

PROTOLON(SMK) (N)TSCGEWOEU

Medium voltage reeling cable



Application

Flexible medium voltage reeling cable for application under high to extreme mechanical stresses, e.g. high travel speeds, dynamic tensile loads, multiple changes of direction into different planes, churning on running over rollers and torsional stresses. Mainly for mobile equipment, e.g. fast-moving container cranes and large moving equipment.

Global data

Brand	PROTOLON(SMK)
Type designation	(N)TSCGEWOEU
Standard	Based on DIN VDE 0250-813
Certifications / Approvals	GOST-R

Design features

Conductor	Conductor and earth conductor made of electrolytic copper tinned, very finely stranded, class FS (refer also to DIN VDE 0295)
Insulation	PROTOLON HS High grade special compound based on high-quality EPR (at least 3GI3); improved mechanical and electrical characteristics (refer also to DIN VDE 0207, Part 20)
Electrical field control	Inner semiconductive layer of EPR, outer semiconductive layer of modified NBR, capable of being stripped when cold and thus extremely easy to prepare (Easy Strip design)
Core identification	Natural coloured insulation with black semiconductive layer
Core arrangement	Three-core design, with earth conductor split into 3 parts positioned in the interstices
Sheath system	- PROTOFIRM Sandwich - double layer inner sheath: Special compound based on EPR, quality at least 5GM3, also served as water barrier, color: red; - Anti-torsion braid: Reinforced braid made of polyester threads, in a vulcanized bond between the sheaths, resulting in high strength of the sheath system; - PROTOFIRM Sandwich - double layer outer sheath: A sheath system with a unique combination of flexibility and robustness has been achieved through the use of a new sandwich structure. Abrasion and tear-proof high grade rubber compounds based on PCP, quality at least 5GM5, colour: bright red/red.
Marking	PROTOLON (SMK) (N)TSCGEWOEU (number of cores)x(cross-section) (rated voltage) (year of manufacture) (serial number)

Electrical parameters

Rated voltage	1.8/3 kV	3.6/6 kV	6/10 kV	8.7/15 kV	12/20 kV
Max. permissible operating voltage AC	2.1/3.6 kV	4.2/7.2 kV	6.9/12 kV	10.4/18 kV	13.9/24 kV
Max. permissible operating voltage DC	2.7/5.4 kV	5.4/10.8 kV	9/18 kV	13.5/27 kV	18/36 kV
AC test voltage	6 kV	11 kV	17 kV	24 kV	29 kV
EMC	This design exhibits an extremely low interference level as a result of use of a symmetrical three-core design with very narrow manufacturing tolerances.				
Data transmission	Special designs with Twisted Shielded Pairs or Individually Screened control elements available on request. A special cable design with fibre optics can be found in the product range PROTOLON(SMK)-LWL.				
Current Carrying Capacity description	According to DIN VDE 0298, Part 4. Higher values are permissible in specific cases (please consult the manufacturer)				

Chemical parameters

Resistance to oil	Acc. to DIN EN 60811-404 and DIN VDE 0473-811-404, paragraph 10
Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone, UV and moisture
Water resistance	According to HD 2216

Thermal parameters

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

Max. tensile load on the conductor	20 N/mm ²
Max. tensile load on the conductor during acceleration	Up to 30 (acc. to DIN VDE 0298 part 3: 15 N/mm ²) N/mm ²
Torsional stress	± 25 °/m
Min. bending radius	Acc. to DIN VDE 0298 part 3
Min. distance with S-type directional changes	20 x D (D = cable diameter)
Travel speed	- Gantry (reeling operation): no restriction. For speeds beyond 240 m/min it is recommended to consult the cable manufacturer.
Additional tests	Reversed bending test, torsional stress test

