



Traction cable screened RADOX®TENUIS-TW/S EMC

General properties :

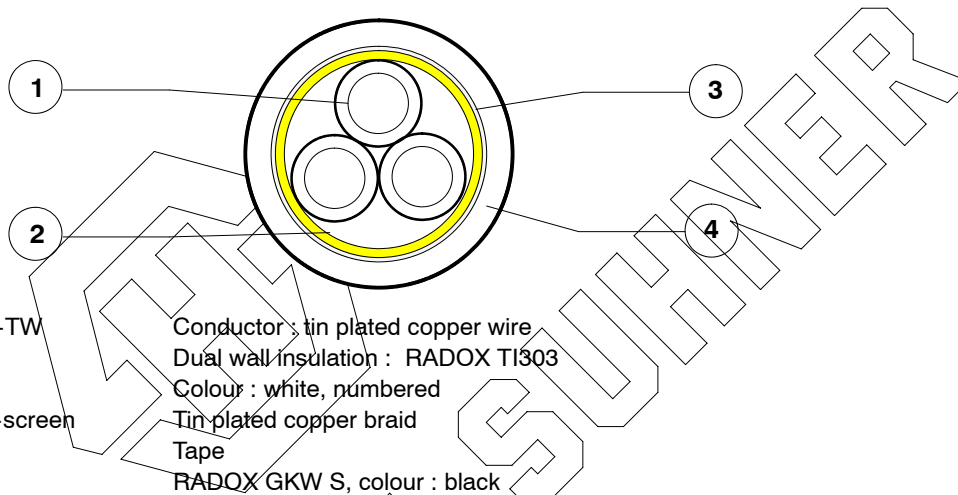
Dual wall insulation of high-tech-polymers with excellent electrical properties; resistant to high and low temperature, oil, acid, alkali, ozone and weathering; limited fire hazard properties, low smoke, halogen free, flame retardant, low toxicity, soldering iron resistant; flexible, easy to strip.

Application :

For permanently protected installation, inside and outside railway rolling stock, busses and other vehicles to connect fixed and sporadic moved parts using DC or AC technologys.

Due to the thin wall insulation and to the comprehensive as well as excellent characteristics these cables are especially suitable as compact lead wires for systems.

For applications with high bending frequencies, such as bogie or connections between wagons, it is recommended to use the specially developed H+S cable families.



1. Cores TENUIS-TW

Conductor : tin plated copper wire
Dual wall insulation : RADOX TI303
Colour : white, numbered
Tin-plated copper braid
Tape
RADOX GWK S, colour : black

2. Standard EMC-screen

3. Wrapping

4. Sheath

Printing on sheath : H + S xxxxxxxx-zzzzzz RADOX TENUIS-TW/S EMC 600/1000 V n x ... mm²

Production lot number

Part number

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, 5 min		3500	V AC
		8400	V DC

Operating temperature			
fixed installation		- 40 ... + 120	°C
free installation / sporadic movement		- 25 ... + 90	°C

Min. bending radius *)			
fixed	at bending angle ≤ 90°	all D	2 x D
	at bending angle > 90°	D ≤ 12 mm	3 x D
	at bending angle > 90°	D > 12 mm	4 x D
free installation / sporadic movement		D ≤ 12 mm	6 x D
		D > 12 mm	8 x D

*) provided that careful and competent handling is used in combination with proven fixture methods

Copyright 2011 Huber + Suhner AG. This document may not be copied nor be passed on to third parties without our written permission.
Uncontrolled copy when printed (will not be updated).

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.

