

Rolling Stock Cables



HIGH VOLTAGE 26/45 kV

TENAX-TRAIN-Plus (N)TMCW0EU 26/45kV Pantograph Cables 26/45kV

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Application

Halogen-free single-core HD flexible cables for railway rolling stock, having special fire performance and reduced dimensions. As a general rule, single-core cables are used in short lengths, e.g. for connection of switchgear cubicles and for connection of mobile transformer substations to the overhead line. Also usable for connection of pantographs in locomotives and trains. Suitable for occasional movement during operation. When laying and during operation care should be taken to protect them against excessive mechanical stresses. In other respects, DIN VDE 0298-3 applies as well as DIN EN 50355; attention should be paid to the rules for installation of cabling (DIN EN 50343). Usable on railway vehicles having hazard level HL1, 2, 3 acc. to DIN EN 45545-1(2013). Expected lifetime of the cable at an average utilisation is approximately 25 years.

Global data

Brand	TENAX-TRAIN-Plus
Type designation	(N)TMCW0EU
Standard	Based on DIN VDE 0250-813 Based on IEC 60840-2011

Design features

Conductor	Copper, tinned, finely stranded class 5 acc. to DIN VDE 0295 / IEC 60228
Insulation	Halogen-free, cross-linked special compound, basic material HEPR, requirements based on type EI110 (EN50264-1) / HEPR (IEC 60840).
Electrical field control	Inner and outer layer of semi-conductive rubber compound; colour: black. Core screen cold strippable "Easy Strip"
Screen	Stranded layer of tinned copper wires bedded between two separating layers
Outer sheath	Halogen-free, cross-linked special compound, basic material EVA, requirements based on type EM104. Colour: red or black

Electrical parameters

Rated voltage	26/45 kV
Max. permissible operating voltage AC	30/52 kV
Max. permissible operating voltage DC	40.5/81 kV
AC test voltage - main cores	87 kV (5 Min.)
Impulse voltage strength	250 kV
Max. partial discharge intensity	5 pC @ 52 kV
Suitability for railway networks	Voltage pulses IEC 61287-1 Short time overvoltages DIN EN 50124-2; Long time overvoltages DIN EN 50163

Thermal parameters

Max. operating temperature of the conductor	90 °C
Max. short circuit temperature of the conductor	250 °C (5 s.)
Ambient temperature for fixed installation	min -40 °C ; max +80 °C
Ambient temperature in fully flexible operation	min -40 °C ; max +80 °C

Number of cores x cross section	MLFB Number	Conductor diameter nom. mm	Diameter over screen (nom.) mm	Outer diameter min. mm	Outer diameter max. mm	Bending radius free moving min. mm	Weight (approx.) kg/km	Conductor resistance at 20°C max. Ω/km	Nominal operating capacitance μF/km	Current-carrying capacity for installat. in air, trefoil (1) A	Current carrying capacity free in air (2) A	Short Circuit Current (conductor) kA
1x50/16	5DK9751	9.3	30.5	36	38	380	1900	0.393	0.16	237	309	7.15
1x70/16	5DK9752	11.5	31.8	38	40	400	2400	0.277	0.18	291	379	10
1x95/16	5DK9753	12.6	33.5	40.5	42.5	425	2550	0.21	0.19	351	457	13.6
1x95/25	5DK9754	12.6	33.7	40.7	42.7	427	2670	0.21	0.19	351	457	13.6
1x120/16	5DK9755	14.6	36	43	45	450	3000	0.164	0.21	408	531	17.2
1x120/25	5DK9756	14.6	36.2	43.2	45.2	452	3000	0.164	0.21	408	531	17.2
1x150/25	5DK9757	16	36.7	44.5	46.5	465	3700	0.132	0.23	470	613	21.5
1x185/25	5DK9758	18	38.9	46.5	48.5	485	4200	0.108	0.25	536	699	26.6
1x240/25	5DK9759	20.6	41.5	49	51	510	4500	0.0817	0.26	632	823	34.3
1x300/35	5DK9760	23.1	44.8	52	54	540	5400	0.0654	0.29	725	945	42.9
1x400/35	5DK9761	26.5	48.5	56	58	580	6400	0.0495	0.32	879	1145	57.2
1x500/35	5DK9762	29.3	50.2	59	62	620	7400	0.0391	0.36	989	1288	71.5
1x630/35	5DK9763	33.9	54.8	64	68	680	9200	0.0292	0.41	1099	1432	90.1

(1) Values for closed trefoil formation (2) 1-core free in air

Permanent operation with DC or AC with 50 up to 60 Hz at 30 °C ambient temperature, free in air.

