



# Traction cable

## RADOX 9 GWK-AX 3600V M

### Product description:

**RADOX 9 GWK-AX 3600V M** Single core cables with reduced wall thickness  
 Nominal voltage: 3600 / 6000 V AC  
 Hazard level: M (extra low temperature, extra oil and extra fuel resistant)

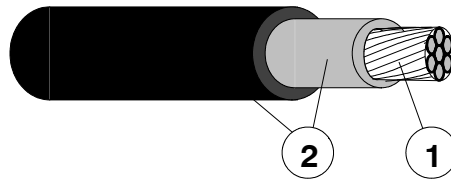
### General Properties:

Halogen free, electron-beam cross-linked cables with improved behaviour in case of fire, easy to strip, soldering resistant and flexible. Excellent ozone, chemical, weather and UV resistance. The cables are in accordance to EN 50264-3-1, but significantly thinner.

### 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.  
 For unscreened cables the guidelines of EN 50153 shall be followed.

### General composition of cable:



1. Conductor : stranded tin plated copper, acc. to EN 60228 cl. 5
2. Insulation : inner layer RADOX EI 110, colour: red  
 outer layer RADOX EI 109, colour : black (see table 1),  
 coloured (see table 2)

### Marking:

[a] HUBER+SUHNER RADOX 9 GWK-AX 3600V [b] M [c]- [d] [e] [f]

		example:
[a]	Meter marking (in m)	= 1234 = m
[b]	Construction	1X150
[c]	Part number	12345678
[d]	Batch number	1234567
[e]	Production week and year	03- 2017
[f]	Production place (only if China)	CN

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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	.....	$U_0$	.....	3600	.....	V AC
Voltage rating cond.- cond.	.....	$U$	.....	6000	.....	V AC
maximum permissible Voltage rating AC cond.- earth	.....		.....	4300	.....	V AC
maximum permissible Voltage rating AC cond.- cond.	.....	$U_m$	.....	7200	.....	V AC
maximum permissible Voltage rating DC cond.- earth	.....	$V_0$	.....	5400	.....	V DC
maximum permissible Voltage rating DC cond.- cond.	.....		.....	9000	.....	V DC
Test voltage.	.....		.....	11000	.....	V AC
Temperature range	.....		.....	- 50 ... + 120	.....	°C

### Min. bending radius

fixed	.....	$D \leq 12 \text{ mm}$	.....	3 x D
	.....	$D > 12 \text{ mm}$	.....	4 x D
sporadic movement	.....	$D \leq 12 \text{ mm}$	.....	4 x D
	.....	$D > 12 \text{ mm}$	.....	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 EN 60811- 1- 4 Par. 8, respectively low temperature behaviour tests for static conditions, e.g. for fixed installation 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.



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### The cables are in conformity with:

<b>Fire protection on railway vehicles, hazard level</b> . . . . .	<b>HL1 - HL3</b> . . . . .	<b>EN 45545</b>
Vertical flame spread . . . . .	50 < L ≤ 540 mm . . . . .	EN 60332- 1- 2
Vertical flame spread, bunched, D ≤ 6 mm . . . . .	L ≤ 1.5 m . . . . .	EN 50305, 9.1.2
Vertical flame spread, bunched, 6 < D < 12 mm . . . . .	L ≤ 2.5 m . . . . .	EN 50305, 9.1.1 (EN 60332- 3- 25)
Vertical flame spread, bunched, D ≥ 12 mm . . . . .	L ≤ 2.5 m . . . . .	EN 60332- 3- 24
Smoke density . . . . .	T ≥ 70 % . . . . .	EN 61034- 2
Toxicity . . . . .	ITC ≤ 6 . . . . .	EN 50305, 9.2
<b>Fire protection on railway vehicles, level of protection</b> . . . . .	<b>1 - 4</b> . . . . .	<b>DIN 5510</b>
Vertical flame spread . . . . .	50 < L ≤ 540 mm . . . . .	EN 60332- 1- 2
Vertical flame spread, bunched, D ≤ 6 mm . . . . .	L ≤ 1.5 m . . . . .	EN 50305, 9.1.2
Vertical flame spread, bunched, 6 < D < 12 mm . . . . .	L ≤ 2.5 m . . . . .	EN 60332- 3- 25
Vertical flame spread, bunched, D ≥ 12 mm . . . . .	L ≤ 2.5 m . . . . .	EN 60332- 3- 24
Smoke density . . . . .	T ≥ 60 % . . . . .	EN 61034- 2
Corrosivity of combustion gases . . . . .	pH ≥ 4.3, C ≤ 10 μS/mm . . . . .	EN 50267- 2- 2
Amount of halogen acid gas . . . . .	HCl + HBr ≤ 0.5 % . . . . .	EN 50267- 2- 1
Content of fluorine . . . . .	HF ≤ 0.1 % . . . . .	EN 60684- 2, 45.2
Toxicity . . . . .	ITC ≤ 3 . . . . .	EN 50305, 9.2
<b>Fire protection on railway vehicles, category</b> . . . . .	<b>A1, A2, B</b> . . . . .	<b>NF F16- 101</b>
Fire protection on railway vehicles, class . . . . .	C / F1 . . . . .	NF F16- 101
Vertical flame spread . . . . .	50 < L ≤ 540 mm . . . . .	NF C32- 070, 2.1
Vertical flame spread, bunched . . . . .	L ≤ 300 mm . . . . .	NF C32- 070, 2.2
Smoke index . . . . .	I.F. ≤ 5 . . . . .	X10- 702- 2, NF X70- 100- 1
<b>Fire protection on railway vehicles, hazard level</b> . . . . .	<b>LR1 - LR4</b> . . . . .	<b>UNI CEI 11170</b>
Vertical flame spread . . . . .	50 < L ≤ 540 mm . . . . .	EN 60332- 1- 2
Vertical flame spread, bunched, D ≤ 6 mm . . . . .	L ≤ 1.5 m . . . . .	EN 50305, 9.1.2
Vertical flame spread, bunched, 6 < D < 12 mm . . . . .	L ≤ 2.5 m . . . . .	EN 60332- 3- 25
Vertical flame spread, bunched, D ≥ 12 mm . . . . .	L ≤ 2.5 m . . . . .	EN 60332- 3- 24
Smoke density . . . . .	T ≥ 70 % . . . . .	EN 61034- 2
Corrosivity of combustion gases . . . . .	pH ≥ 4.3, C ≤ 10 μS/mm . . . . .	EN 50267- 2- 2
Amount of halogen acid gas . . . . .	HCl + HBr ≤ 0.5 % . . . . .	EN 50267- 2- 1
Toxicity . . . . .	ITC ≤ 3 . . . . .	EN 50305, 9.2
<b>Fire protection on railway vehicles, category</b> . . . . .	<b>Ia, Ib, II</b> . . . . .	<b>BS 6853, GM/RT 2130</b>
Vertical flame spread . . . . .	50 < L ≤ 540 mm . . . . .	EN 60332- 1- 2
Vertical flame spread, bunched . . . . .	L ≤ 2.5 m . . . . .	EN 50266, BS 6853 An. D.8.7
Smoke density . . . . .	A <sub>0</sub> ≤ BS 6853 . . . . .	BS 6853 An. D.8.7
Toxicity . . . . .	R ≤ 1.0 . . . . .	BS 6853 An. B.1
<b>Fire protection on railway vehicles</b> . . . . .	<b>Fulfilled</b> . . . . .	<b>NFPA 130</b>
Vertical flame spread, bunched . . . . .	L ≤ 1.5 m . . . . .	UL 1685, 12 (FT4 exp.)
Smoke density . . . . .	TSR ≤ 150 m <sup>2</sup> , PSRR ≤ 0.40 m <sup>2</sup> /s . . . . .	UL 1685, 12 (FT4 exp.)