HUBER+SUHNER
Wire+Cable Division

CH-8330 Pfäffikon



+41 (0)1 952 22 11



+41 (0)1 952 26 40

www.hubersuhner.com



Traction cable screened RADOX®TENUIS-TW/S EMC

The cables are in conformity with:

Fire protection on railway vehicles, hazard level	1 - 4	DIN 5510
Vertical flame spread	$50 < L \leq 540 \text{ mm}$	EN 60332-1-2
Vertical flame spread, bunched, $D \leq 6 \text{ mm}$	$L \leq 1.5 \text{ m}$	EN 50305, 9.1.2
Vertical flame spread, bunched, $6 < D < 12 \text{ mm}$	$L \leq 2.5 \text{ m}$	EN 50266-2-5 (EN 50305, 9.1.1)
Vertical flame spread, bunched, $D \geq 12 \text{ mm}$	$L \leq 2.5 \text{ m}$	EN 50266-2-4
Smoke density	$T \geq 60 \%$	EN 61034-2
Corrosivity of combustion gases	$\text{pH} \geq 4.3, C \leq 10 \mu\text{S/mm}$	EN 50267-2-2
Amount of halogen acid gas	$\text{HCl} + \text{HBr} \leq 0.5 \%$	EN 50267-2-1
Content of fluorine	$\text{HF} \leq 0.1 \%$	EN 60684-2, 45.2
Toxicity, insulation	$\text{ITC} \leq 6$	EN 50305, 9.2
Toxicity, filler and sheath	$\text{ITC} \leq 3$	EN 50305, 9.2

Fire protection on railway vehicles, category	A1, A2, B	NF F16-101
Fire protection on railway vehicles, class	C / F0	NF F16-101
Vertical flame spread	$50 < L \leq 540 \text{ mm}$	NF C32-070, 2.1
Vertical flame spread, bunched	$L \leq 300 \text{ mm}$	NF C32-070, 2.2
Smoke index	$\text{I.F.} \leq 5$	X10-702-2, NF X70-100-1

Fire protection on railway vehicles, hazard level	LR1 - LR4	UNI CEI 11170
Vertical flame spread	$50 < L \leq 540 \text{ mm}$	EN 60332-1-2
Vertical flame spread, bunched, $D \leq 6 \text{ mm}$	$L \leq 1.5 \text{ m}$	EN 50305, 9.1.2
Vertical flame spread, bunched, $6 < D < 12 \text{ mm}$	$L \leq 2.5 \text{ m}$	EN 50266-2-5 (EN 50305, 9.1.1)
Vertical flame spread, bunched, $D \geq 12 \text{ mm}$	$L \leq 2.5 \text{ m}$	EN 50266-2-4
Smoke density	$T \geq 70 \%$	EN 61034-2
Corrosivity of combustion gases	$\text{pH} \geq 4.3, C \leq 10 \mu\text{S/mm}$	EN 50267-2-2
Amount of halogen acid gas	$\text{HCl} + \text{HBr} \leq 0.5 \%$	EN 50267-2-1
Toxicity, insulation	$\text{ITC} \leq 6$	EN 50305, 9.2
Toxicity, filler and sheath	$\text{ITC} \leq 3$	EN 50305, 9.2

Fire protection on railway vehicles, hazard level	HL1 - HL3	CEN/TS 45545
Vertical flame spread	$50 < L \leq 540 \text{ mm}$	EN 60332-1-2
Vertical flame spread, bunched, $D \leq 6 \text{ mm}$	$L \leq 1.5 \text{ m}$	EN 50305, 9.1.2
Vertical flame spread, bunched, $6 < D < 12 \text{ mm}$	$L \leq 2.5 \text{ m}$	EN 50266-2-5 (EN 50305, 9.1.1)
Vertical flame spread, bunched, $D \geq 12 \text{ mm}$	$L \leq 2.5 \text{ m}$	EN 50266-2-4
Smoke density	$T \geq 70 \%$	EN 61034-2
Toxicity	$\text{CITc} \leq 0.75$	CEN/TS 45545-2, An. C.16.4

Additional regulations:

H+S: 567 046 Thin wall → RADOX®TENUIS-TW Part 1 - General requirements
RADOX®TENUIS-TW Part 2 - Single core cables
RADOX®TENUIS-TW Part 3 - Multi core cables
H+S: 581998 Traction cable TENUIS-TW/S current rating for multi core cables
H+S: 582716 addendum to data sheet 568354
General Properties, design according to EN 50306
EN 50355 Guide to Use