PROTOLON(HMK) (N)TMCGCHXOEUK 26/45kV

Pantograph Cables, extra cold resistant (-55°C)

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Application

Halogen-free single-core HD flexible cables for railway rolling stock, having special fire performance and reduced dimensions. As a general rule, single-core cables are used in short lengths, e.g. for connection of switchgear cubicles and for connection of mobile transformer substations to the overhead line. Also usable for connection of pantographs in locomotives and trains. Suitable for occasional movement during operation. When laying and during operation care should be taken to protect them against excessive mechanical stresses. In other respects, DIN VDE 0298-3 applies as well as DIN EN 50355; attention should be paid to the rules for installation of cabling (DIN EN 50343). Usable on railway vehicles where GOST certification is needed, tests according to EN 45545-2 are conducted internally only. Expected lifetime of the cable at an average utilisation is approximately 25 years.

Global data

Brand	PROTOLON(HMK)
Type designation	(N)TMCGCHXOEUK
Standard	Based on DIN VDE 0250-813 Based on IEC 60840-2011
Certifications / Approvals	GOST Certificate No C-DE.ПБ68.В.02108

Design features

Conductor	Copper, tinned, finely stranded class 5 according to DIN VDE 0295 / IEC 60228
Insulation	Halogen-free, cross-linked special compound, basic material HEPR
Electrical field control	Inner and outer layer of semi-conductive rubber compound; colour: black Core screen cold strippable
Screen	Stranded layer of tinned copper wires bedded between two separating layers
Outer sheath	Halogen-free, cross-linked special polyolefin compound; colour: black

Electrical parameters

Rated voltage	26/45 kV
Max. permissible operating voltage AC	31/54 kV
Max. permissible operating voltage DC	40.5/81 kV
AC test voltage - main cores	65 kV (5 Min.)
Impulse voltage strength	250 kV
Max. partial discharge intensity	≤ 5 pC @ 52 kV
Suitability for railway networks	Voltage pulses IEC 61287-1 Short time overvoltages DIN EN 50124-2 Long time overvoltages DIN EN 50163

Thermal parameters

Max. operating temperature of the conductor	90 °C
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fixed installation	min -55 °C ; max +80 °C
Ambient temperature in fully flexible operation	min -55 °C ; max +80 °C

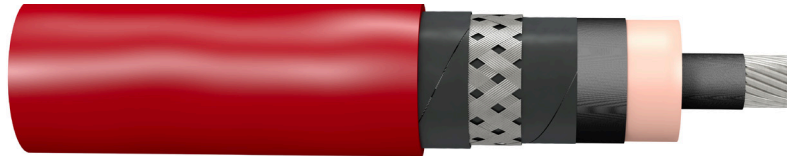
Number of cores x cross section	MLFB Number	Conductor diameter nom. mm	Diameter over screen (nom.) mm	Outer diameter min. mm	Outer diameter max. mm	Weight (approx.) kg/km	Current carrying capacity (1) A	Short Circuit Current (conductor) kA
1x50/16	5DK9731	9	30.4	36	38	1900	309	7.15
1x70/16	5DK9732	10.8	32.2	38	40	2400	379	10
1x95/16	5DK9733	12.6	34	40.5	42.5	2700	457	13.6
1x95/25	5DK9734	12.6	34.2	40.7	42.7	2700	457	13.6
1x120/16	5DK9735	14.2	35.6	43	45	3000	531	17.2
1x120/25	5DK9736	14.2	35.8	43.2	45.2	3000	531	17.2
1x150/25	5DK9737	15.8	37.4	44.5	46.5	3700	613	21.5
1x185/25	5DK9738	17.4	39	46.5	48.5	4200	699	26.6
1x240/25	5DK9739	20.4	42	49	51	4500	823	34.3
1x300/35	5DK9740	22.9	44.7	52	54	5400	945	42.9
1x400/35	5DK9741	26.2	48	55	57	6400	1145	57.2
1x500/35	5DK9742	29.5	51	59	62	7400	1288	71.5
1x630/35	5DK9743	33.6	55.1	64	68	9200	1432	90.1

