

LOW VOLTAGE REELING CABLES FOR E-RTG'S

| | CORDAFLEX (SMK) | TROMMELFLEX KSM-S |
|----------------|---|--------------------------------------|
| Designation | (N)SHTOEU | (N)SHTOEU |
| Dimension | Based on DIN VDE 0250 part 814 | Based on DIN VDE 0250 part 814 |
| Cores | Power: 3C+3G | Power: 3C+3C |
| Outer Sheath | Rubber | Rubber |
| Approvals | VDE Reg. GOST-R | |
| Tensile Load | 30 N/mm ² | 20 N/mm ² |
| Speed | 240 m/min | 180 m/min |
| Temp. (moving) | -35°C/+80°C (special to -45°C on request) | -40°C/+80°C |

CORDAFLEX(SMK) (N)SHTOEU

Low voltage reeling cable for E-RTG's



Application

Flexible low voltage reeling cable for power supply (also with integrated fiber optics), suitable for application under high and very high mechanical stresses. The main application is reeling operation on ERTG's (Electrified Rubber Tyred Gantry cranes).

Global data

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|----------------------------|---------------------------|
| Brand | CORDAFLEX(SMK) |
| Type designation | (N)SHTOEU-J/-O |
| Standard | Based on DIN VDE 0250-814 |
| Certifications / Approvals | VDE Reg. Nr. 7519; GOST-R |

Notes on installation

Notes on installation Preparation of fibre-optics requires special skills and use of elaborate tools. It is therefore recommended that performance of this work is entrusted to our customer service (Factory assembly). Please provide the connection dimensions.

Design features

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|---------------------|---|
| Conductor | Electrolytic copper tinned, very finely stranded class FS |
| Insulation | PROTOLON MS Special compound based on high-quality EPR (min. 3GI3); improved mechanical and electrical characteristics. |
| Core identification | Best identification as a result of light colored insulation with numbers printed in black for power and control cables, earth conductor green-yellow colored. |
| Optical Fiber | Fibre core diameter: 62.5, 50 or 9µm; diameter across the cladding: 125µm; diameter over the coating: 250µm. Design available with 6,12, 18 or 24 fibres. |

| Fibre class: | G50/125µm | G62,5/125µm | E9/125µm |
|------------------------------------|--------------------|--------------------|----------------|
| Type: | Graded-index fibre | Graded-index fibre | Monomode fibre |
| - Attenuation at 850 nm: | <2,8 dB/km | <3,3 dB/km | - |
| - Attenuation at 1310 nm: | <0,8 dB/km | <0,9 dB/km | <0,4 dB/km |
| - Attenuation at 1550 nm: | - | - | <0,3 dB/km |
| - Bandwidth at 850 nm: | >400 MHz | >400 MHz | - |
| - Bandwidth at 1300 nm: | >1200 MHz | >600 MHz | - |
| - Numerical aperture: | 0,2 ± 0,02 | 0,275 ± 0,02 | 0,14 ± 0,02 |
| - Chromatic dispersion at 1300 nm: | - | - | <3,5 ps/nm km |
| - Chromatic dispersion at 1550 nm: | - | - | <3,5 ps/nm km |

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| Fiber coding | Specially developed color code for identification of the individual fibres |
| Fiber covering | Hollow core with filling compound, Basic material: ETFE, Compound: 7YI 1, Natural color |
| Core arrangement | Laid-up in a maximum of 3 layers |
| Sheath system | - PROTOFIRM Special - Inner sheath: High grade special compound based on PCP, color: yellow; - Anti-torsion braid: Reinforced braid made of polyester threads, in a vulcanized bond between the sheaths, resulting in a high strength of the sheath system; - PROTOFIRM Special - Outer sheath: A sheath system with a unique combination of flexibility and robustness has been achieved through the use of this structure. Abrasion and tear resistant special rubber compound based on PCP, color: yellow. |
| Marking | CORDAFLEX (SMK) (N)SHTOEU -J/-O (number of cores) x (cross section)+VDE Reg.-Nr. |

Electrical parameters

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|---------------------------------------|---|
| Rated voltage | 0.6/1 kV (600/1000V) |
| Max. permissible operating voltage AC | 0.7/1.2 kV |
| Max. permissible operating voltage DC | 0.9/1.8 kV |
| AC Test Voltage | 3.5 kV (5 Min.) |
| Data transmission | Special design with fibre-optics for trouble free data transmission at high data rates. |
| Current Carrying Capacity description | Acc. to DIN VDE 0298-4 |