Traction cable screened RADOX®TENUIS-TW/S EMC

Cable size n x mm ²	Conductor Constr.* n x mm		Conductor dia. nom mm	Core dia. nom mm	Cable dia. nom mm	R ₂₀ * max Ω/km	Fire load kJ/m	Wight copper kg / 100m	H + S Part No.
2 x 0.50	19 x 0.18		0.88	1.43	4.8 ± 0.3	40.1	323	1.8	12568117
3 x 0.50	19 x 0.18		0.88	1.43	5.3 ± 0.3	40.1	383	2.3	12568118
4 x 0.50	19 x 0.18		0.88	1.43	5.4 ± 0.3	40.1	390	2.9	12568119
5 x 0.50	19 x 0.18		0.88	1.43	6.2 ± 0.3	40.1	495	4.4	12581351
6 x 0.50	19 x 0.18		0.88	1.43	6.5 ± 0.3	40.1	526	4.8	12568120
7 x 0.50	19 x 0.18		0.88	1.43	7.2 ± 0.3	40.1	700	5.0	12583138
8 x 0.50	19 x 0.18		0.88	1.43	7.5 ± 0.3	40.1	798	6.7	12581352
9 x 0.50	19 x 0.18		0.88	1.43	7.9 ± 0.3	40.1	730	7.3	12581450
10 x 0.50	19 x 0.18		0.89	1.43	7.9 ± 0.3	40.1	1183	6.62	84112800
12 x 0.50	19 x 0.18		0.88	1.43	8.1 ± 0.3	40.1	770	9.1	12581353
15 x 0.50	19 x 0.18		0.88	1.43	9.0 ± 0.3	40.1	1226	9.6	12582036
16 x 0.50	19 x 0.18		0.89	1.43	9.1 ± 0.3	40.1	1020	9.8	12583727
25 x 0.50	19 x 0.18		0.88	1.43	11.3 ± 0.4	40.1	1828	15.3	12582037
30 x 0.50	19 x 0.18		0.88	1.43	12.3 ± 0.4	40.1	2210	19.3	12582909
36 x 0.50	19 x 0.18		0.88	1.43	13.3 ± 0.4	40.1	2571	22.6	12582038
42 x 0.50	19 x 0.18		0.88	1.43	14.7 ± 0.4	40.1	3061	26.2	12582039



Traction cable screened RADOX®TENUIS-TW/S EMC

Cable size n x mm ²	Conductor Constr.* n x mm		Core dia nom mm	Cable dia. nom mm	R ₂₀ * max Ω/km	Fire load kJ/m	Wight copper kg / 100m		H + S Part No.
2 x 2 x 0.50	19 x 0.18	0.88	1.43	7.2 ± 0.3	40.1	662	3.6	8.0	12568121
3 x 2 x 0.50	19 x 0.18	0.88	1.43	8.1 ± 0.3	40.1	765	4.8	9.8	12581451
4 x 2 x 0.50	19 x 0.18	0.88	1.43	9.3 ± 0.3	40.1	950	6.1	13.1	12568122
5 x 2 x 0.50	19 x 0.18	0.88	1.43	10.3 ± 0.4	40.1	1155	7.9	16.3	12582041
6 x 2 x 0.50	19 x 0.18	0.88	1.43	11.1 ± 0.4	40.1	1370	9.2	18.8	12582042
8 x 2 x 0.50	19 x 0.18	0.89	1.43	13.5 ± 0.4	40.1	2130	13.8	27.2	12583728
10 x 2 x 0.50	19 x 0.18	0.89	1.43	13.7 ± 0.4	40.1	1730	15.7	27	84104571
12 x 2 x 0.50	19 x 0.18	0.88	1.43	13.0 ± 0.3	40.1	1680	20.6	27.6	12581358
2 x (2 x 0.50)	19 x 0.18	0.88	1.43	11.8 ± 0.4	40.1	1950	8.7	22.4	12582040
5 x (2 x 0.50)	19 x 0.18	0.89	1.43	15.8 ± 0.4	40.1	3115	15.7	39.4	84102775
10 x (2 x 0.50)	19 x 0.18	0.88	1.43	21.0 ± 0.5	40.1	4870	30.0	68.2	84089823