Rated voltage 1.8/3 kV

Number of cores x cross section	Part number	MLFB Number	Conductor diameter max. mm	Earth 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	Dynamic tensile force max. N	Conductor resistance at 20°C max. Ω/km	Current carrying capacity (1) A	Short Circuit Current (conductor) kA
3x25+3x25/3	20004456	5DK2101	7.1	4.2	34.3	37.3	373	2110	1500	2250	0.8	131	3.58
3x35+3x25/3		5DK2102	8.3	4.2	43	46	460	3150	2100	3150	0.57	162	5.01
3x50+3x25/3	20143217	5DK2103	9.9	4.2	46.4	49.4	494	3840	3000	4500	0.39	202	7.15
3x70+3x35/3	20004457	5DK2104	11.8	5	45.9	48.9	489	4230	4200	6300	0.28	250	10.01
3x95+3x50/3	20004458	5DK2105	13.8	5.9	50.3	54.3	543	5440	5700	8550	0.21	301	13.59
3x120+3x70/3		5DK2106	15.4	7	63.8	67.8	678	8010	7200	10800	0.16	352	17.16
3x150+3x70/3		5DK2107	17.2	7	67.7	71.7	717	9240	9000	13500	0.13	404	21.45
3x185+3x95/3		5DK2108	19	8	71.6	75.6	756	10750	11100	16650	0.11	461	26.46
3x240+3x120/3		5DK2110	21.8	9	79.4	83.4	834	13640	14400	21600	0.08	540	34.32
3x300+3x150/3		5DK2111	24.4	10	84.7	89.7	897	16230	18000	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). Special designs upon request!

Rated voltage 3.6/6 kV

Number of cores x cross section	Part number	MLFB Number	Conductor diameter max. mm	Earth 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	Dynamic tensile force max. N	Conductor resistance at 20°C max. Ω/km	Current carrying capacity (1) A	Short Circuit Current (conductor) kA
3x25+3x25/3	20004476	5DK3101	7.1	4.2	35.5	38.5	385	2210	1500	2250	0.8	131	3.58
3x35+3x25/3	20004477	5DK3102	8.3	4.2	39	42	420	2720	2100	3150	0.57	162	5.01
3x50+3x25/3	20004478	5DK3103	9.9	4.2	42.4	45.4	454	3380	3000	4500	0.39	202	7.15
3x70+3x35/3	20004479	5DK3104	11.8	5	46.4	49.4	494	4310	4200	6300	0.28	250	10.01
3x95+3x50/3	20004480	5DK3105	13.8	5.9	51.4	55.5	555	5570	5700	8550	0.21	301	13.59
3x120+3x70/3	20024335	5DK3106	15.4	7	55	59	590	6700	7200	10800	0.16	352	17.16
3x150+3x70/3	20004481	5DK3107	17.2	7	58.8	62.8	628	7820	9000	13500	0.13	404	21.45
3x185+3x95/3	20006940	5DK3108	19	8	64	68	680	9530	11100	16650	0.11	461	26.46
3x240+3x120/3		5DK3110	21.8	9	72.5	76.5	765	12120	14400	21600	0.08	540	34.32
3x300+3x150/3		5DK3111	24.4	10	78.2	82.2	822	14580	18000	27000	0.07	620	42.9

Special designs upon request!

(1) Nominal current carrying capacity for rubber cables laid on a surface, at 30°C ambient temperature (see also VDE 0298-4, Table 15).

Rated voltage 6/10 kV

Number of cores x cross section	Part number	MLFB Number	Conductor diameter max. mm	Earth 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	Dynamic tensile force max. N	Conductor resistance at 20°C max. Ω/km	Current carrying capacity (1) A	Short Circuit Current (conductor) kA
3x25+3x25/3	20004539	5DK4061	7.1	4.2	37.8	40.8	408	2400	1500	2250	0.8	131	3.58
3x35+3x25/3	20001443	5DK4062	8.3	4.2	40.2	43.2	432	2830	2100	3150	0.57	162	5.01
3x35+3x35/3	20004545	5DK4072	8.3	5	40.2	43.2	432	2920	2100	3150	0.57	162	5.01
3x35+3x50/3	20008105	5DK4802	8.3	5.9	42.7	45.7	457	3280	2100	3150	0.57	162	5.01
3x50+3x25/3	20004540	5DK4063	9.9	4.2	43.7	46.7	467	3570	3000	4500	0.39	202	7.15
3x70+3x50/3	20004546	5DK4074	11.8	5.9	47.7	50.7	507	4570	4200	6300	0.28	250	10.01
3x95+3x50/3	20004541	5DK4065	13.8	5.9	52.8	56.8	568	5710	5700	8550	0.21	301	13.59
3x120+3x70/3	20004542	5DK4066	15.4	7	56.2	60.2	602	6840	7200	10800	0.16	352	17.16
3x150+3x70/3	20004543	5DK4067	17.2	7	61.5	65.5	655	8200	9000	13500	0.13	404	21.45
3x185+3x95/3	20004544	5DK4068	19	8	65.3	69.3	693	9690	11100	16650	0.11	461	26.46
3x240+3x120/3	20113369	5DK4070	21.8	9	73.8	77.8	778	12310	14400	21600	0.08	540	34.32
3x300+3x150/3	20154762	5DK4071	24.4	10	79.5	83.5	835	14780	18000	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).
Special designs upon request!

