0,164
150	0,129	0,132
185	0,106	0,108

TFCrane R-(N)TSKCGEWÖU + FO KN

Based on: DIN VDE 0250-813

Medium Voltage Rubber Flexible Cable with Cradle Separator and Integrated Fiber-Optics for Reeling Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded tinned or bare copper conductor class 5 to IEC 60228. Type of conductor design: opposite-lay with special length of lay.
Separator	Semi-conductive tape on power and earthing conductors and insulation and between earth conductor and semi-conductive layer
Conductor screen	Semi-conductive layer of special rubber, developed by TF Kable
Insulation	Special EPDM rubber, halogen-free, lead-free compound, exceeding type 3GI3, developed by TF Kable, White
Insulation screen	Semi-conductive, special strippable layer over insulation of power cores. Maximum resistivity of semi-conductive layers $\sim 200 [\Omega \times m]$
Earth conductor	Tinned or bare copper conductor class 5 to IEC 60228 with extruded special semi-conductive rubber compound
Fiber Optic Module	A-D(ZN)13Y 6, 12, 18 or 24 fibers G50/125, G62,5/125 or E9/125
Identification of the fibers	Color coded fibres and tubes
Fiber covering	Loose buffered tubes with filling compound
Core arrangement	Power cores, earth conductor (split into 2 parts), and FO laid up around semi-conductive cradle separator. Anti-adhesion graphite over assembled conductors.
Inner sheath	A special synthetic thermosetting compound type 5GM3 acc. to DIN VDE 0207/21, Red
Anti-torsion braid	Braid of polyamide threads between inner and outer sheath
Outer sheath	Special synthetic thermosetting compound, 5GM5 quality acc. to DIN VDE 0207/21 developed by TF Kable, Red



FEATURES

Rated Voltage U_0/U	3,6/6 kV	6/10 kV	8,7/15 kV	12/20 kV
Max. operating voltage U_m	7,2 kV	12 kV	18 kV	24 kV
AC test voltage	11 kV	17 kV	24 kV	29 kV

- Partial discharge: $1,25U_0/\max 20 \text{ pC}$
- Current carrying capacity: DIN VDE 0298-4

- Max. conductor operating temperature: $+90^\circ\text{C}$
- Max. conductor temperature during short circuit: $+250^\circ\text{C}$
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

- Minimum bending radius acc. to DIN VDE 0298-3:

Fixed installation	6D
On drums	12D
On deflection pulleys	15D
Moving freely	10D

- Roller bending test
 - Reeling test
 - Twist limits: $25^\circ/\text{m}$
 - Travel speed up to: 180 m/min
(Speeds above 180 m/min to be consulted with manufacturer)
 - Tensile load: See table (Increased tensile load due to additional support elements)
 - Excellent tear, impact and abrasion resistant outer sheath
 - Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2
- Oil resistant: PN-EN 60811-404, IEC 60811-404
UV resistant: UL 2556, ISO 4892-2
Ozone resistant: PN-ISO 1431-1
- Example of standard sheath marking:
TF KABLE 3 TFCrane R-(N)TSKCGEWÖU + FO KN
3x50+2x25/2+FO 6/10kV year + meter

APPLICATIONS

Specially designed flexible reeling cable with reduced dimensions for high mechanical stresses occur in applications with monospiral reels and cylindrical reels, extreme high reeling speed, torsional stress. Also for connection of large material handling machines such as excavators, dumpers, crushers in open-cast mines. For use in wet or dry conditions, in industrial units, in underground and open-cast mining, in explosion-risk areas.

Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
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Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3,6/6 kV				
3x25+2x25/2+FO	6,5	41,6	2542	2205
3x35+2x25/2+FO	7,5	43,7	2951	2955
3x50+2x25/2+FO	9,3	48,1	3623	4080
3x70+2x35/2+FO	11,1	53,8	4765	5580
3x95+2x50/2+FO	13	57,9	5798	8125
3x120+2x70/2+FO	14,5	63,5	7258	10000
3x150+2x70/2+FO	16,2	67,2	8416	12250
3x185+2x95/2+FO	18,3	71,7	9800	14875
6/10 kV				
3x25+2x25/2+FO	6,5	43,4	2692	2205
3x35+2x25/2+FO	7,5	45,4	3176	2955
3x50+2x25/2+FO	9,3	51,6	4010	4080
3x70+2x35/2+FO	11,1	55,5	4941	5580
3x95+2x50/2+FO	13	59,6	6004	8125
3x120+2x70/2+FO	14,5	65,2	7485	10000
3x150+2x70/2+FO	16,2	68,9	8655	12250
3x185+2x95/2+FO	18,3	75,2	10372	14875
8,7/15 kV				
3x25+2x25/2+FO	6,5	46,8	3009	2205
3x35+2x25/2+FO	7,5	48,9	3427	2955
3x50+2x25/2+FO	9,3	55	4385	4080
3x70+2x35/2+FO	11,1	59	5343	5580
3x95+2x50/2+FO	13	64,9	6708	8125
3x120+2x70/2+FO	14,5	68,7	7934	10000
3x150+2x70/2+FO	16,2	72,3	9150	12250
3x185+2x95/2+FO	18,3	78,7	10913	14875
12/20 kV				
3x25+2x25/2+FO	6,5	51,6	3516	2205
3x35+2x25/2+FO	7,5	53,7	3968	2955
3x50+2x25/2+FO	9,3	58,1	4724	4080
3x70+2x35/2+FO	11,1	63,8	5974	5580
3x95+2x50/2+FO	13	67,9	7109	8125
3x120+2x70/2+FO	14,5	71,7	8375	10000
3x150+2x70/2+FO	16,2	77,1	9916	12250

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C	
	Plain wires	Tinned wires
mm ²	Ω/km	Ω/km
25	0,78	0,795
35	0,554	0,565
50	0,386	0,393
70	0,272	0,277
95	0,206	0,21
120	0,161	0,164
150	0,129	0,132
185	0,106	0,108

FIBER DATA

Parameter	G50/125 multimode	G62,5/125 multimode	E9/125 singlemode
Attenuation at 850 nm	≤2.5 dB/km	≤3.0	–
Attenuation at 1300 nm	≤0.6 dB/km	≤1.0	–
Attenuation at 1550 nm	–	–	≤0.21 / ≤0.19 dB/km
Bandwidth at 850 nm	≥700 MHz*km	220 MHz*km	–
Bandwidth at 1300 nm	≥500 MHz*km	500 MHz*km	–
Numerical Aperture at 850 nm	0.200 ±0.010	≤0.275 ±0.015	–
Group refractive index at 850 nm	1.483	1.496	–
Group refractive index at 1300 nm	1.479	1.491	–
Group refractive index at 1550 nm	–	–	1.468

