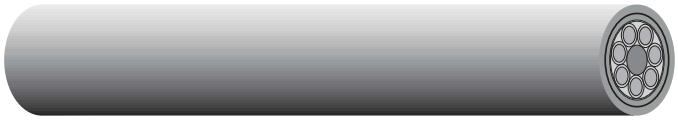
AKAPP-STEMMANN
Member of the Fandstan Electric Group

Flexible with energy!

Special cables



A comprehensive program high flexible cables for a wide variety of applications, such as:

- hand, spring and motor driven reels;
- cable chains;
- festooning;
- extremely high or low temperatures;
- under water

There's a perfect cable for every application! Please contact us for more info.

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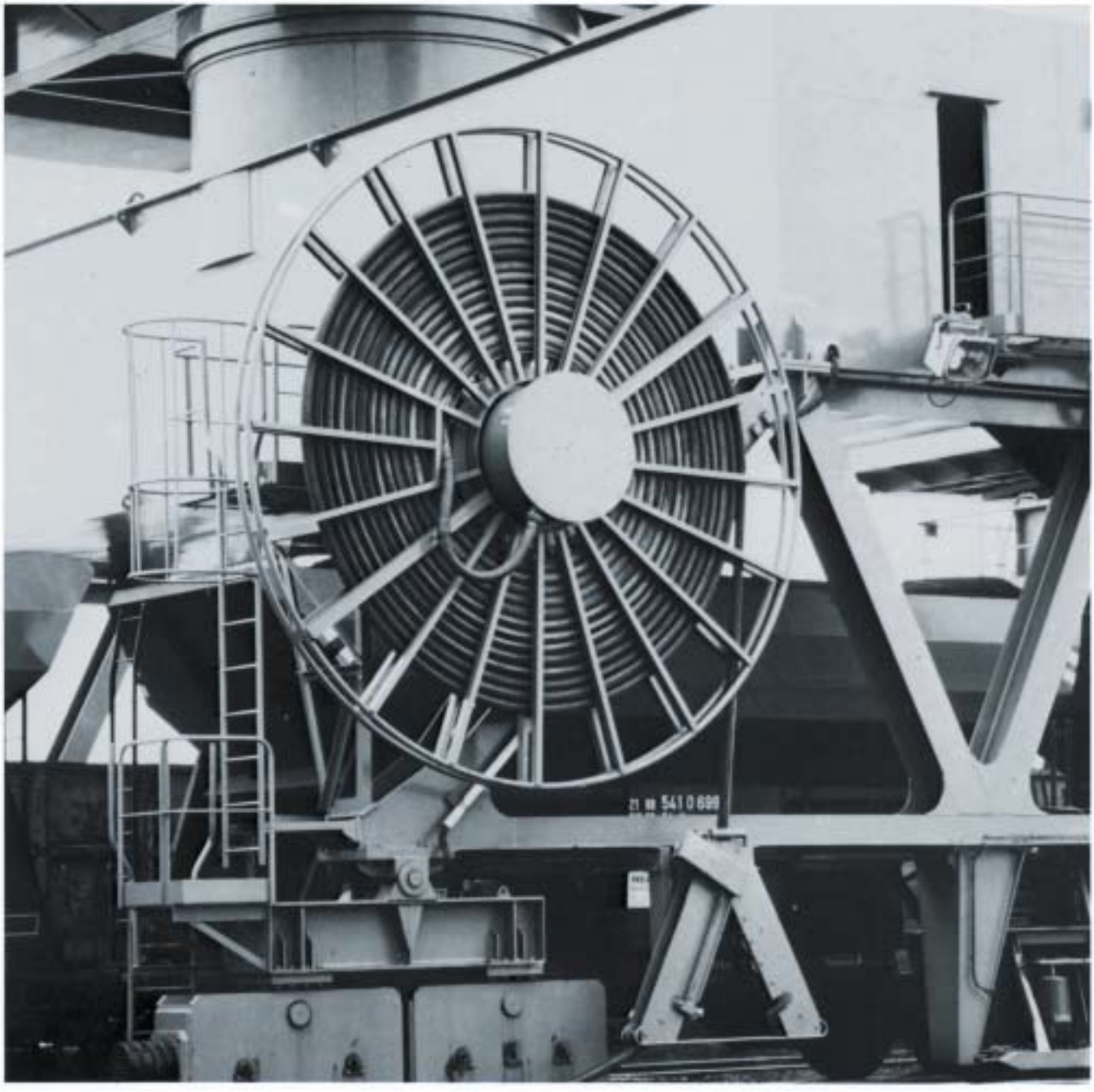
1 Finely stranded copper conductor
2 Core insulation
3 Filler
4 Foil
5 Textile tape
6 Spinned textile
7 Chloroprene inner sheath
8 wide-mesch textile braiding vulcanized bound
9 Chloroprene outer Sheath



Notes on reeling cables and trailing cables 1 kV - 20 kV

The development in the field of movable insulated wire carriers like motor-driven reels and cable trailers is an ongoing process. In view of this process, we would like to provide the following information:

The cost pressure forces ever greater handling speeds in the area of cranes and hoists, especially for container cranes. Travelling speeds of 180 m/min are standard today, but we deliver more and more cables which are moved at 210 up to 240m/min with enormous acceleration and deceleration. These demanding requirements are in many cases intensified by tensile loads and torsional strains which produce even more challenging operating conditions.

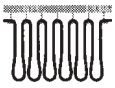
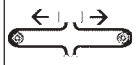
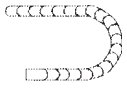
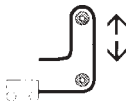
Moreover, extended guarantees are often demanded for large-scale projects.