Traction cable screened RADOX®TENUIS-TW/S EMC

Cable size n x mm ²	Conductor		Core dia nom mm	Cable dia. nom mm	R ₂₀ * max Ω/km	Fire load kJ/m	Wight copper kg / 100m	H + S Part No.
2 x 0.75	19 x 0.23	1.10	1.63	5.0 ± 0.3	26.7	345	2.6	12568514
3 x 0.75	19 x 0.23	1.10	1.63	5.4 ± 0.3	26.7	380	3.6	12568515
3 G 0.75	19 x 0.23	1.10	1.63	5.4 ± 0.3	26.7	380	3.6	12583993
4 x 0.75	19 x 0.23	1.10	1.63	6.0 ± 0.3	26.7	441	4.8	12568516
4 G 0.75	19 x 0.23	1.10	1.63	6.0 ± 0.3	26.7	441	4.8	12583994
5 x 0.75	19 x 0.23	1.10	1.63	6.7 ± 0.3	26.7	570	5.4	12582044
6 x 0.75	19 x 0.23	1.10	1.63	7.2 ± 0.3	26.7	675	5.9	12568517
7 x 0.75	19 x 0.23	1.10	1.63	8.0 ± 0.3	26.7	863	6.8	12581578
8 x 0.75	19 x 0.23	1.10	1.63	8.4 ± 0.3	26.7	962	8.2	12582045
10 x 0.75	19 x 0.23	1.10	1.63	8.7 ± 0.3	26.7	896	9.6	12582046
12 x 0.75	19 x 0.23	1.10	1.63	9.0 ± 0.3	26.7	910	12.3	12581354
14 x 0.75	19 x 0.22	1.10	1.63	9.8 ± 0.3	26.7	1100	13.1	12584333
16 x 0.75	19 x 0.23	1.10	1.63	10.5 ± 0.4	26.7	1236	14.8	12582047
18 x 0.75	19 x 0.23	1.10	1.63	11.0 ± 0.4	26.7	1397	16.2	12582048
24 x 0.75	19 x 0.23	1.10	1.63	12.8 ± 0.4	26.7	1761	22.8	12582049
2 x 2 x 0.75	19 x 0.23	1.10	1.63	8.2 ± 0.3	26.7	841	4.8	12582050
3 x 2 x 0.75	19 x 0.23	1.10	1.63	9.0 ± 0.3	26.7	978	6.7	12581579
6 x 2 x 0.75	19 x 0.23	1.10	1.63	12.8 ± 0.4	26.7	1680	11.7	12584411
6 x (2 x 0.75)	19 x 0.22	1.10	1.63	19.5 ± 0.5	26.7	4750	24.8	12584429
8 x 2 x 0.75	19 x 0.22	1.10	1.63	15.2 ± 0.5	26.7	2600	18.4	12585078