TFCrane (N)SHTÖU -J/O VR

FOR POWER MOBILE CONNECTION

Based on: DIN VDE 0250-814

Low Voltage Rubber Flexible Cable for Vertical Reeling Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded tinned or bare copper conductor class 5 to IEC 60228. Special construction with optimized lay length.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	EPDM rubber, halogen-free, lead-free compound, type 3GI3 acc. to DIN VDE 0207/20, developed by TFCable
Circuit identification	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 -J version: 3 - core: Green-yellow, blue, brown 4 - core: Green-yellow, brown, black, grey or green-yellow, blue, brown, black 5 - core: Green-yellow, blue, brown, black, grey -O version: 3 - core: Brown, black, grey or blue, brown, black 4 - core: Blue, brown, black, grey 5 - core: Blue, brown, black, grey, black
Inner sheath	A special synthetic thermosetting compound type 5GM3 acc. to DIN VDE 0207/21, Yellow
Anti-torsion braid	Braid of polyamide threads between inner and outer sheath
Outer sheath	Special synthetic thermosetting compound, 5GM5 quality acc. to DIN VDE 0207/21 developed by TFCable, Yellow



FEATURES

Rated Voltage U_0/U	0,6/1 kV
Max. operating voltage U_m	1,2 kV
AC test voltage	3 kV

- Current carrying capacity: DIN VDE 0298-4
- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

- Minimum bending radius acc. to DIN VDE 0298-3:

OD of cable [mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
 - Reeling test
 - Twist limits: 50°/m
 - Travel speed up to: 100 m/min (Speeds above 100 m/min to be consulted with manufacturer)
 - Tensile load: See table (Increased tensile load due to additional support elements)
 - Excellent tear, impact and abrasion resistant outer sheath
 - Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2
- Oil resistant: PN-EN 60811-404, IEC 60811-404
 UV resistant: UL 2556, ISO 4892-2
 Ozone resistant: PN-ISO 1431-1
- Example of standard sheath marking:
 TF KABLE 3 TFCrane (N)SHTÖU -J VR
 3x35 0,6/1kV CE year + meter

APPLICATIONS

Specially designed flexible cable for power mobile connections, for extremely high mechanical stresses. The cable is used in cable winding reels for winding and unwinding with co-occurrent tensile and torsion stress. Other applications include installation on conveyors, container cranes, harbour cranes, building machinery, handling machines for vertical reeling applications. For use in wet or dry conditions, in industrial units, in underground and open-cast mining, in explosion-risk areas.

Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
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Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3x1,5	1,5	11,9	205	135
3x2,5	2,1	13,5	271	225
3x4	2,7	16,9	418	360
3x6	3	17,6	487	540
3x10	4,1	21,6	764	900
3x16	5,2	23,8	1014	1440
3x25	6,6	28,7	1501	2250
3x35	7,5	32,2	1975	3150
3x50	9,3	38,3	2774	4500
3x70	11,1	42,1	3568	6300
3x95	13	48,8	4746	8550
3x120	14,5	52,0	5730	10800
3x150	16,2	56,6	6991	13500
3x185	18,3	63,8	8572	16650
3x240	20,7	71,6	11227	21600
4x1,5	1,5	12,7	238	180
4x2,5	2,1	15,7	362	300
4x4	2,7	18,1	495	480
4x6	3	19,0	583	720
4x10	4,1	23,3	924	1200
4x16	5,2	27,0	1307	1920
4x25	6,6	32,6	1951	3000
4x35	7,5	34,9	2434	4200
4x50	9,3	41,5	3428	6000
4x70	11,1	45,8	4442	8400
4x95	13	53,1	5905	11400
4x120	14,5	58,6	7417	14400
4x150	16,2	63,6	9062	18000
4x185	18,3	71,5	11048	22200
5x1,5	1,5	13,6	276	225
5x2,5	2,1	16,8	420	375
5x4	2,7	19,5	581	600
5x6	3	21,3	728	900

Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
5x10	4,1	25,2	1104	1500
5x16	5,2	29,0	1562	2400
5x25	6,6	35,3	2339	3750
5x35	7,5	39,3	3066	5250
5x50	9,3	45,2	4142	7500
5x70	11,1	51,7	5613	10500

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C	
	Plain wires	Tinned wires
mm ²	Ω/km	Ω/km
1,5	13,3	13,7
2,5	7,98	8,21
4	4,95	5,09
6	3,3	3,39
10	1,91	1,95
16	1,21	1,24
25	0,78	0,795
35	0,554	0,565
50	0,386	0,393
70	0,272	0,277
95	0,206	0,21
120	0,161	0,164
150	0,129	0,132
185	0,106	0,108
240	0,0801	0,0817

TFCrane (N)SHTÖU -J VR

3+3PE symmetrical construction

Based on: DIN VDE 0250-814

Low Voltage Rubber Flexible Cable for Vertical Reeling Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded tinned or bare copper conductor class 5 to IEC 60228. Special construction with optimized lay length.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	EPDM rubber, halogen-free, lead-free compound, type 3GI3 acc. to DIN VDE 0207/20, developed by TFCable
Color of insulation*	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 Power cores: 3-core circuit identification: Brown, black, grey Earth cores: Green-yellow
Earth conductor	Tinned or bare copper conductor rubber insulated
Core arrangement	Three power cores twisted together, earth conductor split into 3 parts and placed into the interstices.
Inner sheath	A special synthetic thermosetting compound type 5GM3 acc. to DIN VDE 0207/21, Yellow
Anti-torsion braid	Braid of polyamide threads between inner and outer sheath
Outer layer of sheath	Special synthetic thermosetting compound, 5GM5 quality acc. to DIN VDE 0207/21 developed by TFCable, Yellow



FEATURES

Rated Voltage U_0/U	0,6/1 kV
Max. operating voltage U_m	1,2 kV
AC test voltage	3 kV

- Current carrying capacity: DIN VDE 0298-4
- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C
- Minimum bending radius acc. to DIN VDE 0298-3:

OD of cable[mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
- Reeling test
- Twist limits: 50°/m
- Travel speed up to: 100 m/min
(Speeds above 100 m/min to be consulted with manufacturer)
- Tensile load: See table (Increased tensile load due to additional support elements)
- Excellent tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2

Oil resistant: PN-EN 60811-404, IEC 60811-404
UV resistant: UL 2556, ISO 4892-2
Ozone resistant: PN-ISO 1431-1

Example of standard sheath marking:
TF KABLE 3 TFCrane (N)SHTÖU -J VR
3x35+3x16/3 0,6/1kV CE year + meter

APPLICATIONS

Specially designed flexible cable for power mobile connections, for extremely high mechanical stresses. The cable is used in cable winding reels for winding and unwinding with co-occurrent tensile and torsion stress. Other applications include installation on conveyors, container cranes, harbour cranes, building machinery, handling machines for vertical reeling applications. For use in wet or dry conditions, in industrial units, in underground and open-cast mining, in explosion-risk areas.

Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
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Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3x35+3x16/3	7,5	30,8	2065	3150
3x50+3x25/3	9,3	36,9	2930	4500
3x70+3x35/3	11,1	42,1	3950	6300
3x95+3x50/3	13	47	5103	8550
3x120+3x70/3	14,5	50,2	6267	10800
3x150+3x70/3	16,2	56,6	7795	13500
3x185+3x95/3	18,3	62	9373	16650
3x240+3x120/3	20,7	69,8	12276	21600
3x300+3x150/3	24,2	80	15567	27000

TFCrane (N)SHTÖU -J/O VR S

Based on: DIN VDE 0250-814

Low Voltage Rubber Flexible Signalling Cable for Vertical Reeling Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded tinned or bare copper conductor class 5 to IEC 60228. Special construction with optimized lay length.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	EPDM rubber, halogen-free, lead-free compound, type 3GI3 acc. to DIN VDE 0207/20, developed by TF Kable
Circuit identification	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 J- version Above 5 cores: Green-yellow, other cores black with white numbering O-version: Above 5 cores: Black with white numbering
Inner sheath	A special synthetic thermosetting compound type 5GM3 acc. to DIN VDE 0207/21, Yellow
Anti-torsion braid	Braid of polyamide threads between inner and outer sheath
Outer sheath	Special synthetic thermosetting compound, 5GM5 quality acc. to DIN VDE 0207/21 developed by TF Kable, Yellow



POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C	
	Plain wires	Tinned wires
mm ²	Ω/km	Ω/km
16	1,21	1,24
25	0,78	0,795
35	0,554	0,565
50	0,386	0,393
70	0,272	0,277
95	0,206	0,21
120	0,161	0,164
150	0,129	0,132
185	0,106	0,108
240	0,0801	0,0817
300	0,0641	0,0654

FEATURES

Rated Voltage U_0/U	0,6/1 kV
Max. operating voltage U_m	1,2 kV
AC test voltage	3 kV

▪ Current carrying capacity: DIN VDE 0298-4

- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

▪ Minimum bending radius acc. to DIN VDE 0298-3:

OD of cable[mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
- Reeling test
- Twist limits: 50°/m
- Travel speed up to: 100m/min
(Speeds above 100 m/min to be consulted with manufacturer)
- Tensile load: See table (Increased tensile load due to additional support elements)
- Excellent tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2

Oil resistant: PN-EN 60811-404, IEC 60811-404
 UV resistant: UL 2556, ISO 4892-2
 Ozone resistant: PN-ISO 1431-1

Example of standard sheath marking:
 TF KABLE 3 TFCrane (N)SHTÖU -J VR S
 7x2,5 0,6/1kV CE year + meter

APPLICATIONS

Specially designed flexible cable for signalling mobile connections, for extremely high mechanical stresses. The cable is used in cable winding reels for winding and unwinding with co-occurrent tensile and torsion stress. Other applications include installation on conveyors, container cranes, harbour cranes, building machinery, handling machines for vertical reeling applications. For use in wet or dry conditions, in industrial units, in underground and open-cast mining, in explosion-risk areas.

Standard length cable packing 500 m on drums.
 Other forms of packing and delivery are available on request

Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
7x1,5	1,5	16,9	410	2315
7x2,5	2,1	19,4	556	2525
12x1,5	1,5	22,6	724	2540
12x2,5	2,1	26,2	1002	2900
18x1,5	1,5	24,9	893	2810
18x2,5	2,1	30,1	1320	3350
24x1,5	1,5	25,9	1028	3080
24x2,5	2,1	31,3	1527	3800
30x1,5	1,5	29,8	1333	3350
30x2,5	2,1	36,3	2000	4250
36x1,5	1,5	32,4	1547	3620
36x2,5	2,1	39,4	2322	4700
42x1,5	1,5	34,8	1795	3890
42x2,5	2,1	42,0	2671	5150
44x1,5	1,5	34,8	1817	3980
44x2,5	2,1	42,0	2706	5300
50x1,5	1,5	36,7	2032	4250
50x2,5	2,1	44,4	3030	5750
56x2,5	2,1	47,1	3443	6200

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C	
	Plain wires	Tinned wires
mm ²	Ω/km	Ω/km
1,5	13,3	13,7
2,5	7,98	8,21

TFCrane (N)GRDGÖU -J/O

Based on: DIN VDE 0250-814

Low Voltage Rubber Flexible Cable for Festoon Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded bare or tinned copper conductor class 5 acc. to IEC 60228.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	EPDM rubber, halogen-free, lead-free compound, type 3G13 acc. to DIN VDE 0207/20, developed by TF Kable
Circuit identification	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 -J version: 3 - core: Green-yellow, blue, brown 4 - core: Green-yellow, brown, black, grey or green-yellow, blue, brown, black 5 - core: Green-yellow, blue, brown black, grey Above 5 cores: Green-yellow, other cores black with white numbering -O version: 3 - core: Brown, black, grey or blue, brown, black 4 - core: Blue, brown, black, grey 5 - core: Blue, brown, black, grey, black Above 5 cores: Black with white numbering
Inner sheath	A synthetic thermosetting compound type Gm1b acc. to DIN VDE 0207/21, Black
Outer sheath	Synthetic thermosetting compound, type 5GM3 acc. to DIN VDE 0207/21 developed by TF Kable, Black



FEATURES

Rated Voltage U_0/U	0,6/1kV
Max. operating voltage U_m	1,2 kV
AC test voltage	3 kV

- Current carrying capacity: DIN VDE 0298-4
- Max. conductor operating temperature: +90°C

- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

- Minimum bending radius acc. to DIN VDE 0298-3:

OD of cable[mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
- Reeling test
- Twist limits: 25°/m
- Travel speed up to: 240m/min
- Tensile load: 15N/mm²

Oil resistant: PN-EN 60811-404, IEC 60811-404
 UV resistant: UL 2556, ISO 4892-2
 Ozone resistant: PN-ISO 1431-1

Example of standard sheath marking:
 TF KABLE 3 TFCrane (N)GRDGÖU-J 4x10 0,6/1kV CE
 year + meter

- Tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2

APPLICATIONS

Flexible cable designed for high mechanical stresses, especially for applications with frequent bending. For festoon systems and connecting moveable parts of container cranes, industrial units, material handling equipment. For use in wet or dry conditions, outdoors, indoors.

Standard length cable packing 500 m on drums.
 Other forms of packing and delivery are available on request

Number of cores x cross-section mm ²	Conductor diameter mm	Approx. overall diameter mm	Approx. weight kg/km	Max. tensile load N
1x25	6,6	12,7	349	375
1x35	7,5	13,7	449	525
1x50	9,3	15,9	615	750
1x70	11,1	18,0	835	1050
1x95	13	20,3	1079	1425
1x120	14,5	22,2	1359	1800
1x150	16,2	24,3	1687	2250
1x185	18,3	27,6	2054	2775
4x4	2,7	16,9	423	240
4x6	3	17,7	508	360

Number of cores x cross-section mm ²	Conductor diameter mm	Approx. overall diameter mm	Approx. weight kg/km	Max. tensile load N
4x10	4,1	22,0	827	600
4x16	5,2	25,6	1169	960
4x25	6,6	30,9	1773	1500
4x35	7,5	33,2	2244	2100
4x50	9,3	39,7	3170	3000
5x4	2,7	18,2	515	300
5x6	3	19,9	654	450
5x10	4,1	23,9	1017	750
5x16	5,2	27,7	1444	1200
12x1,5	1,5	21,8	621	270
12x2,5	2,1	25,4	876	450
18x1,5	1,5	24,1	786	405
18x2,5	2,1	29,1	1165	675
24x1,5	1,5	25,1	945	540
24x2,5	2,1	30,3	1406	900
30x1,5	1,5	28,8	1196	675
30x2,5	2,1	35,1	1799	1125
36x1,5	1,5	31,4	1387	810
36x2,5	2,1	38,2	2094	1350

