

Traction cable

RADOX TENUIS-TW 600V MM

General properties:

Halogen free, electron-beam cross-linked cables with improved behaviour in case of fire, easy to strip and flexible.

Multicore signal and control cables, unshielded

Nominal voltage: 600 / 1000 V AC

Hazard level: M (extra low temperature, extra oil and extra fuel resistant)

Application:

The cables are intended for permanent installation in rail vehicles or for applications in which a limited alternating bending stress occur during service.

Guidelines for selection and installation are described in the standards EN 50355 and EN 50343.

General composition of cable:



1.	Filler (optional)	RADOX 125 REC
2.	RADOX TENUIS-TW 600V cores	Conductor: stranded tin plated copper, acc. to EN 50306-2
3.	RADOX TENUIS-TW 600V cores	Insulation: RADOX EI 303
		Colours: white, black numbered
		other colours on request
4.	Separator (optional)	Tape
5.	Sheath	RADOX EM 104, acc. to EN 50264-1
		Colour: black, yellow marked

Marking:

[a] HUBER+SUHNER RADOX TENUIS-TW 600V [b] MM [c]-[d] [e] [f] [g]

		example:
[a]	Meter marking (in m)	= 001234 = m
[b]	Construction	3X1.5
[c]	Part number	12345678
[d]	Batch number	1234567
[e]	Production week and year	03-2017
[f]	Production place (only if China)	CN
[g]	CRCC certificate (only if available)	CRCC10218P11529R1M

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The product fulfils the test and specification requirements described in this document for the stated areas of application and operating conditions. HUBER+SUHNER AG does not expressly or implicitly guarantee performance under additional or changed conditions. Deviations are to be agreed upon in writing.

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Technical Data :

Voltage rating cond.-earth	U_0	600	V AC
Voltage rating cond.-cond.	U	1000	V AC
maximum permissible Voltage rating AC cond.-earth		720	V AC
maximum permissible Voltage rating AC cond.-cond.	U_m	1200	V AC
maximum permissible Voltage rating DC cond.-earth	V_0	900	V DC
maximum permissible Voltage rating DC cond.-cond.		1500	V DC
Test voltage		3500	V AC

Temperature range

fixed installation - 50 ... + 125 °C

Min. bending radius

fixed installation	cable diameter \leq 12 mm	3 x D
	cable diameter > 12 mm	4 x D
sporadic movement	cable diameter \leq 12 mm	4 x D
	cable diameter > 12 mm	5 x D

NB:

The upper temperature limit is determined by long term ageing according to EN 50305 Par. 7 and extrapolation to 20,000 hours.

The lower temperature limit is determined by bending and elongation tests according to EN60811-504/505, respectively low temperature behaviour tests according to GOST 20.57.406-81, method 204-1 and GOST 17491-80.

The specified bending radii require a careful and proper handling using proven fastening technologies.

The cables are in conformity with:

Fire protection on railway vehicles, hazard level	HL1 - HL3	EN 45545-2
Vertical flame spread	50 mm < L \leq 540 mm	EN 60332-1-2
Vertical flame spread, bunched, D \leq 6 mm	L \leq 1.5 m	EN 50305, 9.1.2
Vertical flame spread, bunched, 6 < D < 12 mm	L \leq 2.5 m	EN 60332-3-25
Vertical flame spread, bunched, D \geq 12 mm	L \leq 2.5 m	EN 60332-3-24
Smoke density	T \geq 70 %	EN 61034-2
Corrosivity of combustion gases	pH \geq 4.3, C \leq 10 μ S/mm	EN 60754-2
Amount of halogen acid gas	HCl + HBr \leq 0.5 %	EN 60754-1
Content of fluorine	HF \leq 0.1 %	EN 60684-2, 45.2
Toxicity	ITC \leq 6	EN 50305, 9.2

Fire safety, class **O1.8.1.2.1 (single)** **GOST 31565**

P1b.8.1.2.1 (bundle)

Vertical flame spread	50 mm < L \leq 540 mm	EN 60332-1-2
Vertical flame spread, bunched	L \leq 2.5 m	EN 60332-3-22
Corrosivity of combustion gases	pH \geq 4.3, C \leq 10 μ S/mm	EN 60754-2
Amount of halogen acid gas	HCl + HBr \leq 0.5 %	EN 60754-1
Toxicity	40 < Tx \leq 120 g/m ³	GOST 12.1.044-89
Smoke density	T \geq 60 %	EN 61034-2

Fire protection on railway vehicles **Fulfilled** **NFPA 130**

Vertical flame spread, bunched	L \leq 1.5 m	UL 1685, 12 (FT4 exp.)
Smoke density	TSR \leq 150 m ² , PSRR \leq 0.40 m ² /s	UL 1685, 12 (FT4 exp.)