Rated voltage 8.7/15 kV

Number of cores x cross section	Part number	MLFB Number	Conductor diameter max. mm	Earth 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	Dynamic tensile force max. N	Conductor resistance at 20°C max. Ω/km	Current carrying capacity (1) A	Short Circuit Current (conductor) kA
3x25+3x25/3	20004658	5DK5061	7.1	4.2	41.1	44.1	441	2680	1500	2250	0.8	139	3.58
3x35+3x25/3	20004659	5DK5062	8.3	4.2	43.7	46.7	467	3150	2100	3150	0.57	172	5.01
3x50+3x25/3	20004660	5DK5063	9.9	4.2	47.1	50.1	501	3840	3000	4500	0.39	215	7.15
3x70+3x35/3	20004661	5DK5064	11.8	5	52	56	560	5010	4200	6300	0.28	265	10.01
3x95+3x50/3	20148256	5DK5065	13.8	5.9	57.2	61.2	612	6070	5700	8550	0.21	319	13.59
3x120+3x70/3		5DK5066	15.4	7	62.1	66.1	661	7480	7200	10800	0.16	371	17.16
3x150+3x70/3		5DK5067	17.2	7	65.9	69.9	699	8630	9000	13500	0.13	428	21.45
3x185+3x95/3		5DK5068	19	8	69.8	73.8	738	10140	11100	16650	0.11	488	26.46
3x240+3x120/3		5DK5070	21.8	9	77.3	81.3	813	12860	14400	21600	0.08	574	34.32
3x300+3x150/3		5DK5071	24.4	10	84.2	89.2	892	15730	18000	27000	0.07	660	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).
Special designs upon request!

Rated voltage 12/20 kV

Number of cores x cross section	Part number	MLFB Number	Conductor diameter max. mm	Earth 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	Dynamic tensile force max. N	Conductor resistance at 20°C max. Ω/km	Current carrying capacity (1) A	Short Circuit Current (conductor) kA
3x25+3x25/3	20004698	5DK5521	7.1	4.2	44.1	47.1	471	2950	1500	2250	0.8	139	3.58
3x35+3x25/3	20004699	5DK5522	8.3	4.2	46.6	49.6	496	3440	2100	3150	0.57	172	5.01
3x50+3x25/3	20119477	5DK5523	9.9	4.2	51.8	55.8	558	4300	3000	4500	0.39	215	7.15
3x70+3x35/3	20025103	5DK5524	11.8	5	55	59	590	5350	4200	6300	0.28	265	10.01
3x95+3x50/3	20004700	5DK5525	13.8	5.9	61.6	65.6	656	6660	5700	8550	0.21	319	13.59
3x120+3x70/3	20168895	5DK5526	15.4	7	65.1	69.1	691	7870	7200	10800	0.16	371	17.16
3x150+3x70/3		5DK5527	17.2	7	69	73	730	9060	9000	13500	0.13	428	21.45
3x185+3x95/3		5DK5528	19	8	74.3	78.3	783	10850	11100	16650	0.11	488	26.46
3x240+3x120/3		5DK5530	21.8	9	80.3	84.3	843	13340	14400	21600	0.08	574	34.32
3x300+3x150/3		5DK5532	24.4	10	87.2	92.2	922	16250	18000	27000	0.07	660	42.9

Special designs upon request!

(1) Nominal current carrying capacity for rubber cables laid on a surface, at 30°C ambient temperature (see also VDE 0298-4, Table 15).