Although we are able to supply almost 90% of all applications, even the most demanding, with our different types of NSHTÖU-TROMMELFLEX K and VS resp. SM, we want to draw your attention to some technical details. The use of most advanced core and sheath materials like Hypalon or Polyurethane as well as the use of extremely robust Kevlar for braiding or the suspension elements enables performance which far surpasses the minimum values specified by VDE.

Please contact us if you have special requirements in the area of reeling cables for example with different cross-sections combined, screened cores or combinations with fibre optics.

We will find the solution for your problem and realise our solution in lots as small as 150 m to 250 m (depending on the dimensions and cable qualities). For this we fall back on a wide-ranging experience. That sets us apart from other suppliers of reeling and trailing cables and make us one of the leading companies on almost every market world-wide.

Range of use

Cable guidance systems	Reel						
Stress	simple	high	extreme				
NSHTÖU-TROMMELFLEX (K)	++	+	❍	++	❍	+	-
TROMMELFLEX PUR-H	+	++	++	+	++	+	++
NSHTÖU-Cordaflex (K)	++	++	-	+	-	+	-
NSHTÖU-Cordaflex (SM)	-	+	++	-	++	-	++

++ primary application
+ suitable
❍ partly suitable - after consultation
- not suitable

Please note that our PVC and Polychloroprene flatform cables as well as our trailing chain cables are suitable for some applications of the table above. Further details are given in

Chapter 2 - Flatform cables

Chapter 6 - High flexibility control cables.

Should you have any question regarding the range of use or if you have a borderline application, please be sure to contact us. Should you have any questions concerning the use of trailing cables and cables suitable for baskets - we are at your disposal at any time.

TROMMELFLEX **PUR**-H
reeling cable made of halogen-free polyurethane

Construction		1 fine wire copper conductors 2 core insolation made of Polyester compound 3 Polyurethane inner sheath 4 open anti-torsion braiding 5 Polyurethane outer sheath
Application	In comparison with NSHTÖU cables the type TROMMELFLEX PUR-H has **substantially reduced outer diameters and weights**. Because of that the user can make considerable savings by using smaller motor drives and reels. Space can be saved because of the smaller bending radii from the reduced outer diameters. The reduced weights lead to savings in freight charges.	Used as a reeling cable for heavy duty units such as cable reels, hoisting equipment, conveyor systems, mobile motors, rail traction motors and agricultural machinery at high and extraordinary stresses. Can be used in dry, damp and wet rooms and in the open.
Technical data	Cores made of fine wire conductors with reference to VDE 0295 class 5 stranded around a central textile suspension unit with a short length of twist. Anti-torsion braid embedded in between the inner and outer sheath. Insolation based on **halogen-free** Polyester, inner and outer sheath made of **halogen-free** Polyurethane. Core colours according to DIN VDE 0293. Colour of sheath: black, other colours on request.	Max. temperature at the conductor: in operation: + 80 °C. in case of short circuit: + 250 °C Max. temperature at surface: fixed installation: -50 to + 80 °C flexible: -40 to + 80 °C
Minimum bending radius	6 x d	
Tensile strength	see table below	
Voltages	Rated voltage	Vo/V = 0.6/1 kV
	Test voltage	2.5 kV, 50 Hz
	For assembly notes see Ch. 14	

Selection and order data	No. of conductors and nominal cross-section mm2	Order No.	Outer diameter min. mm	Outer diameter max. mm	Net weight per 100 m approx. kg	Tensile strenght N	Copper weight per 100 m approx. kg
TROMMELFLEX **PUR**-H	**4 x 1.5**		9.9	11.1	15.5	1.200	5.8
	5 x 1.5		10.6	11.8	17.8	1.500	8.1
	7 x 1.5		11.9	13.3	23.1	2.000	11.5
	12 x 1.5		15.3	16.9	35.9	2.500	19.6
	18 x 1.5		16.1	17.9	47.4	2.500	27.1
	24 x 1.5		20.4	22.6	59.0	2.500	39.2
	30 x 1.5		21.8	24.2	71.0	2.500	45.0
	42 x 1.5		25.7	28.5	98.0	2.500	63.3
	4 x 2.5		10.9	12.1	20.8	1.500	9.9
	5 x 2.5		11.6	12.8	24.1	1.800	12.5
	7 x 2.5		12.6	14.0	30.8	2.500	18.0
	12 x 2.5		19.6	20.2	48.0	2.500	30.8
	18 x 2.5		18.5	20.5	67.9	2.500	45.1
	24 x 2.5		23.1	25.5	82.0	2.500	61.6
	30 x 2.5		25.9	28.7	97.0	2.500	77.1
	4 x 4		12.0	13.4	28.1	1.800	16.0
	4 x 6		13.2	14.8	37.2	2.000	24.1
	4 x 10		17.0	18.8	61.1	2.000	40.4
	4 x 16		21.2	23.4	92.4	2.500	64.5
	4 x 25		24.5	27.1	127.0	2.500	100.5
	4 x 35		26.9	29.7	172.0	2.500	141.7
	4 x 50		31.9	35.1	263.0	3.000	202.4
	4 x 70		37.8	41.8	332.6	4.200	283.3
	4 x 95		44.4	49.2	469.5	5.700	384.5
	4 x 120		49.3	54.3	556.5	7.200	485.7
	4 x 150		53.5	58.9	693.3	9.000	601.1
	5 x 4		13.1	14.5	31.8	2.000	20.0
	5 x 6		14.5	16.1	42.6	2.500	31.7
	5 x 10		18.5	20.5	70.4	2.500	52.8
	5 x 16		23.0	25.6	106.7	2.500	84.4
	25 x 1.5 + 5 x 1.5 (c)		22.2	24.6	73.0	2.500	63.5
	19 x 2.5 + 5 x 1.5 (c)		23.0	25.6	82.0	2.500	53.6