Chemical parameters

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|--------------------|---|
| Resistance to oil | Acc. to DIN EN 60811-404; DIN VDE 0473-811-404, paragraph 10 |
| Weather resistance | Unrestricted use outdoors and indoors, resistant to ozone, UV and moisture. |
| Water resistance | Given and verified in long-term tests |

Thermal parameters

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|---|-------------------------|
| Max. permissible temperature at conductor | 90 °C |
| Max. short circuit temperature of the conductor | 250 °C |
| Ambient temperature for fixed installation | min -50 °C ; max +80 °C |
| Ambient temperature in fully flexible operation | min -35 °C ; max +80 °C |

Mechanical parameters

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|---|--|
| Max. tensile load on the conductor | 30 N/mm ² |
| Torsional stress | ± 50 °/m |
| Min. bending radius | Acc. to DIN VDE 0298 part 3 |
| Min. distance with S-type directional changes | 20 X D |
| Travel speed | - Gantry (reeling operation): no restriction. It is recommended to consult the manufacturer for speeds beyond 240m/min; - Trolley (festoon operation): up to 240 m/min. |
| Additional tests | Reversed bending test, roller bending test, torsional stress test. |

| Number of cores x cross section | Part number | MLFB Number | Conductor diameter max. mm | Outer diameter min. mm | Outer diameter max. mm | Bending radius free moving min. mm | Weight (ca.) kg/km | Permissible tensile force max. N | Conductor resistance at 20°C max. Ω/km | Current carrying capacity (1) A | Short Circuit Current (conductor) kA |
|---|-------------|-------------|----------------------------|------------------------|------------------------|------------------------------------|--------------------|----------------------------------|--|---------------------------------|--------------------------------------|
| (N)SHTOEU-J power cables, 3-core design, earth conductor split in three | | | | | | | | | | | |
| 3x35+3x16/3 | 20004037 | 5DH3121 | 8.4 | 28.7 | 31.7 | 159 | 1990 | 3150 | 0.57 | 162 | 5.01 |
| 3x50+3x25/3 | 20004038 | 5DH3122 | 10.3 | 34.4 | 37.4 | 187 | 2810 | 4500 | 0.39 | 202 | 7.15 |
| 3x70+3x35/3 | 20004039 | 5DH3123 | 12 | 39.7 | 42.7 | 214 | 3860 | 6300 | 0.28 | 250 | 10.01 |
| 3x95+3x50/3 | 20004040 | 5DH3124 | 14 | 44.3 | 47.3 | 237 | 4950 | 8550 | 0.21 | 301 | 13.59 |
| 3x120+3x70/3 | 20004041 | 5DH3125 | 15.8 | 51 | 55 | 275 | 6440 | 10800 | 0.16 | 352 | 17.16 |
| 3x150+3x70/3 | 20004042 | 5DH3126 | 17.5 | 53.9 | 57.9 | 290 | 7500 | 13500 | 0.13 | 404 | 21.45 |
| 3x185+3x95/3 | 20004043 | 5DH3127 | 19.4 | 58.9 | 62.9 | 315 | 8990 | 16650 | 0.11 | 461 | 26.46 |
| 3x240+3x120/3 | 20004044 | 5DH3128 | 22.5 | 67.4 | 71.4 | 357 | 11940 | 21600 | 0.08 | 540 | 34.32 |
| 3x300+3x150/3 | 20051390 | 5DH3119 | 25.2 | 75.6 | 79.6 | 398 | 14740 | 27000 | 0.07 | 620 | 42.9 |
| (N)SHTOEU-J 3-core design power cables with FO, earth conductor splitted in two | | | | | | | | | | | |
| 3x35 + 2x16/2 + 1x(6G62,5) | | 5DH3*** | 8.4 | 35.7 | 38.7 | 194 | 2390 | 3150 | 0.57 | 162 | 5.01 |
| 3x50 + 2x25/2 + 1x(6G62,5) | | 5DH3*** | 10.3 | 39.9 | 42.9 | 215 | 3220 | 4500 | 0.39 | 202 | 7.15 |
| 3x70 + 2x35/2 + 1x(6G62,5) | | 5DH3*** | 12 | 43.7 | 46.7 | 234 | 4200 | 6300 | 0.28 | 250 | 10.01 |
| 3x95 + 2x50/2 + 1x(6G62,5) | | 5DH3*** | 14 | 47.6 | 50.6 | 253 | 5220 | 8550 | 0.21 | 301 | 13.59 |
| 3x120 + 2x70/2 + 1x(6G62,5) | | 5DH3*** | 15.8 | 54 | 58 | 290 | 6700 | 10800 | 0.16 | 352 | 17.16 |
| 3x150 + 2x70/2 + 1x(6G62,5) | | 5DH3283 | 17.5 | 57 | 61 | 305 | 7750 | 13500 | 0.13 | 404 | 21.45 |
| 3x185 + 2x95/2 + 1x(6G62,5) | 20155139 | 5DH3284 | 19.4 | 59.5 | 63.5 | 318 | 9200 | 16650 | 0.11 | 461 | 26.46 |
| 3x240 + 2x120/2 + 1x(6G62,5) | 20168346 | 5DH3*** | 22.5 | 69.7 | 73.7 | 369 | 12320 | 21600 | 0.08 | 540 | 34.32 |
| 3x300 + 2x150/2 + 1x(6G62,5) | | 5DH3*** | 25.2 | 78 | 82 | 410 | 15000 | 27000 | 0.07 | 620 | 42.9 |