Requirement of hazard level Code M (according to EN 50264-1 or EN 50306-1)

Extra low temperature	- 40°C
Extra oil resistance	IRM 902, 72h, 100°C
Extra fuel resistance	IRM 903, 168h, 70°C

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Construction 1) n x mm ²	Conductor Dia.nom. mm	Core 2) Dia.nom. mm	Cable Dia. mm	R ₂₀ 3) max. Ω/km	Fireload nom. kJ/m	Weight nom.		H+S Part No.	
						Copper kg / 100m	Cable		
4x0.25	0.6	1.17	4.5 ± 0.3	88.5	322	0.9	3.0	85 064 923	
4x0.25	0.6	1.17	4.95 ± 0.15	88.5	385	0.9	3.6	85 024 776	4)
2x0.34	0.75	1.3	3.95 ± 0.3	54.7	236	0.7	2.4	85 027 193	
16x0.34 + 3x1	0.75 1.2	1.3 1.77	8.95 ± 0.3	54.7 20.0	1080	8.3	15.1	85 111 512	
2x0.5	0.9	1.42	4.4 ± 0.2	40.1	290	0.9	3.1	12 568 036	
3x0.5	0.9	1.42	4.6 ± 0.2	40.1	315	1.4	3.6	12 568 037	
4x0.5	0.9	1.42	5.0 ± 0.2	40.1	365	1.8	4.4	12 568 038	
5x0.5	0.9	1.42	5.5 ± 0.2	40.1	473	2.3	5.4	12 566 304	
6x0.5	0.9	1.42	6.0 ± 0.2	40.1	569	2.7	6.4	12 568 039	
9x0.5	0.9	1.42	7.3 ± 0.3	40.1	792	4.1	9.1	12 583 000	
10x0.5	0.9	1.42	7.3 ± 0.3	40.1	760	4.6	9.6	85 073 536	
12x0.5	0.9	1.42	7.6 ± 0.3	40.1	862	5.5	10.7	12 585 961	
15x0.5	0.9	1.42	8.6 ± 0.3	40.1	1102	6.9	13.5	12 583 667	
16x0.5	0.9	1.42	8.6 ± 0.3	40.1	1102	7.3	13.9	84 096 896	
25x0.5	0.9	1.42	10.5 ± 0.4	40.1	1623	11.5	20.9	12 583 001	
2x2x0.5	0.9	1.42	6.8 ± 0.3	40.1	630	1.8	6.4	12 568 040	
4x2x0.5	0.9	1.42	8.5 ± 0.3	40.1	966	3.6	10.3	12 568 041	
6x2x0.5	0.9	1.42	10.2 ± 0.4	40.1	1451	5.5	14.9	84 097 766	
5x(3x0.5)	0.9	1.42	14.1 ± 0.4	40.1	2880	11.3	31.9	12 583 566	5)
5x(3x0.5)	0.9	1.42	14.5 ± 0.4	40.1	3345	10.7	32.2	85 118 440	5)
6x(3x0.5)	0.9	1.42	14.6 ± 0.3	40.1	3135	13.6	35.0	12 584 344	6)
2x(6x0.5)	0.9	1.42	15.5 ± 0.5	40.1	3610	8.8	32.9	85 022 107	6)
2x0.75	1.1	1.62	4.75 ± 0.3	26.7	330	1.4	3.8	12 568 047	
3x0.75	1.1	1.62	5.15 ± 0.3	26.7	380	2.1	4.8	12 568 048	
3G0.75	1.1	1.62	5.15 ± 0.3	26.7	380	2.1	4.8	12 583 990	
4x0.75	1.1	1.62	5.6 ± 0.3	26.7	468	2.8	5.9	12 568 049	
4G0.75	1.1	1.62	5.6 ± 0.3	26.7	468	2.8	5.9	12 583 992	
5G0.75	1.1	1.62	5.75 ± 0.3	26.7	495	3.5	6.8	85 111 986	
6x0.75	1.1	1.62	6.75 ± 0.3	26.7	707	4.2	8.7	12 568 050	
8x0.75	1.1	1.62	7.8 ± 0.3	26.7	978	5.6	11.5	12 584 272	