Other constructions on request

Applications	In dry, damp and wet rooms as well as in outdoor areas as reelable cable for hoisting equipment, handling and transport systems, for heavy mechanical strains.	E.g. motor cable reels with deflector with travel speeds of up to 120 m/min.
Technical data	Constructed according to DIN 0250 Part 814, with particularly fine-wire conductors acc. to DIN VDE 0295 class 5, short strand twist and textile weave vulcanised between sheaths. The insulation is equivalent to rubber compound 3GI3 acc. to DIN VDE 0207 Part 20.	The sheaths are equivalent to rubber compound 5GM3 acc. to DIN VDE 0207 Part 21 and are oil-resistant and flame-retardant. Max. permissible operating temperature at conductor: + 90 °C. Ambient temperature range: -25 °C (flexible) resp. -40 °C (fixed) to +80 °C.
Minimum bending radii	VDE 0298 Part 3 applies for the use on hoisting equipment, VDE 0168 applies for installations in open-cast mines and quarries and comparable operations.	In the case of installations which are not governed by these regulations, the values given therein are to be applied analogously.
Sustained tensile loads	In accordance with VDE 0298 Part 3, the sustained tensile load on the conductors is not to exceed 20 N/mm2 with reference to the overall copper cross-section of the outer conductors.	The tensile strains of dynamic processes (accelerating, stopping, overrunning the feed point) are to be taken into consideration.
Voltages	Rated voltage:	Vo/V = 0.6/1 kV
	Maximum permissible operating voltages for three-phase and single-phase alternating current installations	Vo/V = 0.69/1.2 kV
	Direct current installations	Vo/V = 0.9 /1.8 kV
	Test voltage AC	2,5 kV
	See Chapter 14 for installation recommendations	

Selection and order data	No. of conductors and nominal cross-section mm2	Order No.	No. of strands x diameter of single strand (approx.) mm	Outer dimension min. mm	Outer dimension max. mm	Net weight per 100 m approx. kg	Copper weight 100 m approx. kg
NSHTÖU-TROMMELFLEX (K)	**4 x 1.5**		44 x 0.20	12.4	13.9	23.5	5.8
	5 x 1.5			13.3	14.8	27.6	8.1
	7 x 1.5			16.5	18.5	41.4	11.5
	12 x 1.5			20.2	22.2	59.6	19.6
	18 x 1.5			23.0	25.0	80.1	27.1
	24 x 1.5			25.5	28.5	102.4	39.2
	30 x 1.5			28.2	31.2	122.9	45.0
	42 x 1.5			33.4	36.4	173.3	63.3
	4 x 2.5		73 x 0.20	15.2	17.2	36.8	9.9
	5 x 2.5			16.3	18.3	42.7	12.5
	7 x 2.5			18.7	20.7	57.8	18.0
	8 x 2.5				24.5	70.0	19.2
	12 x 2.5			23.0	25.0	82.8	30.8
	18 x 2.5			26.8	29.8	119.5	45.1
	24 x 2.5			30.0	33.0	156.7	61.6
	30 x 2.5			33.2	36.2	186.0	77.1
	42 x 2.5*						
	4 x 4		77 x 0.25	17.1	19.1	55.2	16.0
	4 x 6		112 x 0.25	18.4	20.4	59.1	24.1
	4 x 10		196 x 0.25	23.7	25.7	97.4	40.4
	4 x 16		217 x 0.30	27.3	30.3	138.8	64.5
	4 x 25		329 x 0.30	33.2	36.2	202.7	100.5
	4 x 35		475 x 0.30	35.8	38.8	256.9	141.7
	4 x 50		684 x 0.30	43.0	46.0	359.4	202.4
	4 x 70		551 x 0.40	46.7	49.7	463.7	283.3
	4 x 95		703 x 0.40	54.1	58.1	646.8	384.5
	4 x 120		912 x 0.40	60.6	64.6	799.1	485.7
	4 x 150		1121 x 0.40	65.9	69.9	970.7	601.1
	4 x 185*						
	5 x 4		77 x 0.25	18.3	20.3	61.5	20.0
	5 x 6		112 x 0.25	20.8	22.8	75.3	31.7
	5 x 10		196 x 0.25	25.3	28.3	118.9	52.8
	5 x 16		217 x 0.30	29.7	32.7	166.7	84.4
	8 x 4		77 x 0.25		27.0	100.0	30.0
	25 x 1.5 + **5 x 1.5 (c)**		44 x 0.25	36.2	39.2	197.9	63.5
	19 x 2.5 + **5 x 1.5 (c)**		73 x 0.20	30.2	33.2	159.0	53.6
(N) SHTÖU-TROMMELFLEX (K)	**3 x 2 x 1.5***					36.4	8.6
	3 x (2 x 1.5) (c)*					72.0	27.8
	6 x (2 x 1.5) (c)*					127.0	34.5

* Not routinely stocked. Please inquire as needed!

We can also produce NSHTÖU cables in custom dimensions with three-part earth conductors, mixed conductor cross-sections and a variety of copper screenings as well as with integrated light waveguide elements. The minimum order quantities depend on the cable dimensions, but are very low in relation to the usual requirements of this market. In some cases we can also use stock types for custom dimensions. In addition, we can provide reelable polyurethane cables as custom-made merchandise.