Short Circuit Current for 1s

(1) The values in the table are valid for one cable in permanent operation with DC or AC with 50 up to 60 Hz at 90 °C operation temperature, 30 °C ambient temperature, free in air

TENAX-TRAIN-Plus Jumper (N)TMCW0EU 26/45kV Pantograph Cables

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Application

Halogen-free single-core HD flexible cables for railway rolling stock, having special fire performance and reduced dimensions. As a general rule, single-core cables are used in short lengths, e.g. for connection of switchgear cubicles and for connection of mobile transformer substations to the overhead line. Also usable for connection of pantographs in locomotives and trains, this special design also for flexible connections to distribute power across the train. When laying and during operation care should be taken to protect them against excessive mechanical stresses. In other respects, DIN VDE 0298-3 applies as well as DIN EN 50355; attention should be paid to the rules for installation of cabling (DIN EN 50343). Usable on railway vehicles having hazard level HL1, 2, 3 acc. to DIN EN 45545-1(2013). Expected lifetime of the cable at an average utilisation is approximately 25 years.

Global data

Brand	TENAX-TRAIN-Plus Jumper
Type designation	(N)TMCW0EU
Standard	Based on DIN VDE 0250-813 Based on IEC 60840-2011

Design features

Conductor	Copper, tinned, finely stranded class 5 according to DIN VDE 0295/ IEC 60228
Insulation	Halogen-free, cross-linked special compound, basic material HEPR, requirements based on type EI110 (EN50264-1) / HEPR (IEC 60840); colour: light-pink
Electrical field control	Inner and outer layer of semi-conductive rubber compound; colour: black. Core screen cold strippable "Easy Strip"
Screen	Braid of tinned copper wires bedded between two separating layers
Outer sheath	Halogen-free, cross-linked special compound, basic material EVA, requirements based on type EM104; colour: black or red (others possible)

Electrical parameters

Rated voltage	26/45 kV
Max. permissible operating voltage AC	31/54 kV
Max. permissible operating voltage DC	40.5/81 kV
AC test voltage - main cores	87 kV (5 Min.)
Impulse voltage strength	250 kV
Max. partial discharge intensity	≤ 5 pC @ 52 kV
Suitability for railway networks	Voltage pulses IEC 61287-1 Short time overvoltages DIN EN 50124-2 Long time overvoltages DIN EN 50163

Chemical parameters

Smoke emission	DIN EN 61034-2
Toxicity of smoke	DIN EN 50305
Performance against fire	DIN EN 45545-2
Flame propagation	DIN EN 60332-1-2 DIN EN 60332-3-24
Resistance to oil	DIN EN 60811-404
UV-resistance	ISO 4892-2
Ozone resistance	DIN EN 50305 clause 7.4
Acid and alkaline resistance	DIN EN 60811-404

Thermal parameters

Max. operating temperature of the 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

Number of cores x cross section	MLFB Number	Conductor diameter nom. mm	Diameter over screen (nom.) mm	Outer diameter min. mm	Outer diameter max. mm	Weight (approx.) kg/km	Current carrying capacity (1) A	Short Circuit Current (conductor) kA
1x50/16	5DK9751	9.3	30.5	36	38	1900	309	7.15
1x70/16	5DK9752	11.5	31.8	38	40	2400	379	10
1x95/16	5DK9753	12.6	33.5	40	42	2550	457	13.6
1x95/25	5DK9754	12.6	33.7	40.5	42.5	2700	457	13.6
1x120/16	5DK9755	14.6	36	43	45	3000	531	17.2
1x120/25	5DK9756	14.6	36.2	43	45	3060	531	17.2
1x150/25	5DK9757	16	36.7	44	46	3360	613	21.5
1x185/25	5DK9758	18	38.9	46	48	4200	699	26.6
1x240/25	5DK9759	20.6	41.5	49	51	4500	823	34.3
1x300/35	5DK9760	23.1	44.8	52	54	5400	945	42.9
1x400/35	5DK9761	26.5	48.5	56	58	6400	1145	57.2
1x500/35	5DK9762	29.3	50.2	59	62	7400	1288	71.5
1x630/35	5DK9763	33.9	54.8	64	68	9200	1432	90.1