Traction cable screened RADOX®TENUIS-TW/S EMC

Cable size n x mm ²	Conductor Constr.* n x mm		Core dia nom mm	Cable dia. nom mm	R ₂₀ * max Ω/km	Fire load kJ/m	Wight copper kg / 100m		H + S Part No.
2 x 1.0	19 x 0.25	1.21	1.78	5.6 ± 0.3	20.0	430	2.7	6.0	12568162
3 x 1.0	19 x 0.25	1.21	1.78	6.0 ± 0.3	20.0	460	3.9	7.6	12568163
4 x 1.0	19 x 0.25	1.21	1.78	6.5 ± 0.3	20.0	527	4.9	8.8	12568164
5 x 1.0	19 x 0.25	1.21	1.78	7.0 ± 0.3	20.0	615	6.1	9.9	12583729
6 x 1.0	19 x 0.25	1.21	1.78	7.8 ± 0.3	20.0	795	7.1	11.4	12568165
7 x 1.0	19 x 0.25	1.21	1.78	8.5 ± 0.3	20.0	930	8.3	13.9	12583999
8 x 1.0	19 x 0.25	1.21	1.78	8.9 ± 0.3	20.0	1120	10.8	17.1	12581449
12 x 1.0	19 x 0.25	1.21	1.78	9.9 ± 0.3	20.0	1070	15.6	20.5	12581355
16 x 1.0	19 x 0.25	1.21	1.78	11.2 ± 0.4	20.0	1440	18	25.9	12584811
22 x 1.0	19 x 0.25	1.21	1.78	13.3 ± 0.3	20.0	2064	24.5	37.0	12581356
25 x 1.0	19 x 0.25	1.21	1.78	13.8 ± 0.4	20.0	2110	27.0	39.2	12582051
50 x 1.0	19 x 0.25	1.21	1.78	19.1 ± 0.5	20.0	3970	52.2	74.9	12582052
2 x 2 x 1.0	19 x 0.25	1.21	1.78	8.8 ± 0.3	20.0	892	6.2	11.7	12581357
5 x 2 x 1.0	19 x 0.25	1.21	1.78	12.7 ± 0.4	20.0	1620	15.0	24.7	12584697
6 x 2 x 1.0	19 x 0.25	1.21	1.78	14.0 ± 0.4	20.0	2020	17.9	30.8	12584412
6 x (2 x 1.0)	19 x 0.25	1.21	1.78	19.8 ± 0.5	20.0	4540	27.2	63.2	12584430
8 x 2 x 1.0	19 x 0.25	1.21	1.78	16.7 ± 0.5	20.0	3120	23.7	41.7	12585378
4 x (3 x 1.0)	19 x 0.25	1.21	1.78	17.9 ± 0.5	20.0	3950	25.0	52.5	12585384
3 x 4 x 1.0	19 x 0.25	1.21	1.78	12.4 ± 0.4	20.0	1700	15.8	26.8	12583002
4 x 4 x 1.0	19 x 0.25	1.21	1.78	14.2 ± 0.4	20.0	2160	20.8	33.9	12584118



Traction cable screened RADOX®TENUIS-TW/S EMC

Cable size n x mm ²	Conductor Constr.* n x mm		Conductor dia nom mm	Core dia nom mm	Cable dia. nom mm	R ₂₀ * max Ω/km	Fire load kJ/m	Wight copper kg / 100m		H + S Part No.
2 x 1.5	19 x 0.31		1.52	2.17	6.5 ± 0.3	13.7	563	4.2	8.6	12568172
3 x 1.5	19 x 0.31		1.52	2.17	6.8 ± 0.3	13.7	580	5.5	9.5	12568173
3 G 1.5	19 x 0.31		1.52	2.17	6.8 ± 0.3	13.7	585	5.6	9.6	12583730
4 x 1.5	19 x 0.31		1.52	2.17	7.4 ± 0.3	13.7	665	6.9	11.8	12568174
4 G 1.5	19 x 0.31		1.52	2.17	7.4 ± 0.3	13.7	675	7.0	11.5	12583731
5 x 1.5	19 x 0.31		1.52	2.17	8.3 ± 0.3	13.7	890	8.6	14.2	12582053
5 G 1.5	19 x 0.31		1.52	2.17	8.3 ± 0.3	13.7	850	8.6	14.1	12583732
6 x 1.5	19 x 0.31		1.52	2.17	9.0 ± 0.3	13.7	1020	12.0	16.8	12581465
6 G 1.5	19 x 0.31		1.52	2.17	9.0 ± 0.3	13.7	1010	10.3	16.5	12583733
7 x 1.5	19 x 0.31		1.52	2.17	10.0 ± 0.3	13.7	1270	12.5	20.3	12583734
7 G 1.5	19 x 0.31		1.52	2.17	10.0 ± 0.3	13.7	1270	12.5	20.3	12583735
8 x 1.5	19 x 0.31		1.52	2.17	11.0 ± 0.4	13.7	1610	15.3	23.9	12586408
10 x 1.5	19 x 0.31		1.52	2.17	11.4 ± 0.4	13.7	1490	17.0	29.2	12583544
12 x 1.5	19 x 0.31		1.52	2.17	12.1 ± 0.4	13.7	1700	21.0	31.4	12582054
18 x 1.5	19 x 0.31		1.52	2.17	14.4 ± 0.4	13.7	2490	30.5	45.2	12582056
27 x 1.5	19 x 0.31		1.52	2.17	17.0 ± 0.5	13.7	3240	43.6	62.1	12582057