Applications	In dry, damp and wet rooms as well as in outdoor areas as reelable cable for heavy mechanical strains, e.g. cable reels with deflector with travel speeds of up to 120 m/min.	However, not suitable for vertical pull-off. For vertical applications, we recommend our cable types NSHTÖU TROMMELFLEX (K) and, for extreme mechanical strains, NSHTÖU CORDAFLEX (SM).
Technical data	Constructed according to DIN 0250 Part 814, with particularly fine-wire conductors, short strand twist and textile weave vulcanised between sheaths.	Max. permissible operating temperature at conductor: + 90 °C. Ambient temperature range: -30 °C to +50 °C.
Minimum bending radii	According to VDE 0298 Part 3, table 2.	
Sustained tensile loads	The sustained static tensile load on the conductors is not to exceed 20 N/mm2 with reference to the overall copper cross-section of the outer conductors.	The tensile strains of dynamic processes (accelerating, stopping, overrunning the feed point) are to be taken into consideration.
Current-carrying capacity:	According to VDE 0100 or other regulations. See also “Technical Tables”, Ch. 14.	
Voltages	Rated voltage:	Vo/V = 0.6/1 kV
	Maximum permissible operating voltages for three-phase and single-phase alternating current installations Direct current installations	Vo/V = 0.69/1.2 kV Vo/V = 0.9 /1.8 kV
	Test voltage AC	2,5 kV

See Chapter 14 for installation recommendations

Selection and order data	No. of conductors and nominal cross-section mm2	Order No.	No. of strands x diameter of single strand (approx.) mm	Outer dimension min. mm	Outer dimension max. mm	Net weight per 100 m approx. kg	Copper weight 100 m approx. kg
CORDAFLEX (K) NSHTÖU-J power cables, four cores	**4 x 4**		77 x 0.25	18.1	20.1	49.0	15.4
	4 x 6		114 x 0.25	19.7	21.7	61.0	23.0
	4 x 10		198 x 0.25	24.0	26.0	94.0	38.4
	4 x 16		217 x 0.30	27.5	30.5	132.0	61.4
	4 x 25		342 x 0.30	33.4	36.4	195.0	96.0
	4 x 35		478 x 0.30	36.4	39.4	253.0	141.1
	4 x 50		508 x 0.35	42.9	45.9	350.0	192.0
	4 x 70		717 x 0.35	47.5	50.5	455.0	268.8
	4 x 95		768 x 0.39	55.1	59.1	608.0	364.8
	4 x 120		981 x 0.39	60.6	64.6	760.0	460.8
	4 x 150*		1221 x 0.39	65.7	69.7	910.0	576.0
	4 x 185*		1484 x 0.39	73.1	77.1	1113.0	710.4
NSHTÖU-J power cables, three cores/three-part earth conductor	**3 x 50 + 3 x 25/3**		508/169 x 0.35/0.25	39.2	42.2	305.0	168.0
	3 x 70 + 3 x 35/3		717/168 x 0.35/0.30	43.3	46.3	396.0	235.2
	3 x 95 + 3 x 50/3*		768/342 x 0.39/0.30	50.5	53.5	533.0	321.6
	3 x 120 + 3 x 70/3*		981/451 x 0.39/0.30	53.8	57.5	645.0	412.8
	3 x 150 + 3 x 70/3*		1221/451 x 0.39/0.30	58.0	62.0	756.0	499.2
	3 x 185 + 3 x 95/3*		1484/481 x 0.39/0.35	64.8	68.8	939.0	624.0
	3 x 240 + 3 x 120/3*		1971/520 x 0.39/0.35	73.7	77.7	1227.0	806.4
NSHTÖU-J control cables,	**4 x 1.5**		46 x 0.20	12.7	14.3	23.5	5.8
	5 x 1.5			13.7	15.3	27.6	7.2
	7 x 1.5			17.1	19.1	45.0	10.1
	8 x 1.5*			18.2	20.2	51.0	11.5
	12 x 1.5			20.3	22.3	65.0	17.3
	18 x 1.5			23.3	25.3	86.5	25.9
	20 x 1.5*			24.4	26.4	94.5	28.8
	24 x 1.5			26.4	29.4	112.0	34.6
	30 x 1.5			28.5	31.5	132.0	43.2
	36 x 1.5*			30.6	33.6	152.0	51.8
	44 x 1.5*			35.8	38.8	192.0	63.4
	4 x 2.5		76 x 0.20	15.2	17.2	35.0	9.6
	5 x 2.5			16.4	18.4	41.0	12.0
	7 x 2.5			19.2	21.2	60.0	16.8
	12 x 2.5			22.8	24.8	86.0	28.8
	18 x 2.5			27.2	30.2	124.0	43.2
	24 x 2.5			31.0	34.0	161.0	57.6
	30 x 2.5			32.4	35.4	181.0	72.0
	36 x 2.5			36.3	39.3	223.0	86.4
	44 x 2.5			41.6	44.6	283.0	105.6
	51 x 2.5*			44.2	47.2	323.0	122.4
	54 x 2.5*			45.6	48.6	343.0	129.6
(N) SHTÖU-O screened cables, single-core-screening	**12 x 1 (c)**		57 x 0.15	23.2	25.2	81.5	23.9
	18 x 1 (c)			27.6	30.6	99.0	34.6
	24 x 1 (c)			31.7	34.7	152.0	47.8
	30x 1 (c)*			34.4	37.4	180.0	58.5
	36 x 1 (c)*			36.3	39.3	195.0	71.7
	4 x 1.5 (c)*		46 x 0.20	14.6	16.6	32.0	10.8
(N) SHTÖU-O screened cables, paired-core-screening	**3 x (2 x 1) C**		57 x 0.15	22.3	24.3	66.5	21.4
	6 x (2 x 1) C			29.8	32.8	134.0	42.7
	9 x (2 x 1) C			37.6	40.5	202.0	64.1
	12 x (2 x 1) C*			38.8	41.8	205.0	85.5

* Please inquire for minimum order quantity.