POWER CONDUCTOR RESISTANCE

Cross-section mm ²	Max. conductor resistance at 20°C	
	Plain wires Ω/km	Tinned wires Ω/km
1,5	13,3	13,7
2,5	7,98	8,21
4	4,95	5,09
6	3,3	3,39
10	1,91	1,95
16	1,21	1,24
25	0,78	0,795
35	0,554	0,565
50	0,386	0,393
70	0,272	0,277
95	0,206	0,21
120	0,161	0,164
150	0,129	0,132
185	0,106	0,108

TFCrane (N)GRDGÖU -J

3+3PE symmetrical construction

Based on: DIN VDE 0250-814

Low Voltage Rubber Flexible Cable for Festoon Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded bare or tinned copper conductor class 5 acc. to IEC 60228.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	EPDM rubber, halogen-free, lead-free compound, type 3GI3 acc. to DIN VDE 0207/20, developed by TF Kable
Color of insulation*	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 Power cores: 3-core circuit identification: Brown, black, grey Earth cores: Green-yellow
Earth conductor	Tinned or bare copper conductor rubber insulated
Core arrangement	Three power cores and earth conductor (split into 3 parts) laid up around central rubber filler.
Inner sheath	A synthetic thermosetting compound type Gm1b acc. to DIN VDE 0207/21, Black
Outer sheath	Synthetic thermosetting compound, type 5GM3 acc. to DIN VDE 0207/21 developed by TF Kable, Black

* other core identification available on request



FEATURES

Rated Voltage U_0/U	0,6/1kV
Max. operating voltage U_m	1,2 kV
AC test voltage	3 kV

- Current carrying capacity: DIN VDE 0298-4
- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

- Minimum bending radius acc. to DIN VDE 0298-3:

OD of cable[mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
- Reeling test
- Twist limits: 25°/m
- Travel speed up to: 240m/min
- Tensile load: 15N/mm²

Oil resistant: PN-EN 60811-404, IEC 60811-404
 UV resistant: UL 2556, ISO 4892-2
 Ozone resistant: PN-ISO 1431-1

Example of standard sheath marking:
 TF KABLE 3 TFCrane (N)GRDGÖU-J
 3x70+3x50/3 0,6/1kV CE year + meter

- Tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2

APPLICATIONS

Flexible cable designed for high mechanical stresses, especially for applications with frequent bending. For festoon systems and connecting moveable parts of container cranes, industrial units, material handling equipment. For use in wet or dry conditions, outdoors, indoors.

Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
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Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3x35+3x16/3	7,5	29,4	1878	1575
3x50+3x25/3	9,3	35,2	2674	2250
3x70+3x35/3	11,1	40,2	3624	3150

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C	
	Plain wires	Tinned wires
mm ²	Ω/km	Ω/km
16	1,21	1,24
25	0,78	0,795
35	0,554	0,565
50	0,386	0,393
70	0,272	0,277



TFCrane (N)GRDGCGÖU -J

Based on: DIN VDE 0250-814

Low Voltage Screened Rubber Flexible Cable for Festoon Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded bare copper conductor class 5 acc. to IEC 60228.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	EPDM rubber, halogen-free, lead-free compound, type 3GI3 acc. to DIN VDE 0207/20, developed by TFKable
Color of insulation*	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 Power cores: 4-core circuit identification: Green-yellow, brown, black, grey
Inner sheath	A synthetic thermosetting compound type Gm1b acc. to DIN VDE 0207/21, Black
Screen over inner sheath	Tinned copper wire braid - coverage min. 80%
Outer sheath	Synthetic thermosetting compound, type 5GM3 acc. to DIN VDE 0207/21 developed by TFKable, Black

* other core identification available on request



FEATURES

Rated Voltage U_0/U	0,6/1kV
Max. operating voltage U_m	1,2 kV
AC test voltage	3 kV

- Current carrying capacity: DIN VDE 0298-4
- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C
- Minimum bending radius acc. to DIN VDE 0298-3:

OD of cable[mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
- Reeling test
- Travel speed up to: 240m/min
- Tensile load: 15N/mm²
- Tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2
- Oil resistant: PN-EN 60811-404, IEC 60811-404
- UV resistant: UL 2556, ISO 4892-2
- Ozone resistant: PN-ISO 1431-1

Example of standard sheath marking:
TF KABLE 3 TFCrane (N)GRDGCGÖU-J 4x10 0,6/1kV CE
year + meter

APPLICATIONS

Screened flexible cable designed for use on festoon systems, on hall gantry cranes, gantry cranes, rack material handling equipment, transportation system or machine tools. The cable is used under high mechanical stresses, especially for applications with frequent bending. For use in wet or dry conditions, outdoors, indoors.

Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
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Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
4x2,5	2,1	15,8	382	150
4x4	2,7	18,2	539	240
4x6	3	19,0	629	360
4x10	4,1	23,3	977	600

TFCrane (N)GRDGCGÖU -J

3+3PE symmetrical construction

Based on: DIN VDE 0250-814

Low Voltage Screened Rubber Flexible Cable for Festoon Applications

DESIGN FEATURES

Conductors	Annealed flexible stranded tinned or bare copper conductor class 5 acc. to IEC 60228.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	EPDM rubber, halogen-free, lead-free compound, type 3GI3 acc. to DIN VDE 0207/20, developed by TFKable
Color of insulation*	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 Power cores: 3-core circuit identification: Brown, black, grey Earth cores: Green-yellow
Earth conductor	Tinned or bare copper conductor rubber insulated
Core arrangement	Three power cores and earth conductor (split into 3 parts) laid up around central rubber filler.
Inner sheath	A synthetic thermosetting compound type Gm1b acc. to DIN VDE 0207/21, Black
Screen over inner sheath	Tinned copper wire braid - coverage min. 80%
Outer sheath	Synthetic thermosetting compound, type 5GM3 acc. to DIN VDE 0207/21 developed by TFKable, Black

* other core identification available on request



POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C
mm ²	Ω/km
2,5	7,98
4	4,95
6	3,3
10	1,91



FEATURES

Rated Voltage U_0/U	0,6/1kV
Max. operating voltage U_m	1,2 kV
AC test voltage	3 kV

- Current carrying capacity: DIN VDE 0298-4
- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

- Minimum bending radius acc. to DIN VDE 0298-3:

OD of cable[mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
 - Reeling test
 - Travel speed up to: 240m/min
 - Tensile load: 15N/mm²
 - Tear, impact and abrasion resistant outer sheath
 - Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2
 - Oil resistant: PN-EN 60811-404, IEC 60811-404
- UV resistant: UL 2556, ISO 4892-2
Ozone resistant: PN-ISO 1431-1
- Example of standard sheath marking:
TF KABLE 3 TFCrane (N)GRDGGÖU-J 3x70+3x10 0,6/1kV
CE year + meter

APPLICATIONS

Screened flexible cable designed for use on festoon systems, on hall gantry cranes, gantry cranes, rack material handling equipment, transportation system or machine tools. The cable is used under high mechanical stresses, especially for applications with frequent bending. For use in wet or dry conditions, outdoors, indoors.

Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
-------------------------------	---

Number of cores x cross-section	Conductor diameter	Approx. overall diameter	Approx. weight	Max. tensile load
mm ²	mm	mm	kg/km	N
3x16+3x2,5	5,2	24,2	1175	720
3x25+3x4	6,6	28,6	1700	1125
3x35+3x6	7,5	30,7	2137	1575
3x50+3x10	9,3	36,5	3035	2250
3x70+3x10	11,1	41,5	3953	3150
3x95+3x16	13	46,5	5106	4275
3x120+3x16	14,5	49,7	6104	5400
3x150+3x25	16,2	55,8	7806	6750

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C	
	Plain wires	Tinned wires
mm ²	Ω/km	Ω/km
2,5	7,98	8,21
4	4,95	5,09
6	3,3	3,39
10	1,91	1,95
16	1,21	1,24
25	0,78	0,795
35	0,554	0,565
50	0,386	0,393
70	0,272	0,277
95	0,206	0,21
120	0,161	0,164
150	0,129	0,132

TFCrane (N)GFLCGÖU -O

Based on: DIN VDE 0250-809

Low Voltage Flat Rubber Flexible Cable with Individually Screened Conductors for Festoon Applications

DESIGN FEATURES

Conductors	Special design ensuring higher flexibility. Annealed flexible stranded bare copper conductor: <ul style="list-style-type: none"> Up to 25 mm² - extra flexible, class 6 acc. to IEC 60228 Above 35 mm² - flexible, class 5 to IEC 60228.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	Special EPDM rubber, halogen-free, lead-free compound, type 3GI3 quality, developed by TF Kable
Circuit identification	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 -O version: 3 - core: Brown, black, grey or blue, brown, black 4 - core: Blue, brown, black, grey 5 - core: Blue, brown, black, grey, black Above 5 cores: Black with white numbering
Individual screen	Tinned copper wire braid. For shielded cores - covering min. 60%
Core arrangement	Parallel, for more than 12 cores: parallel bundles
Outer sheath	Special synthetic thermosetting compound, 5GM3 quality acc. to DIN VDE 0207/21 developed by TF Kable, Black



FEATURES

Rated Voltage U₀/U	0,6/1 kV
Max. operating voltage U_m	1,2 kV
AC test voltage	3 kV

- Current carrying capacity: DIN VDE 0298-4
- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

- Minimum bending radius acc. to DIN VDE 0298-3:

Thickness of flat cable [mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
- Travel speed up to: 180m/min
- Tensile load: 15N/mm²
- Tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2
- Oil resistant: PN-EN 60811-404, IEC 60811-404
- UV resistant: UL 2556, ISO 4892-2

Ozone resistant: PN-ISO 1431-1

Example of standard sheath marking:
TF KABLE 3 TFCrane (N)GFLCGÖU - O
4x(2x1mm²)c 0,6/1 kV year + meter

APPLICATIONS

Flexible flat cable designed for mechanical stresses, especially for applications with frequent bending during operation in one plane only. The cable is used on festoon systems and for connecting moveable parts of machine tools, material handling equipment. Used also on industrial lifting equipment. For use in wet or dry conditions, outdoors and indoors.

Standard length cable packing 500 m on drums.
Other forms of packing and delivery are available on request

Number of cores x cross-section mm ²	Conductor diameter mm	Min height of flat cable mm	Max height of flat cable mm	Min width of flat cable mm	Max width of flat cable mm	Approx. weight kg/km	Max tensile load N
4x10(C)	4	11,6	13,3	36	39,1	936	600
4x16(C)	5	12,8	14,5	40,2	43,3	1239	960
4x25(C)	6,1	14,7	16,8	47,3	50,4	1779	1500
4x35(C)	7,3	16,9	19	53,4	57,5	2352	2100
4x50(C)	9	19,4	21,5	62	66,1	3185	3000
4x70(C)	10,8	21,8	23,9	69,8	73,9	4196	4200
4x95(C)	12,9	24,2	27,3	78,7	83,8	5364	5700

POWER CONDUCTOR RESISTANCE

Cross-section	Max. conductor resistance at 20°C
	Plain wires
mm ²	Ω/km
1,5	13,3
2,5	7,98
4	4,95
6	3,3
10	1,91
16	1,21
25	0,78
35	0,554
50	0,386
70	0,272
95	0,206
120	0,161
150	0,129
185	0,106
240	0,0801
300	0,0641
400	0,0486



TFCrane NGFLGÖU -J/O

DIN VDE 0250-809

Low Voltage Flat Rubber Flexible Cable for Festoon Applications

DESIGN FEATURES

Conductors	Special design ensuring higher flexibility. Annealed flexible stranded bare copper conductor: <ul style="list-style-type: none"> Up to 25 mm² - extra flexible, class 6 acc. to IEC 60228 Above 35 mm² - flexible, class 5 to IEC 60228.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	Special EPDM rubber, halogen-free, lead-free compound, type 3GI3 quality, developed by TF Kable
Circuit identification	Colour coding of power conductors compliant to HD 308, DIN VDE 0293- 308 -J version: 3 - core: Green-yellow, blue, brown 4 - core: Green-yellow, brown, black, grey or green-yellow, blue, brown, black 5 - core: Green-yellow, blue, brown, black, grey Above 5 cores: Green-yellow, other cores black with white numbering -O version: 3 - core: Brown, black, grey or blue, brown, black 4 - core: Blue, brown, black, grey 5 - core: Blue, brown, black, grey, black Above 5 cores: Black with white numbering
Core arrangement	Parallel, for more than 12 cores: parallel bundles
Outer sheath	Special, synthetic thermosetting compound, 5GM3 quality acc. to DIN VDE 0207/21 developed by TF Kable, Black



FEATURES

Rated Voltage U ₀ /U	300/500V
AC test voltage	2,5 kV

- Current carrying capacity: DIN VDE 0298-4

- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

- Minimum bending radius acc. to DIN VDE 0298-3:

Thickness of flat cable [mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
- Travel speed up to: 180m/min
- Tensile load: 15N/mm²
- Tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2
- Oil resistant: PN-EN 60811-404, IEC 60811-404
- UV resistant: UL 2556, ISO 4892-2

Ozone resistant: PN-ISO 1431-1

Example of standard sheath marking:
TF KABLE 3 TFCrane NGFLGÖU - J
4x25 300/500V CE year + meter

APPLICATIONS

Flexible flat cable designed for mechanical stresses, especially for applications with frequent bending during operation in one plane only. The cable is used on festoon systems and for connecting moveable parts of machine tools, material handling equipment.
For use in wet or dry conditions, outdoors and indoors.