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						Copper kg / 100m	Cable kg / 100m		
10x0.75	1.1	1.62	8.1 ± 0.3	26.7	935	7.0	12.8	12 585 274	
12x0.75	1.1	1.62	8.4 ± 0.3	26.7	1006	8.4	14.5	84 111 116	
36x0.75	1.1	1.62	14.1 ± 0.4	26.7	2600	25.5	41.6	85 070 303	
4x2x0.75	1.1	1.62	9.5 ± 0.3	26.7	1200	5.6	13.9	84 097 783	
5x(4x0.75)	1.1	1.62	18.3 ± 0.5	26.7	4700	20.6	53.8	12 583 090	7)
2x1	1.2	1.77	5.1 ± 0.2	20.0	370	1.8	4.5	12 568 052	
3x1	1.2	1.77	5.4 ± 0.2	20.0	434	2.7	5.6	12 568 053	
3G1	1.2	1.77	5.4 ± 0.2	20.0	434	2.7	5.6	85 093 498	
4x1	1.2	1.77	5.8 ± 0.2	20.0	445	3.6	6.7	12 568 054	
4G1	1.2	1.77	5.8 ± 0.2	20.0	445	3.6	6.7	85 106 526	
5x1	1.2	1.77	6.65 ± 0.3	20.0	580	4.5	8.7	85 072 779	
5G1	1.2	1.77	6.65 ± 0.3	20.0	580	4.5	8.7	85 103 631	
6x1	1.2	1.77	7.3 ± 0.3	20.0	814	5.4	10.5	12 568 055	
7x1	1.2	1.77	8.0 ± 0.3	20.0	994	6.3	12.4	12 585 459	
8x1	1.2	1.77	8.3 ± 0.3	20.0	1093	7.2	13.8	84 121 018	
9G1	1.2	1.77	8.65 ± 0.3	20.0	1101	8.1	15.0	85 110 070	
10x1	1.2	1.77	8.7 ± 0.3	20.0	1055	9.0	15.5	12 581 348	
12x1	1.2	1.77	9.1 ± 0.3	20.0	1151	10.8	17.7	12 584 271	
16x1	1.2	1.77	10.4 ± 0.4	20.0	1524	14.4	23.5	12 584 654	
19x1	1.2	1.77	11.6 ± 0.4	20.0	1925	17.2	28.4	12 585 980	
25x1	1.2	1.77	12.8 ± 0.4	20.0	2234	22.6	35.6	12 581 349	
37x1	1.2	1.77	15.7 ± 0.5	20.0	3000	33.5	52.5	85 095 097	
2x2x1	1.2	1.77	8.0 ± 0.3	20.0	886	3.6	9.6	12 583 421	
2x1.5	1.5	2.17	6.0 ± 0.3	13.7	520	2.6	6.4	12 568 098	
3x1.5	1.5	2.17	6.3 ± 0.3	13.7	572	3.9	7.8	12 568 099	
3G1.5	1.5	2.17	6.3 ± 0.3	13.7	572	3.9	7.8	12 582 026	
4x1.5	1.5	2.17	6.9 ± 0.3	13.7	650	5.2	9.6	12 568 100	
4G1.5	1.5	2.17	6.9 ± 0.3	13.7	650	5.2	9.6	12 583 172	
5x1.5	1.5	2.17	7.8 ± 0.3	13.7	884	6.6	12.2	12 581 350	
5G1.5	1.5	2.17	7.8 ± 0.3	13.7	884	6.6	12.2	12 582 027	
6x1.5	1.5	2.17	8.45 ± 0.3	13.7	1058	7.9	14.4	12 582 028	