### Requirement of hazard level code M

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

### Applicable documents:

H+S 557 578 : Current rating for single core cables



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**Table 1 :** Isolation outer layer colour: black

Cable type mm <sup>2</sup>	Conductor <sup>nom</sup> construction n x mm		Cable dia. mm	R <sub>20</sub> <sup>1)</sup> max Ω / km	C <sub>H2O</sub> <sup>2)</sup> nom pF/m	Fireload nom kJ / m	Weight <sup>nom</sup> copper cable kg / 100m		H+S Part. Nr.
	D mm								
1.5	37x0.23	1.5	4.50±0.10	13.7	215	317	1.4	3.6	12 537 829
2.5	61x0.23	1.9	5.10±0.10	8.21	242	397	2.2	4.9	12 537 830
4	61x0.29	2.4	5.70±0.10	5.09	280	474	3.5	6.7	12 537 831
6	84x0.3	2.9	6.30±0.10	3.39	309	560	5.2	8.9	12 537 832
10	80x0.4	3.9	7.50±0.15	1.95	363	742	9.1	14.1	12 545 520
16	119x0.4	5.3	9.40±0.15	1.24	416	1138	13	21	12 544 525
25	182x0.4	6.6	11.0±0.3	0.795	471	1444	21	30	12 547 257
35	266x0.4	7.8	12.6±0.3	0.565	502	1868	30	42	12 547 260
50	378x0.4	9.3	14.6±0.3	0.393	537	2355	43	58	12 545 521
70	348x0.5	11.4	16.7±0.3	0.277	637	2720	61	80	12 547 262
95	444x0.5	12.9	18.7±0.3	0.210	658	3404	78	101	12 547 264
120	570x0.5	14.9	21.0±0.3	0.164	704	4441	100	128	12 545 522
150	722x0.5	16.8	23.2±0.3	0.132	752	5208	127	160	12 547 268
185	874x0.5	18.3	25.0±0.3	0.108	781	5593	153	189	12 545 523
240	1147x0.5	21.1	28.0±0.3	0.0817	863	6462	201	243	12 547 678
300	1443x0.5	23.7	30.8±0.3	0.0654	933	7379	253	301	12 551 573
400	1952x0.5	27.3	35.3±0.5	0.0495	955	10112	343	404	12 564 160



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**Table 2 :** Isolation outer layer colour: see table

Cable type mm <sup>2</sup>	Conductor nom		Cable dia. mm	R <sub>20</sub> <sup>1)</sup> max Ω / km	C <sub>H2O</sub> <sup>2)</sup> nom pF/m	Fireload nom kJ / m	Weight nom		Colour <sup>3)</sup>	H+S Part. Nr.
	construction n x mm	D mm					copper	cable		
1.5	37x0.23	1.5	4.50±0.10	13.7	215	317	1.4	3.6	gy	84 096 994
4	61x0.29	2.4	5.70±0.10	5.09	280	474	3.5	6.7	og	12 583 016
6	84x0.4	2.9	6.30±0.10	3.39	309	560	5.2	8.9	og	85 020 961
10	80x0.4	3.9	7.50±0.15	1.95	363	742	9.1	14.1	og	12 583 017
16	119x0.4	5.3	9.40±0.15	1.24	416	1138	13	21	og	12 583 018
25	182x0.4	6.6	11.0±0.3	0.795	471	1444	21	30	og	85 088 677
50	378x0.4	9.3	14.6±0.3	0.393	537	2623	43	60	og	85 018 076
70	348x0.5	11.4	16.7±0.3	0.277	637	3096	61	81	og	85 018 068

1) conductor resistance according to EN 60228

2) capacity in water

3) gy: grey  
og: orange