Standard length cable packing 500 m on drums.
Other forms of packing and delivery are available on request

Number of cores x cross+section	Conductor diameter	Min height of flat cable	Max height of flat cable	Min width of flat cable	Max width of flat cable	Approx. weight	Max tensile load
mm ²	mm	mm	mm	mm	mm	kg/km	N
4x10	4	10,4	11,3	31,3	32,8	738	600
4x16	5	12,2	13,0	36,1	37,6	1056	960
4x25	6,1	13,7	14,5	42,3	43,8	1488	1500
4x35	7,3	15,8	16,8	48,8	50,3	2024	2100
4x50	9	18,3	19,3	56,9	59,0	2796	3000

Number of cores x cross+section	Conductor diameter	Min height of flat cable	Max height of flat cable	Min width of flat cable	Max width of flat cable	Approx. weight	Max tensile load
mm ²	mm	mm	mm	mm	mm	kg/km	N
4x70	10,8	20,5	21,5	63,9	66,0	3710	4200
4x95	12,9	23,4	24,5	74,1	76,2	4838	5700
4x120	14	24,2	27,2	79,1	83,2	5986	7200

POWER CONDUCTOR RESISTANCE

Cross-section

Max. conductor resistance at 20°C

Plain wires

mm²

Ω/km

1,5

13,3

2,5

7,98

4

4,95

6

3,3

10

1,91

16

1,21

25

0,78

35

0,554

50

0,386

70

0,272

95

0,206

120

0,161

150

0,129

185

0,106

240

0,0801

300

0,0641

400

0,0486

TFCrane M(StD)HÖU -J/O

Based on: DIN VDE 0250-809

Low Voltage Flat Rubber Flexible Cable with Individually Screened Conductors for Festoon Applications

DESIGN FEATURES

Conductors	Special design ensuring higher flexibility. Annealed flexible stranded bare copper conductor: <ul style="list-style-type: none"> Up to 25 mm² - extra flexible, class 6 acc. to IEC 60228 Above 35 mm² - flexible, class 5 to IEC 60228.
Separator	If needed a suitable tape separator between the conductor and insulation.
Insulation	Special EPDM rubber, halogen-free, lead-free compound, type 3GI3 quality, developed by TF Kable
Circuit identification	Colour coding of power conductors compliant to HD 308, DIN VDE 0293-308 -J version: 3 - core: Green-yellow, blue, brown 4 - core: Green-yellow, brown, black, grey or green-yellow, blue, brown, black 5 - core: Green-yellow, blue, brown black, grey Above 5 cores: Green-yellow, other cores black with white numbering -O version: 3 - core: Brown, black, grey or blue, brown, black 4 - core: Blue, brown, black, grey 5 - core: Blue, brown, black, grey, black Above 5 cores: Black with white numbering
Individual screen	Aluminium/polyester tape under the metallic screen. Spinning of tinned copper wires with a few polyamide yarns in opposite direction. Wrapping with polyester tape. Braiding coverage 85%
Core arrangement	Parallel, for more than 12 cores: parallel bundles
Outer sheath	Special synthetic thermosetting compound, 5GM3 quality acc. to DIN VDE 0207/21 developed by TF Kable, Black



FEATURES

Rated Voltage U ₀ /U	0,6/1 kV
Max. operating voltage U _m	1,2 kV
AC test voltage	3 kV

▪ Current carrying capacity: DIN VDE 0298-4

- Max. conductor operating temperature: +90°C
- Max. conductor temperature during short circuit: +250°C
- Minimum ambient temperature for fixed installation: -40°C
- Minimum ambient temperature for mobile installation: -25°C

▪ Minimum bending radius acc. to DIN VDE 0298-3:

Thickness of flat cable [mm]	>8 ≤ 12	>12 ≤ 20	>20
Fixed installation	3D	4D	4D
On drums	5D	5D	5D
On deflection pulleys	7,5D	7,5D	7,5D
Moving freely	4D	5D	5D

- Roller bending test
- Travel speed up to: 180m/min
- Tensile load: 15N/mm²

Ozone resistant: PN-ISO 1431-1

- Tear, impact and abrasion resistant outer sheath
- Flame propagation: PN-EN 60332-1-2, IEC 60332-1-2
- Oil resistant: PN-EN 60811-404, IEC 60811-404
- UV resistant: UL 2556, ISO 4892-2

Example of standard sheath marking:
TF KABLE 3 TFCrane M(StD)HÖU-J 4x16 0,6/1kV CE
year + meter

APPLICATIONS

Flexible, screened flat cable designed for festoon application, for medium mechanical stresses, in particular for hoisting gear transportation systems, machine tools, for bending in one plane only. For use in wet or dry conditions, outdoors and indoors.

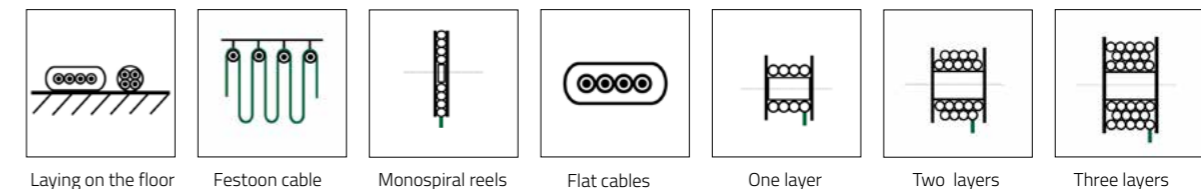
Standard length cable packing	500 m on drums. Other forms of packing and delivery are available on request
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ELECTRICAL PARAMETERS

Number of cores x cross+section mm²	Conductor diameter mm	Min height of flat cable mm	Max height of flat cable mm	Min width of flat cable mm	Max width of flat cable mm	Approx. weight kg/km	Max tensile load N
4x10	4	11,1	12,1	34,7	36,7	891	600
4x16	5	12,3	13,8	38,9	41,5	1237	960
4x25	6,1	12,4	15,5	43	47,1	1629	1500
4x35	7,3	14,6	17	49,8	53,2	2225	2100
4x50	9	17,1	19,8	58	61,6	3048	3000
4x70	10,8	22	24,1	73	77	4494	4200
4x95	12,9	22,7	25,3	76,3	81,9	5391	5700

CURRENT CARRYING CAPACITIES FOR CONTINUOUS OPERATION (VDE 0298-4) AMBIENTE TO AT 30°C (3 CORE CABLES)

Low Voltage cables up to 0,6/1kV and Medium Voltage cables up to 10kV

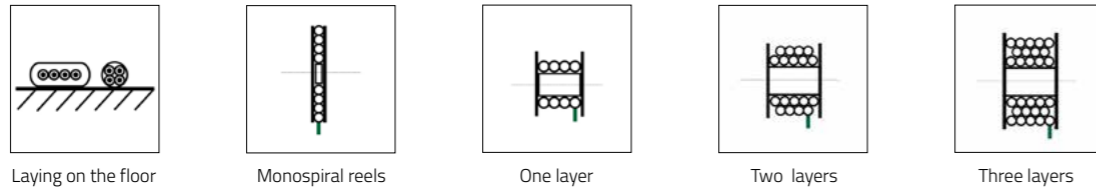


POWER CONDUCTOR RESISTANCE

Cross-section mm²	Max. conductor resistance at 20°C Plain wires Ω/km
1,5	13,3
2,5	7,98
4	4,95
6	3,3
10	1,91
16	1,21
25	0,78
35	0,554
50	0,386
70	0,272
95	0,206
120	0,161
150	0,129
185	0,106
240	0,0801
300	0,0641
400	0,0486