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Construction 1) n x mm ²	Conductor Dia.nom. mm	Core 2) Dia.nom. mm	Cable Dia. mm	R ₂₀ 3) max. Ω/km	Fireload nom. kJ/m	Weight nom.		H+S Part No.
						Copper kg / 100m	Cable	
7x1.5	1.5	2.17	9.1 ± 0.3	13.7	1253	9.2	16.8	12 583 724
7G1.5	1.5	2.17	9.1 ± 0.3	13.7	1253	9.2	16.8	12 582 029
8x1.5	1.5	2.17	10.3 ± 0.4	13.7	1639	10.6	20.5	12 582 030
9G1.5	1.5	2.17	10.6 ± 0.4	13.7	1474	11.9	21.1	12 584 489
10x1.5	1.5	2.17	10.6 ± 0.4	13.7	1443	13.2	22.1	12 582 031
12x1.5	1.5	2.17	11.1 ± 0.4	13.7	1639	15.8	25.8	12 583 725
16x1.5	1.5	2.17	12.6 ± 0.4	13.7	2130	21.1	33.8	12 583 726
18x1.5	1.5	2.17	13.4 ± 0.4	13.7	2449	23.8	38.2	85 063 742
20x1.5	1.5	2.17	14.0 ± 0.4	13.7	2599	24.7	41.1	12 586 297
25x1.5	1.5	2.17	15.5 ± 0.5	13.7	3059	33.1	51.0	84 103 977
25G1.5	1.5	2.17	15.5 ± 0.5	13.7	3057	33.1	51.0	12 582 033
30x1.5	1.5	2.17	16.7 ± 0.5	13.7	3606	39.7	60.6	12 586 298
50x1.5	1.5	2.17	21.5 ± 0.5	13.7	5894	66.4	99.8	85 063 739
58x1.5	1.5	2.17	22.6 ± 0.5	13.7	6100	76.7	113.6	85 070 511
2x2.5	1.9	2.75	7.3 ± 0.3	8.21	766	4.4	9.8	12 568 101
3x2.5	1.9	2.75	7.8 ± 0.3	8.21	854	6.6	12.2	12 582 034
3G2.5	1.9	2.75	7.8 ± 0.3	8.21	854	6.6	12.2	12 582 035
4x2.5	1.9	2.75	8.7 ± 0.3	8.21	1049	8.8	15.5	12 566 306
4G2.5	1.9	2.75	8.7 ± 0.3	8.21	1051	8.8	15.6	12 583 173
5x2.5	1.9	2.75	9.4 ± 0.3	8.21	1249	11.0	18.7	12 581 346
5G2.5	1.9	2.75	9.4 ± 0.3	8.21	1249	11.0	18.7	12 585 007
6x2.5	1.9	2.75	10.6 ± 0.4	8.21	1628	13.2	23.2	12 581 347
7G2.5	1.9	2.75	11.5 ± 0.4	8.21	1960	15.4	27.3	12 583 995
16x2.5	1.9	2.75	15.8 ± 0.5	8.21	3239	35.3	54.6	85 002 904
18x2.5	1.9	2.75	16.8 ± 0.5	8.21	3712	39.7	61.6	85 063 743
20x2.5	1.9	2.75	17.6 ± 0.5	8.21	4126	44.1	68.1	12 585 070
30x2.5	1.9	2.75	20.9 ± 0.5	8.21	5418	66.2	97.5	12 584 363
36x2.5	1.9	2.75	22.5 ± 0.5	8.21	6408	79.6	115.8	12 584 406
4x4	2.4	3.35	10.2 ± 0.4	5.09	1442	14.0	22.9	12 585 458
10x4	2.4	3.35	16.0 ± 0.5	5.09	2108	34.9	55.2	85 084 353

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Cables with coloured cores:

Construction 1) n x mm ²	Con- ductor Dia. _{nom} mm	Core colours	Core 2) D _{nom} mm	Cable Dia. mm	R ₂₀ ³⁾ max Ω/km	Fireload nom. kJ/m	Weight Copper Cable kg/100m		H + S Part No.
2V0.5	0.9	BN-BU	1.42	4.4 ± 0.2	40.1	290	0.9	3.1	12 584 136
3V0.5	0.9	BN-BK- BU	1.42	4.6 ± 0.2	40.1	315	1.4	3.6	12 584 137
4V0.5	0.9	BN-BK- BU-WH	1.42	5.0 ± 0.2	40.1	365	1.8	4.4	12 584 138
5V0.5	0.9	BN-BK- BU-WH- GY	1.42	5.5 ± 0.2	40.1	473	2.3	5.4	12 585 752
6V0.5	0.9	BN-RD- WH-BK- GY-BU	1.42	6.0 ± 0.2	40.1	568	2.8	6.4	84 118 473
3V0.75	1.1	BU-BN- GNYE	1.62	4.75 ± 0.3	26.7	320	2.1	4.3	85 120 318
4V0.75	1.1	BU-BN- GY-GNYE	1.62	5.2 ± 0.3	26.7	375	2.8	5.3	85 120 310
2V1	1.2	BU-RD	1.77	5.1 ± 0.2	20.0	370	1.8	4.5	84 090 409
2V1.5	1.5	BU-BN	2.17	6.0 ± 0.3	13.7	524	2.5	6.3	85 170 889
2V2.5	2.5	BU-BN	2.75	7.3 ± 0.3	8.21	767	4.1	9.7	85 170 961

- 1) X: one colour, numbered
 G: one green-yellow core, others one colour, numbered
 V: various colours
- 2) Cores : Core details according to H+S Datasheet 564 264
- 3) R₂₀ : Conductor resistance according to EN 50306-2
- 4) increased sheath thickness
- 5) Triples screened, marking 10, 20, 30, 40, 50
- 6) Elements screened
- 7) Quad-core no.: 1,4,2,3/ 5,8,6,7/ 9,12,10,11/ 13,16,14,15/ 17,20,18,19

Colour Legend:

BK: black
 BN: brown
 RD: red
 OG: orange
 YE: yellow
 GN: green
 BU: blue
 VT: violet
 GNYE: green-yellow
 GY: grey
 WH: white
 PK: pink
 TQ: turquoise