Applications	In dry, damp and wet rooms as well as in outdoor areas as reelable cable for heavy mechanical strains, e.g. cable reels with deflector with travel speeds of up to 120 m/min.	However, not suitable for vertical pull-off. For vertical applications, we recommend our cable types NSHTÖU TROMMELFLEX (K) and, for extreme mechanical strains, NSHTÖU CORDAFLEX (SM).
Technical data	Constructed according to DIN 0250 Part 814, with particularly fine-wire conductors, short strand twist and textile weave vulcanised between sheaths.	Max. permissible operating temperature at conductor: + 90 °C. Ambient temperature range: -30 °C to +50 °C.
Minimum bending radii	According to VDE 0298 Part 3, table 2.	
Sustained tensile loads	The sustained static tensile load on the conductors is not to exceed 20 N/mm2 with reference to the overall copper cross-section of the outer conductors.	The tensile strains of dynamic processes (accelerating, stopping, overrunning the feed point) are to be taken into consideration.
Current-carrying capacity:	According to VDE 0100 or other regulations. See also “Technical Tables”, Ch. 14.	
Voltages	Rated voltage:	Vo/V = 0.6/1 kV
	Maximum permissible operating voltages for three-phase and single-phase alternating current installations Direct current installations	Vo/V = 0.69/1.2 kV Vo/V = 0.9 /1.8 kV
	Test voltage AC	2,5 kV
	See Chapter 14 for installation recommendations	

Selection and order data	No. of conductors and nominal cross-section mm2	Order No.	No. of strands x diameter of single strand (approx.) mm	Outer dimension min. mm	Outer dimension max. mm	Net weight per 100 m approx. kg	Copper weight 100 m approx. kg
(N)SHTÖU-J combined cables fconductors unscreened and screened	**12 x 2.5 + 4 x 1 (c)***		76/57 x 0.20/0.15	25.1	28.1	105.0	36.7
	12 x 2.5 + 12 x 1 (c)*			31.3	34.3	156.0	52.7
	18 x 2.5 + 18 x 1 (c)*			36.8	39.8	216.0	79.1
	19 x 2.5 + 5 x 1 (c)			31.3	34.3	160.0	55.6
	20 x 2.5 + 10 x 1 (c)*			32.6	35.6	177.0	67.9
	24 x 2.5 + 20 x 1 (c)*			42.3	45.3	278.0	97.4
	25 x 2.5 + 5 x 1 (c)			34.0	37.0	208.0	70.0
	26 x 2.5 + 10 x 1 (c)*			36.5	39.5	215.0	82.3
	30 x 2.5 + 6 x 1 (c)*			36.5	39.5	221.0	85.2
	34 x 2.5 + 10 x 1 (c)*			42.2	45.2	280.0	113.4
	40 x 2.5 + 6 x 1 (c)*			43.1	46.1	298.0	107.9
	7 x 1.5 + 7 x (2 x 1.5) C*		46/46 x 0.20/0.20	34.4	37.4	169.0	62.5
	16 x 2.5 + 4 x (2 x 1) C*		76/57 x 0.20/0.15	32.4	35.4	169.0	46.5
NSHTÖU-J combined	**14 x 2.5 + 16 x 1(c)***		76/57 x 0.20/0.15	34.5	37.5	188.0	65.5
	16 x 2.5 + 2 x 1(c)*			26.2	29.2	117.0	44.0
	16 x 2.5 + 8 x 1(c)*			31.3	34.3	159.0	54.4
	4 x 2.5 + 6 x (2 x 1) C*		46/57 x 0.20/0.15	29.8	32.0	128.0	48.6

* Please inquire for minimum order quantity.

Reelable rubber cables

Installation notes for cables on mobile cable supports

1. **Inspect the cable supports:** for proper movement, no skewing over the travel distance; easy running of the deflection pulleys; the groove width of the deflection pulleys must be at least 12 % greater than the cable diameter.
2. Move the shipping reel to the deployment site using a cable trolley or truck. Roll the reel only in exceptional situations. Roll the reel in the direction of the arrow printed on the reel.
3. Wind the deployment lengths on the installation reel twist-free. Do **not** pull off the cable over the reel flange, **use a winding apparatus.**

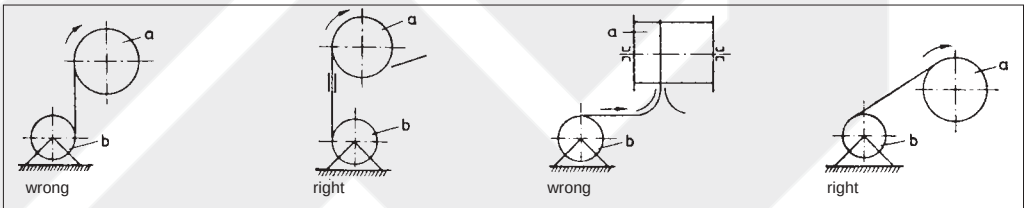
   Observe the bending diameter when performing this task. For cables of up to 21.5 mm in diameter, bending diameter = 10 x cable diameter. For cables greater than 21.5 mm in diameter, bending diameter = 12.5 x cable diameter (VDE 0100).
4. **Do not pull off the cable onto the installation in a loose coil or stretched.**

   Mount the installation reel on the installation at the end of the cable support so that the cable can be pulled off from the top of the reel. The reel should always be at the opposite end from the side to be installed.
5. Install the new cable either using a pulling rope or the cable to be removed (connect them using a cable stocking) over the top of the cable support and position the deflecting pulley at the bottom attachment point on the cable support. **Make sure that the cable cannot become twisted or kinked.**
6. Adjust the cable so that it hangs loosely in the middle position of the cable support.
7. Where possible, move the device along its path several times slowly before fixing the cables in place and then attach them using broad clamps – **avoid oval pinching**.
8. Lay each length individually.