Cross-section mm ²	One cable	Festoon	Monospiral reels	Cylindrical reels							
	Laying on the floor A	Suspended freely in air A	Round cables A	Flat cables A	1 layer A	2 layers A	3 layers A	4 layers A	5 layers A	6 layers A	7 layers A
	(Factor) 1	1,05	0,8	0,49	0,8	0,61	0,49	0,42	0,38	0,27	0,22
1	18	19	14	9	14	11	9	8	7	5	4
1,5	23	24	18	11	18	14	11	10	9	6	5
2,5	30	32	24	15	24	18	15	13	11	8	7
4	41	43	33	20	33	25	20	17	16	11	9
6	53	56	42	26	42	32	26	22	20	14	12
10	74	78	59	36	59	45	36	31	28	20	16
16	99	104	79	49	79	60	49	42	38	27	22
25	131	138	105	64	105	80	64	55	50	35	29
35	162	170	130	79	130	99	79	68	62	44	36
50	202	212	162	99	162	123	99	85	77	55	44
70	250	263	200	123	200	153	123	105	95	68	55
95	301	316	241	147	241	184	147	126	114	81	66
120	352	370	282	172	282	215	172	148	134	95	77
150	404	424	323	198	323	246	198	170	154	109	89
185	461	484	369	226	369	281	226	194	175	124	101
240	540	567	432	265	432	329	265	227	205	146	119
300	620	651	496	304	496	378	304	260	236	167	136

Medium Voltage cables above 10kV



Cross-section mm ²	One cable	Monospiral reels	Cylindrical reels						
	Laying on the floor A	Round cables A	1 layer A	2 layers A	3 layers A	4 layers A	5 layers A	6 layers A	7 layers A
	(Factor) 1	0,8	0,8	0,61	0,49	0,42	0,38	0,27	0,22
16	105	84	84	64	51	44	40	28	23
25	139	111	111	85	68	58	53	38	31
35	172	138	138	105	84	72	65	46	38
50	216	173	173	132	106	91	82	58	48
70	265	212	212	162	130	111	101	72	58
95	319	255	255	195	156	134	121	86	70
120	371	297	297	226	182	156	141	100	82
150	428	342	342	261	210	180	163	116	94
185	488	390	390	298	239	205	185	132	107
240	574	459	459	350	281	241	218	155	126
300	660	528	528	403	323	277	251	178	145

DE-RATING FACTOR FOR AMBIENTE TEMPERATURES OTHER THAN 30°C

Ambiente temperature °C															
10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
1,15	1,12	1,08	1,04	1,0	0,96	0,91	0,87	0,82	0,76	0,71	0,65	0,58	0,50	0,41	0,29

DE-RATING FACTORS FOR GROUPING

Arrangement cables	Number of multi-core cables or number of single or three-phase circuits made up of single-core cables (2 or 3 loaded conductors)															
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	
	De-rating factors															
Bunched directly at the wall, on the floor, in conduit or ducts, on or in the wall																
	1,00	0,80	0,70	0,65	0,60	0,57	0,54	0,52	0,50	0,48	0,45	0,43	0,41	0,39	0,38	
Single layer on the wall or floor, touching																
	1,00	0,85	0,79	0,75	0,73	0,72	0,73	0,71	0,70	0,70	0,70	0,70	0,70	0,70	0,70	
Single layer on the wall or floor, spaced with a clearance of 1 x d (cable diameter)																
	1,00	0,94	0,90	0,90	0,90	0,90	0,90	0,90	0,90	0,90	0,90	0,90	0,90	0,90	0,90	
Single layer under ceiling, touching																
	0,95	0,81	0,72	0,68	0,66	0,64	0,63	0,62	0,61	0,61	0,61	0,61	0,61	0,61	0,61	
Single layer under ceiling, spaced with a clearance of 1 x d (cable diameter)																
	0,95	0,85	0,85	0,85	0,85	0,85	0,85	0,85	0,85	0,85	0,85	0,85	0,85	0,85	0,85	

GUIDE TO USE OF TFCrane CABLES

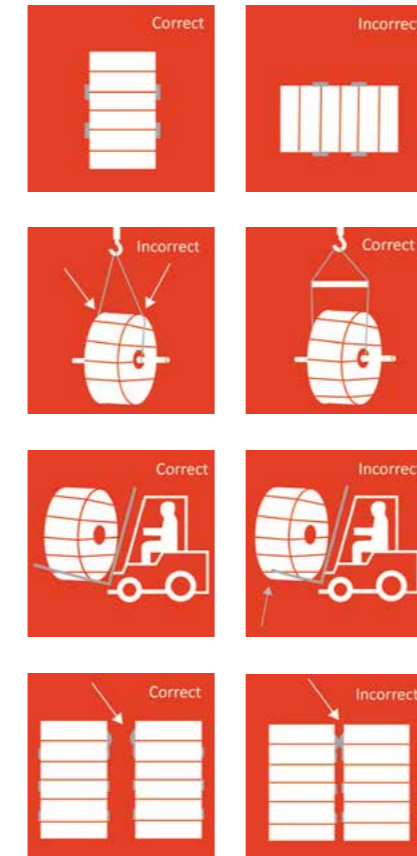
This manual contains information relevant to the handling of cables, including transport, storage, installation and maintenance. However, additional questions may arise, therefore we always encourage you to contact our team.

DE-RATING FACTORS FOR MULTI-CORE CABLES WITH CONDUCTOR CROSS-SECTIONS UP TO 10 mm²

Number of loaded cores	5	7	10	14	19	24	40	61
De-rating factors	0,75	0,65	0,55	0,50	0,45	0,40	0,35	0,30



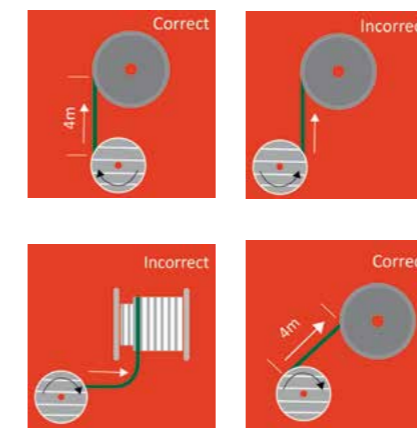
TRANSPORTATION AND STORAGE



Be careful when transporting the drums to avoid damage to the cable or personal injury. Particular attention should be paid to the weight of the drum, as well as to the method and direction of turning and the lifting method. During storage, the drum flanges must not come into contact with the cable on the adjacent drum. If the storage temperature of cables is lower than recommended during installation, they should be protected against such mechanical loads as: shocks, knocks, bending or twisting. If the cable is not fully protected, for example by battens or plastic foil, it must be stored in a place protected from the weather. The ends of the cables should be sealed to prevent moisture penetration during transport and storage.