(1) Nominal current carrying capacity for rubber cables laid on a surface, at 30°C ambient temperature (see also VDE 0298-4, Table 15). Design with 12,18 or 24 fibers and/or G50 or E9 types available upon request.

TROMMELFLEX (KSM-S) (N)SHTOEU: Low voltage reeling cable for E-RTG's



Application

Flexible low voltage reeling cable for power supply (also with integrated fiber optics), suitable for application under high mechanical stresses. The main application is reeling operation on ERTG's (Electrified Rubber Tyred Gantry cranes).

Global data

| | |
|------------------|---------------------------|
| Brand | TROMMELFLEX KSM-S |
| Type designation | (N)SHTOEU-J/-O |
| Standard | Based on DIN VDE 0250-814 |

Design features

| | | | | |
|---------------------|--|---------------------------------|-----------------------------------|----------------------------|
| Conductor | Plain copper, flexible class 5 acc. to DIN EN 60228 / DIN VDE 0295 | | | |
| Insulation | Rubber compound type 3GI3 acc. to DIN VDE 0207-20 | | | |
| Core identification | Acc. to DIN VDE 0293-308 | | | |
| Optical Fiber | 12 fibers, 50/125µ or 62.5/125µ or E9/125µ, within protection jacket. | | | |
| | Fibre class: Type: | G50/125µm Graded-index fibre | G62,5/125µm Graded-index fibre | E9/125µm Monomode fibre |
| | - Attenuation at 850 nm: | <2,8 dB/km | <3,3 dB/km | - |
| | - Attenuation at 1300 nm: | <0,8 dB/km | <0,9 dB/km | <0,4 dB/km |
| | - Attenuation at 1550 nm: | - | - | <0,3 dB/km |
| | - Bandwidth at 850 nm: | >400 MHz | >200 MHz | - |
| | - Bandwidth at 1300 nm: | >1200 MHz | >500 MHz | - |
| | - Numerical aperture: | 0,2 ± 0,02 | 0,27 ± 0,02 | - |
| | - Chromatic dispersion at 1300 nm: | - | - | <3,5 ps/nm km |
| | - Chromatic dispersion at 1550 nm: | - | - | <18 ps/nm km |
| Core arrangement | Cores laid up with short length of lay. Split earth conductor and optical element positioned in the interstices. | | | |
| Inner sheath | Rubber compound type 5GM3 acc. to DIN VDE 0207-21 | | | |
| Reinforcement | Wide- meshed polyester braid, embedded in the sheath | | | |
| Outer sheath | Extruded rubber compound type 5GM5 acc. to DIN VDE 0207-21. Abrasion and tear resistant, oil and flame resistant; Colour: black | | | |
| Marking | White imprint: TROMMELFLEX KSM-S (N)SHTOEU-J (number of cores) x (cross-section) (week/year) | | | |

Electrical parameters

| | |
|---------------------------------------|--|
| Rated voltage | 0.6/1 kV (600/1000V) |
| Max. permissible operating voltage AC | 0.7/1.2 kV |
| Max. permissible operating voltage DC | 0.9/1.8 kV |
| AC Test Voltage | 4 kV (5 Min.) |
| Data transmission | Fibre-optic element for trouble free data transmission |
| Current Carrying Capacity description | Acc. to DIN VDE 0298-4 |

Chemical parameters

| | |
|--------------------|---|
| Resistance to fire | Acc. to IEC 60332-1 (EN 50265-2-1) |
| Resistance to oil | Acc. to EN 60811-404 - ASTM No. 2: 24h at 100 °C |