Trailing cables and reelable rubber cables

Installation notes for reelable cables

1. Move the shipping reel to the deployment site using a cable trolley or truck. Roll the reel only in exceptional situations. Roll the reel in the direction of the arrow printed on the reel.
2. Where possible, before laying on the working reel, lay out the cable at full length, using cable-laying rollers when feasible. Pull off the cable only from the top.
3. If there is not enough space to lay out the cable in full length, proceed as follows: Position the supply reel and the equipment reel as far apart as possible. Pull the cable off the supply reel only from the top. When transferring, do not allow the cable to lie in an S-shape or fall in a different plane (see illustration).
4. For ready-made cables, first attach the termination to the equipment reel (slip-ring body) twist-free, clamp on the cable, wind it onto the equipment reel and then connect it twist-free to the power feed and attach it.
   Do not allow the terminations to drag over the floor.
5. Where the cables are supplied without terminations, attach the terminations after winding.
6. At least two cable turns should remain on the equipment reel when the device is fully extended.
7. If the power feed is:
   a) underground in the middle of the track, wrap one or two cable turns around an equalising ring behind the entry funnel. Then clamp down and connect the cable.
   b) above-ground at the end of the track, the cable section off the reel should be at least 40 times the cable diameter in front of the mounting clamp at the feed point when the installation is in its end position, or wrap one or two cable turns around an equalising ring and then clamp down and connect the cable.
8. Protect the cable from external damage during mounting and operation.



Transferring cable to the working reel (a) from the supply reel (b)

Minimum permissible bending radii

Cable type	Rated voltage up to 0.6/1 kV				Rated voltage over 0.6/1 kV
Cables for fixed installation	Outer diameter of cable or thickness of flatform cable in mm up to 10	10 to 25	over 25		
Fixed installation	4 d	4 d	4 d		6 d
only once mounted and connected	1 d	2 d	3 d		4 d
Flexible cables	Outer diameter of cable or thickness of flatform cable in mm up to 8	8 to 12	12 to 20	over 20	
For fixed installation	3 d	3 d	4 d	4 d	6 d
For free movement	3 d	4 d	5 d	5 d	10 d
For entry	3 d	4 d	5 d	5 d	10 d
For forced guiding 1) and reel operation	5 d	5 d	5 d	6 d	12 d
For use on cable trolleys	3 d	4 d	5 d	5 d	10 d
For use with draglines	4 d	4 d	5 d	5 d	10 d
Pulley deflection	7.5 d	7.5 d	7.5 d	7.5 d	15 d

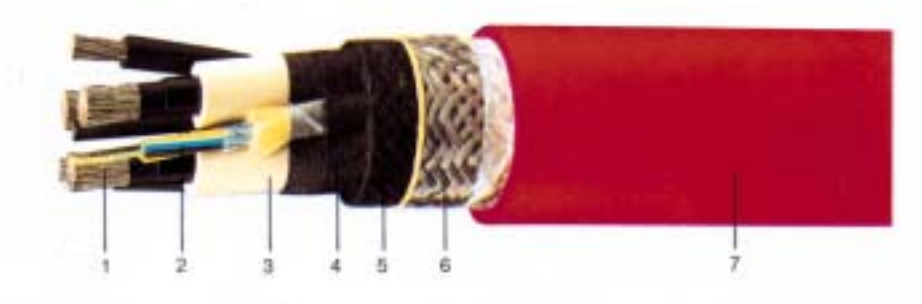
Remarks: d = outer diameter of cable or thickness of flatform cable. For cable types which are suitable for several different types of use, you may need to consult the manufacturer.
1) The suitability for this type of operation must be ensured by means of special design features.

Applications	In dry, damp and wet rooms as well as in outdoor areas for heavy mechanical strains, e.g. in vertical pull-off (spreaders,	hoisting magnets) on mobile cable supports or similar installations with travel speeds of up to 120 m/min.
Technical data	Constructed according to DIN 0250 Part 814, with particularly fine-wire conductors, short strand twist and textile weave vulcanised between sheaths.	Max. permissible operating temperature at conductor: + 90 °C Ambient temperature range: -25 °C to +60 °C.
Minimum bending radii	According to VDE 0298 Part 3, table 2.	
Sustained tensile loads	The static tensile load is not to exceed 30 N/mm2 with reference to the overall copper cross-section of the conductors.	The tensile strains of dynamic processes (accelerating, stopping, overrunning the feed point) are to be taken into consideration.
Current-carrying capacity:	According to VDE 0100 or other regulations. See also “Technical Tables”, Ch. 14.	
Voltages	Rated voltage:	Vo/V = 0.6/1 kV
	Maximum permissible operating voltages for three-phase and single-phase alternating current installations Direct current installations	 Vo/V = 0.69/1.2 kV Vo/V = 0.9 /1.8 kV
	Test voltage AC	2,5 kV
	See Chapter 14 for installation recommendations	