Short Circuit Current for 1s

(1) The values in the table are valid for one cable in permanent operation with DC or AC with 50 up to 60 Hz at 90 °C operation temperature, 30 °C ambient temperature, free in air

Remarks, colours: codes to be added to part number: -0 BK black, -1 RD red; others available upon request

PROTOLON(HMK) Jumper (N)TMCGCHXOEUK 26/45kV Pantograph Cables, extra cold resistant (-55°C)

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Application

Halogen-free single-core HD flexible cables for railway rolling stock, having special fire performance and reduced dimensions. As a general rule, single-core cables are used in short lengths, e.g. for connection of switchgear cubicles and for connection of mobile transformer substations to the overhead line. Also usable for connection of pantographs in locomotives and trains. Suitable for coach interconnection. When laying and during operation care should be taken to protect them against excessive mechanical stresses. In other respects, DIN VDE 0298-3 applies as well as DIN EN 50355; attention should be paid to the rules for installation of cabling (DIN EN 50343). Usable on railway vehicles where GOST certification is needed, tests according to EN 45545-2 are conducted internally only. Expected lifetime of the cable at an average utilisation is approximately 25 years.

Global data

Brand	PROTOLON(HMK) Jumper
Type designation	(N)TMCGCHXOEUK
Standard	Approbation GOST No C-DE.ПБ68.В.02108 Based on DIN VDE 0250-813 Based on IEC 60840-2011
Certifications / Approvals	GOST Certificate No C-DE.ПБ68.В.02108

Design features

Conductor	Copper, tinned, finely stranded class 5 according to DIN VDE 0295 / IEC 60228
Insulation	Halogen-free, cross-linked special compound, basic material HEPR
Electrical field control	Inner and outer layer of semi-conductive rubber compound; colour: black Core screen cold strippable
Screen	Braid of tinned copper wires bedded between two separating layers
Outer sheath	Halogen-free, cross-linked special polyolefin compound; colour: black

Electrical parameters

Rated voltage	26/45 kV
Max. permissible operating voltage AC	31/54 kV
Max. permissible operating voltage DC	40.5/81 kV
AC test voltage - main cores	65 kV (5 Min.)
Impulse voltage strength	250 kV
Max. partial discharge intensity	≤ 5 pC @ 52 kV
Suitability for railway networks	Voltage pulses IEC 61287-1 Short time overvoltages DIN EN 50124-2 Long time overvoltages DIN EN 50163

Thermal parameters

Max. operating temperature of the conductor	90 °C
Max. short circuit temperature of the conductor	250 °C (max. 5 s)
Ambient temperature for fix installation min.	-55 °C
Ambient temp. in fully flex. operation min.	-55 °C

Number of cores x cross section	MLFB Number	Conductor diameter nom. mm	Diameter over screen (nom.) mm	Outer diameter min. mm	Outer diameter max. mm	Weight (approx.) kg/km	Current carrying capacity (1) A	Short Circuit Current (conductor) kA
1x50/16	5DK9786	9	30.4	36	38	1900	309	7.15
1x70/16	5DK9787	10.8	32.2	38	40	2400	379	10
1x95/16	5DK9788	12.6	34	40.5	42.5	2700	457	13.6
1x95/25	5DK9789	12.6	34.2	40.7	42.7	2700	457	13.6
1x120/16	5DK9790	14.2	35.6	43	45	3000	531	17.2
1x120/25	5DK9791	14.2	35.8	43.2	45.2	3000	531	17.2
1x150/25	5DK9792	15.8	37.4	44.5	46.5	3700	613	21.5
1x185/25	5DK9793	17.4	39	46.5	48.5	4200	699	26.6
1x240/25	5DK9794	20.4	42	49	51	4500	823	34.3
1x300/35	5DK9795	22.9	44.7	52	54	5400	945	42.9
1x400/35	5DK9796	26.2	48	55	57	6400	1145	57.2
1x500/35	5DK9797	29.5	51	59	62	7400	1288	71.5
1x630/35	5DK9798	33.6	55.1	64	68	9200	1432	90.1

(1) The values in the table are valid for one cable in permanent operation with DC or AC with 50 up to 60 Hz at 90 °C operation temperature, 30 °C ambient temperature, free in air
Short Circuit Current for 1s