INSTALLATION AND USE

Cable installation



Generally, when the cable is installed onto a force guidance system through a reel or festoon, the delivery drum should be raised above the ground level. The recommended method of proceeding with installing the cable on site is to lift the delivery drum (original one) and then unwind the cable along its entire route. We perform this task using standard cable pulling tools and rollers. It happens that the environmental conditions do not allow us to perform these actions. Then you need to rewind the cable directly from the drum onto the drum / reel. This operation is also recommended when the location of the drum / reel and / or cable travel route are not available. In this case, „S“ -shaped deflections between the drum and the drum / reel should be avoided. Whenever possible, the cable should be rewound directly without going through or over the rollers and without changing direction. Direct scrolling from the delivery drum to the final drum / reel must be performed slowly and at the minimum tension. Doing so will prevent the cable from twisting during installation. The following instructions show the general rules for unwinding the cable. The correct method of installation should be done by unwinding the cable along the machine using a standard cable pulling system and rollers. If this is not possible due to the existing conditions, then the transfer should be carried out directly to the working drum while avoiding the cable bending and keeping the distance between the drums / reels at least 4m.

Twist removal

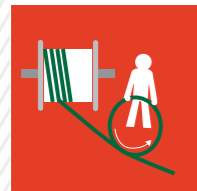
If cable twisting will take place during transport or installation, it is recommended to eliminate it. The methods described below are recommended as the most effective to reduce it.

Wave motion



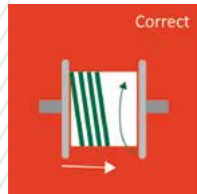
This method requires the involvement of two people who, holding the roller on which the cable is placed, move towards the free end of the cable, thereby shifting the „wave“ of the turn. This operation should be performed until the effect of turning is completely removed.

Spiral method



Removal of a twist by this method is performed by one person. To do this, create a spiral from the cable wound on the drum and roll / unscrew it to the free end of the cable. Depending on the turn, rolling / unscrewing should be done to the right or left. Repeat these steps if the turn has not been eliminated after the first attempt.

Cable installation on cylindrical reels



Crane cables of the TFCrane series may be produced in a left, or right-hand direction, therefore we recommend to contact with TFK engineers to determine the direct way of winding. This will allow you to take advantage of the natural tendency of the cable to move to the left/right when it is rewound and keep the scrolls close to each other.

Reducing the friction



For cables with a larger diameter it is recommended to use rollers that will reduce the friction of the coating during the change of the scrolling direction.

Reels

Attention should be paid to the disadvantage of using the guide rollers which is the negative effect on the outer coating of the cable that is in contact with the roll profile. The contact surface is additionally increased if the rim profile has a hollow shape (basin). This is important because it significantly reduces the lifespan of the cable, therefore it is recommended to use a flat roller as shown in the graphics below.

Invalid roll profile.

In this case, the twisting effect is induced as a result of rolling the cable over the roll, which leads to its faster wear.



The correct roll profile.

The construction used in this way minimizes the twisting effect.



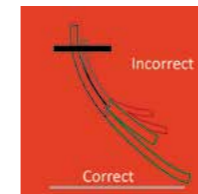
Change of direction

At the stage of designing the cable winding system, appropriate distances should be assumed due to the change of the winding direction. The recommended distance should be equivalent to at least 20 times the cable diameter (or larger at high speed systems). This approach will allow the cable to recover its initial shape before the next rewinding.

Cable guides

The next step after determining the winding system is the selection of cable guides. Their incorrect selection may lead to incorrect operation of the winding system. Among the available solutions, the best in use are guides that ensure large bending radii with minimal deflection of the cable. The arrangement of the guides should be in one axis with the cable tray. Any misalignment will lead to increased twisting of the cable.

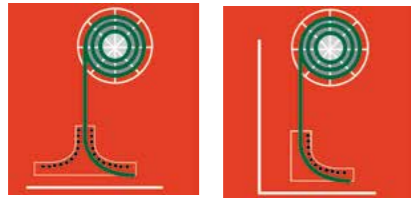
Cable feeding point



The one-way guides are often used even for two-directional feeders for purely economic reasons. However, due to the significant extension of the cable life cycle, a better solution is to use two-way guides: in fact, the twisting and „massage“ effects transmitted by the cable guide are balanced using a symmetrical two-directional guide. The problem does not occur if the winding system is installed at the end. In this case, the one-way guide makes contact with the cable regardless of the direction of machine movement. The preferred solution is the use of two-directional guides or a multi-roll system. These solutions should be designed to hold the curve beyond the angle of deflection. In this way, the minimum bending radii are always maintained. It is also necessary to avoid sudden changes in the bending radius (this is often due to the insufficiently wide angle of the arc of the roller guide). These changes lead to local pressure and as a result to possible cable breakage.

Cable feeding point

The cable should be fed at the center point above the cable guide, regardless of one or two-way guidance.



Protection against too high or too low stress

It is strongly recommended that cable guiding systems include protective devices against both excessive and too low stress. Even short-term exposure to excessive stress caused by mechanical failure or accidents may cause the cable to stop working due to permanent deformation of the cores or break off. At the same time, the other way around it is desirable that the stresses are not too small so that the cable does not hang freely on the drum / reel. This protection is particularly important for high positioned cable drums / reels. All overload and underload protection devices should be set for maximum continuous safe operation at the working stresses defined for each section of the cable.

Cable mesh grip

Optimal strain relief for the cable at the feed point. Safe and easy to use, where forces are spread over a larger surface to prevent damage to the cable.



Cable reels/Drum types

Cable durability and efficiency is closely related to a properly designed winding system. A well-designed system together with a properly selected cable ensures optimal efficiency of the entire system, guaranteeing continuity of work and increased life and reliability. Today's market offers a wide range of winding systems, which are briefly described below.

Monospiral reel

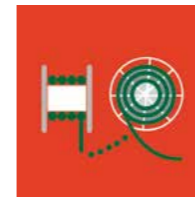
In the case of this type of cable drums, due to the better heat dissipation, the cross section of the power cable is generally smaller compared to other types of drums. The diameter and length of the cable are the main factors to consider when using monospiral drums: a well-saved balance between the inside and outside diameter of the reel / drum allows you to optimize and better control the cable tension.



Cylindrical drum

This solution is especially recommended for cables with large lengths and diameters. Its biggest advantage is the ability to drag a large amount of cable (with increased diameter) over long distances with constant tension.

It is important that the guide mechanism does not damage the cable during unrolling, for example, to prevent unusual friction against the surface of the spiral or irregular twist. It is recommended to use a maximum of two layers to allow thermal balance.



Standard drum

It is the simplest and cheapest solution, but it does not guarantee full control over the cable layers and does not ensure proper operation at high speeds. There may be situations in which the cable is wound unevenly or only on one side, which can cause serious operational difficulties. This solution can only be recommended for cables with small diameters keeping in mind the mentioned work speed.





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