Thermal parameters

| | |
|---|-------------------------|
| Max. permissible temperature at conductor | 90 °C |
| Max. short circuit temperature of the conductor | 250 °C |
| Ambient temperature for fixed installation | min -40 °C ; max +80 °C |
| Ambient temperature in fully flexible operation | min -40 °C ; max +80 °C |

Mechanical parameters

| | |
|---|-------------------------------------|
| Max. tensile load on the conductor | 20 N/mm ² |
| Torsional stress | ± 50 °/m |
| Min. bending radius | Acc. to DIN VDE 0298 part 3 |
| Min. distance with S-type directional changes | 20 X D |
| Travel speed | - Reeling operation: up to 180m/min |

| Number of cores x cross section | Part number | Conductor diameter max. mm | Outer diameter min. mm | Outer diameter max. mm | Bending radius free moving min. mm | Weight (ca.) kg/km | Permissible tensile force max. N | Conductor resistance at 20°C max. Ω/km | Current carrying capacity (1) A | Short Circuit Current (conductor) kA |
|--|-------------|----------------------------|------------------------|------------------------|------------------------------------|--------------------|----------------------------------|--|---------------------------------|--------------------------------------|
| (N)SHTOEU-J power cables, 3-core design, earth conductor splitted in three | | | | | | | | | | |
| 3x50+3x25/3 | 20166655 | 9.6 | 34 | 37 | 185 | 2550 | 3000 | 0.39 | 202 | 7.15 |
| 3x95+3x50/3 | 20164198 | 12.6 | 43 | 46 | 230 | 4340 | 5700 | 0.21 | 301 | 13.59 |
| 3x70+3x35/3 | | 11.1 | 40 | 43 | 215 | 3460 | 4200 | 0.27 | 250 | 10.01 |
| 3x120+3x70/3 | | 14.8 | 51 | 56 | 280 | 5630 | 7200 | 0.16 | 352 | 17.16 |
| 3x150+3x70/3 | 20161381 | 16 | 52 | 56 | 280 | 6500 | 9000 | 0.13 | 404 | 21.45 |
| 3x185+3x95/3 | | 17.7 | 56 | 61 | 305 | 7910 | 11100 | 0.11 | 461 | 26.46 |
| 3x240+3x120/3 | 20160696 | 20.2 | 64 | 70 | 350 | 10380 | 14400 | 0.08 | 540 | 34.32 |
| 3x300+3x150/3 | 20074322 | 22.7 | 70 | 76 | 380 | 13220 | 18000 | 0.06 | 620 | 42.9 |
| 3x400+3x240/3 | | 27 | 82 | 88 | 440 | 20750 | 24000 | 0.05 | 715 | 57.2 |
| (N)SHTOEU-J power cables, 3-core design with FO, earth conductor splitted in two | | | | | | | | | | |
| 3x35 + 2x16/2 + 12LWL | | 7.8 | 33.5 | 36.5 | 183 | 2110 | 2100 | 0.55 | 162 | 5.01 |
| 3x50 + 2x25/2 + 12G62,5 | 20166541 | 9 | 39.5 | 42.5 | 213 | 2910 | 3000 | 0.39 | 202 | 7.15 |
| 3x70 + 2x35/2 + 12LWL | | 11.1 | 40 | 43 | 215 | 3380 | 4200 | 0.27 | 250 | 10.01 |
| 3x95 + 2x50/2 + 12LWL | | 12.6 | 43 | 46 | 230 | 4230 | 5700 | 0.21 | 301 | 13.59 |
| 3x120 + 2x70/2 + 12G62,5 | 20165663 | 14.8 | 48.5 | 52.5 | 263 | 5650 | 7200 | 0.16 | 352 | 17.16 |
| 3x150 + 2x70/2 + 12G62,5 | 20129614 | 16 | 54 | 58 | 290 | 6570 | 9000 | 0.13 | 404 | 21.45 |
| 3x185 + 2x95/2 + 12G62,5 | 20165664 | 17.7 | 56 | 61 | 305 | 8010 | 11100 | 0.11 | 461 | 26.46 |
| 3x240 + 2x120/2 + 12G62,5 | 20166701 | 20.2 | 64 | 70 | 350 | 9980 | 14400 | 0.08 | 540 | 34.32 |
| 3x300 + 2x150/2 + 12LWL | | 22.7 | 70 | 76 | 380 | 12560 | 18000 | 0.06 | 620 | 42.9 |

(1) Nominal current carrying capacity for rubber cables laid on a surface, at 30°C ambient temperature (see also VDE 0298-4, Table 15). For articles without part number the values shown are approximate, and need to be confirmed in case of order.

NOTES