Selection and order data	No. of conductors and nominal cross-section mm2	Order No.	No. of strands x diameter of single strand (approx.) mm	Outer dimension min. mm	Outer dimension max. mm	Net weight per 100 m approx. kg	Copper weight 100 m approx. kg	
NSHTÖU-J power cables	**4 x 4**		79 x 0.25	19.0	21.0	56.5	16.1	
	4 x 6		119 x 0.25	20.4	21.4	69.5	24.2	
	4 x 10		205 x 0.25	24.7	27.7	107.0	42.4	
	4 x 16		224 x 0.30	28.5	31.5	149.0	64.5	
	4 x 25		361 x 0.30	34.8	37.8	227.0	106.8	
	4 x 35		494 x 0.30	37.8	40.8	282.0	148.6	
	4 x 50		522 x 0.35	44.6	47.6	394.0	212.9	
NSHTÖU-J control cables	**46 x 1**		60x 0.15	36.0	39.0	190.0	55.9	
	4 x 1.5		47 x 0.20	12.7	14.3	21.8	6.0	
	7 x 1.5			18.3	20.3	50.0	10.6	
	12 x 1.5			24.5	27.5	88.0	18.2	
	18 x 1.5			24.4	26.4	92.0	27.2	
	24 x 1.5			27.6	30.6	119.0	36.3	
	30 x 1.5*			31.0	33.8	150.0	45.4	
	7 x 2.5		78 x 0.20	20.5	22.5	65.0	17.6	
	12 x 2.5			27.8	30.8	118.0	30.2	
	18 x 2.5			28.4	31.4	132.0	45.4	
	24 x 2.5			32.4	35.4	171.0	60.5	
	30 x 2.5			38.0	41.0	227.0	75.6	
	36 x 2.5			37.5	40.5	233.0	90.7	
	44 x 2.5			43.1	46.1	298.0	110.9	
NSHTÖU-J cables with suspension strand	**46 x 1**		60 x 0.15	36.3	39.3	190.0	56.7	max. permissible tensile force 2600 N
	12 x 2.5*		78 x 0.20	27.8	30.8	113.0	33.9	2600 N
	18 x 2.5*			28.7	31.7	132.0	45.4	2050 N
	24 x 2.5			32.7	35.7	169.0	67.8	3500 N
	30 x 2.5			38.3	41.0	226.0	84.8	3950 N
	36 x 2.5			37.8	40.8	231.0	101.7	3400 N
	44 x 2.5*			43.1	46.1	286.0	124.3	5000 N
(N)SHTÖU-O screened cables, single-core/paired-core screening	**28 x 1 (c)***		60 x 0.15	38.4	41.4	211.0	64.5	
	46 x 1 (c)*			46.0	49.0	304.0	105.9	
	6 x (2 x 1) C			32.0	35.0	135.0	37.9	
(N)SHTÖU-J combined cables, screened and unscreened cores	**19 x 2.5 + 5 x 1 (c)**		78/60 x 0.20/0.15	32.6	35.6	169.0	58.5	
	25 x 2.5 + 5 x 1 (c)			38.1	41.1	225.0	73.6	

* Please inquire for minimum order quantity.

1 Flex., tinplated copper conductor
2 Semi-conducting layer
3 EPR core insulation
4 Semi-conducting layer, 6 and 10 kV only
5 Chloroprene inner sheath
6 Mixed braid (copper and textile)
7 Outer sheath Cloroprene



Applications	In dry, damp and wet rooms and in outdoor areas as well as in mining operations, for extreme mechanical strains. For connecting large-scale hoisting and handling equipment, for power supply at construction sites, bypassing faulty power supply units and similar situations.	
Technical data	Constructed according to DIN 57250 /VDE 0250. EPR-base inner sheath. Oil-resistant and flame-retardant in accordance with VDE 0472.	Maximum permissible operating temperature at conductor: +80 °C Minimum permissible operating temperature at conductor: -20 °C Colour of outer sheath: yellow for 1 kV red for 3 to 20 kV
Minimum bending radii	See table, catalogue chapter 4, page 4/8.	For S-shaped deflections and deflections in a different plane the straight section between two bends must be equal at least to 20 times the cable diameter.
Sustained tensile loads	Under consideration of the overall copper cross-section of the outer conductors: max. static load 15 m/mm2.	
Current-carrying capacity	Acc. to DIN 57250 /VDE 0250 and other regulations, e.g. VDE 0118 (see also “Technical Tables”, Chapter 14).	
Voltages	Rated voltage: Maximum permissible operating voltages for three-phase and single-phase alternating current installations Direct current installations Test voltage AC	Vo/V = 0.6/1 kV Vo/V = 0.69/1.15 kV Vo/V = 1.04/1.73 kV 4 kV
	Rated voltage: Maximum permissible operating voltages for three-phase and single-phase alternating current installations Direct current installations Test voltage AC	Vo/V = 1.7/3 kV Vo/V = 1.96/3.45 kV Vo/V = 2.9 /5.18 kV 6 kV
	Rated voltage: Maximum permissible operating voltages for three-phase and single-phase alternating current installations Direct current installations Test voltage AC	Vo/V = 3.5/6 kV Vo/V = 4.03/ 6.09 kV Vo/V = 6.05/10.35 kV 11 kV
	Rated voltage: Maximum permissible operating voltages for three-phase and single-phase alternating current installations Direct current installations Test voltage AC	Vo/V = 6/10 kV Vo/V = 6.9 /11.5 kV Vo/V = 10.35/17.25 kV 17 kV
	Rated voltage: Maximum permissible operating voltages for three-phase and single-phase alternating current installations Direct current installations Test voltage AC	Vo/V = 12/20 kV Vo/V = 13.8 /23 kV Vo/V = 20.7 /34.5 kV 29 kV

See following pages for selection and order data.
See Chapter 14 for installation recommendations.