Traction cable screened RADOX®TENUIS-TW/S EMC

Cable size n x mm ²	Conductor		Core dia. nom mm	Cable dia. nom mm	R ₂₀ * max Ω/km	Fire load kJ/m	Wight copper kg / 100m		H + S Part No.
2 x 2 x 1.5	19 x 0.31	1.52	2.17	10.6 ± 0.4	13.7	1300	9	17.9	84105087
4 x 2 x 1.5	19 x 0.31	1.52	2.17	13.5 ± 0.4	13.7	1840	16.7	29.3	12585486
4 x (2 x 1.5)	19 x 0.31	1.52	2.17	19.6 ± 0.5	13.7	4900	27.9	62.1	12585504
6 x 2 x 1.5	19 x 0.31	1.52	2.17	16.3 ± 0.5	13.7	2740	23.1	40.7	12585487
6 x (2 x 1.5)	19 x 0.31	1.52	2.17	24.0 ± 0.5	13.7	7670	39.2	90.9	12585505
3 x 4 x 1.5	19 x 0.31	1.52	2.17	14.8 ± 0.4	13.7	2460	23	39	12584953



Traction cable screened RADOX®TENUIS-TW/S EMC

Cable size n x mm ²	Conductor		Core dia nom mm	Cable dia. nom mm	R ₂₀ * max Ω/km	Fire load kJ/m	Wight copper kg / 100m	H + S Part No.
	Constr.* n x mm	dia nom mm						
2 x 2.5	19 x 0.40	1.96	2.75	7.8 ± 0.3	8.21	806	6.3	12.2
3 x 2.5	19 x 0.40	1.96	2.75	8.2 ± 0.3	8.21	860	8.45	14.2
4 x 2.5	19 x 0.40	1.96	2.75	9.1 ± 0.3	8.21	1050	11.4	18.1
4 G 2.5	19 x 0.40	1.96	2.75	9.1 ± 0.3	8.21	1050	11.1	17.7
5 x 2.5	19 x 0.40	1.96	2.75	10.3 ± 0.4	8.21	1278	14.3	22.4
6 x 2.5	19 x 0.40	1.96	2.75	11.4 ± 0.4	8.21	1650	16.5	26.8
7 x 2.5	19 x 0.40	1.96	2.75	12.5 ± 0.4	8.21	1950	20.9	32.9
10 x 2.5	19 x 0.40	1.96	2.75	14.2 ± 0.4	8.21	2180	28.4	42
2 x 2 x 2.5	19 x 0.40	1.96	2.75	13.2 ± 0.4	8.21	2035	15	28.6
2 x 4.0	56 x 0.31	2.46	3.35	8.9 ± 0.3	5.09	1005	9.28	15.9
3 x 4.0	56 x 0.31	2.46	3.35	9.7 ± 0.3	5.09	1140	12.9	20.6
4 x 4.0	56 x 0.31	2.46	3.35	11.0 ± 0.4	5.09	1445	17.7	26.9



Traction cable screened RADOX®TENUIS-TW/S EMC

Cable size n x mm ²	Conductor		Core dia. nom mm	Cable dia. nom mm	R ₂₀ * max Ω/km	Fire load kJ/m	Wight		H + S Part No.
	Constr.* n x mm	dia. nom mm					copper kg / 100m	cable	
4 x 0.75 + 2 x 1.5	19 x 0.22	1.10	1.63	8.0 ± 0.3	26.7	775	7.49	12.5	84116373
	19 x 0.31	1.52	2.17		13.7				

* (typical value x max. single wire diameter, conductor resistance according to IEC 60228)

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[HUBER+SUHNER:](#)

[12582050](#)