NTSWÖU, NTSCGEWÖU
NTMCGCWÖU
NTSCGERLWÖU (SM)

Selection and order data	No. of conductors and nominal cross-section mm2	Order No.	No. of strands x diameter of single strand (approx.) mm	Outer dimension max. approx.	Net weight per 100 m approx. kg	Copper weight 100 m approx. kg
NTSWÖU-J, yellow - 0.6/1 kV	**3 x 120 + 3 x 70/3**		608 x 0.51	60.0	674.0	412.8
	3 x 150 + 3 x 70/3		756 x 0.51	62.3	776.0	499.2
NTSWÖU, red - 1.7/3 kV	**4 x 4**		56 x 0.31	30.0	91.5	15.4
	4 x 6		84 x 0.31	32.0	117.0	23.0
	4 x 10		80 x 0.41	37.5	158.0	38.4
	4 x 16		126 x 0.41	39.0	188.0	61.4
	3 x 25 + 3 x 25/3		196 x 0.41	39.0	229.0	96.0
	3 x 35 + 3 x 25/3		276 x 0.41	44.0	288.0	124.8
	3 x 50 + 3 x 25/3		396 x 0.41	47.5	367.0	168.0
	3 x 70 + 3 x 35/3		360 x 0.51	51.5	447.0	235.2
	3 x 95 + 3 x 50/3		475 x 0.51	59.5	574.0	321.6
	3 x 120 + 3 x 70/3		608 x 0.51	64.0	707.0	412.8
	3 x 150 + 3 x 70/3		756 x 0.51	70.0	845.0	499.2
	3 x 185 + 3 x 95/3		925 x 0.51	73.5	995.0	624.0
NTSCGEWÖU, red - 3.5/6 kV	**3 x 25 + 3 x 25/3**		196 x 0.41	47.4	291.0	96.0
	3 x 35 + 3 x 25/3		276 x 0.41	51.2	338.0	124.8
NTSCGEWÖU, red - 6/10 kV	**3 x 25 + 3 x 25/3**		196 x 0.41	49.0	305.0	96.0
	3 x 35 + 3 x 25/3		276 x 0.41	55.0	374.0	124.8

Trailing cables also supplied in custom lengths and fitted with terminations.

Applications, laying and installation

The single-core type NTMCGCWÖU trailing cables are generally only used in short lengths, e.g. for bypassing switchgear cubicles or connecting mobile transformer substations to overhead power lines. These cables should be protected from greater mechanical strains during laying and operation.
The multiple-core NTSCGERLWÖU (SM) type trailing cables can be used in greater lengths, e.g. for bypassing mains cables, construction-site power supply and comparable applications.
In principle, these cables can be laid using the same methods normally used for laying power cables. The shielding is dimensioned such that it is possible to pull on the cable end up to 500 m.

When pulling, e.g. onto a cable mast, the cable must be held behind the dividing box of the termination. It must be ensured that the terminations are not dragged on the ground. At particularly hazardous points, e.g. where roads are crossed, the cables are to be protected by suspending them at a safe height or using conduit bridges.
Auxiliary reels should be large enough so that the terminations can be securely accommodated in the winding space. The cable should be wound so that a certain section of the inside length is accessible without having to unwind the entire cable. So-called “three-flange reels” are available from speciality manufacturers.

Selection and order data	No. of conductors and nominal cross-section mm2	Order No.	No. of strands x diameter of single strand (approx.) mm	Outer dimension max. approx.	Net weight per 100 m approx. kg	Copper weight 100 m approx. kg
NTMCGCWÖU, red 12/20 kV	**1 x 25**		196 x 0.41	29.2	120.0	46.8
	1 x 50		396 x 0.41	33.9	163.0	71.2
	1 x 95		475 x 0.51	39.0	232.0	114.5
NTSCGERLWÖU (SM) red 6/10 kV	**3 x 25 + 3 x 16/3 E***		196 x 0.41	62.0	530.0	118.0
	3 x 35 + 3 x 16/3 E*		276 x 0.41	65.9	550.0	147.2
	3 x 50 + 3 x 25/3 E*		396 x 0.41	71.5	730.0	207.2
	3 x 70 + 3 x 35/3 E*		360 x 0.51	76.0	860.0	283.7
	3 x 95 + 3 x 50/3 E*		475 x 0.51	80.5	990.0	386.5
NTSCGERLWÖU (SM) red 12/20 kV	**3 x 25 + 3 x 16/3 E***		196 x 0.41	73.0	690.0	118.0
	3 x 35 + 3 x 16/3 E*		276 x 0.41	77.0	760.0	147.2
	3 x 50 + 3 x 25/3 E*		396 x 0.41	80.5	870.0	207.2
	3 x 70 + 3 x 35/3 E*		360 x 0.51	86.3	1050.0	283.7
	3 x 95 + 3 x 50/3 E*		475 x 0.51	91.2	1190.0	386.5

* Please inquire for minimum order quantity.

Where desired, NTSCGERLWÖU (SM) and NTMCGCWÖU trailing cables can be supplied with terminations vulcanised on for use in indoor areas and with outdoor installations.

The above conductor quantities and cross-sections represent just a sample of the possible trailing cable configurations available. Experience has shown that these are the ones most often requested.
In addition, we can manufacture any other desired combination from 1 kV to 12/20 kV, such as:

NTSWÖU-J, 1 kV from 3 x 16 + 3 x 16/3 mm2
to 3 x 240 + 3 x 120/3 mm2
as well as four-core types.

The same applies for other types and different kV ratings.
Special voltage ratings such as 8.7/15 kV are also possible, as are trailing cables with integrated light-waveguide components.

We would also like to mention that we can supply almost any trailing cable even in extremely small minimum order quantities from approx. 200 m. Standards not established in VDE approvals are manufactured with reference to VDE.
As a rule, this also applies for trailing cables over 1 kV.