Railway products

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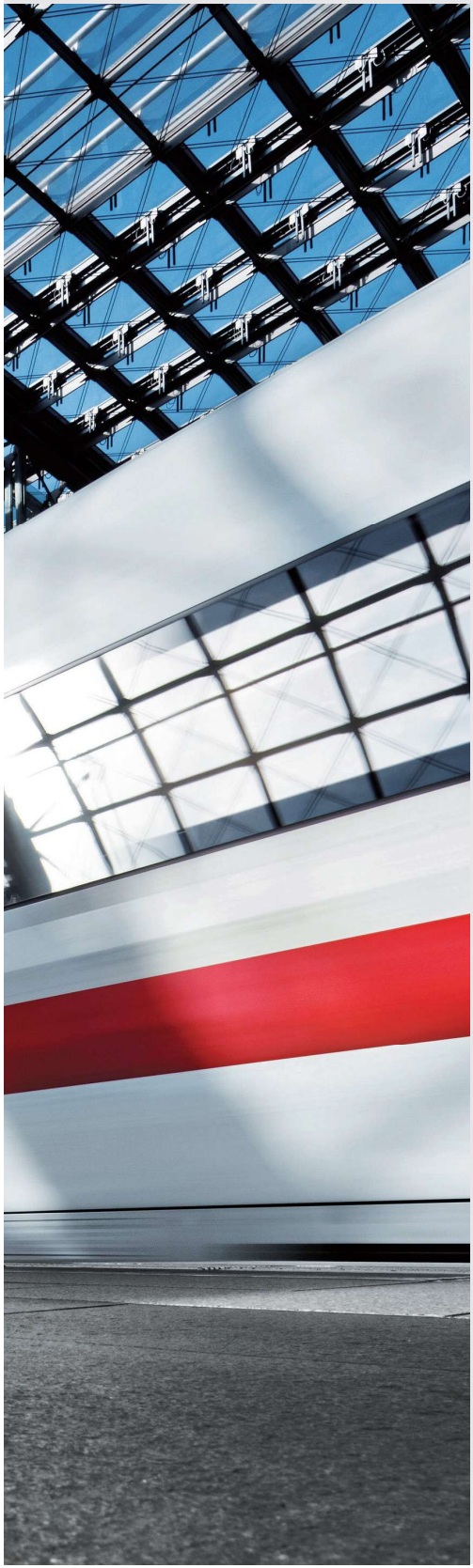
HUBER+SUHNER
Excellence in Connectivity Solutions

Bridging our technologies



Interdisciplinary knowledge

The HUBER+SUHNER Group is a leading international manufacturer of electrical and optical interconnectivity components and systems. Our main markets are communication, transport and industry. Under one roof, we combine technological capabilities in the three core fields of Radio Frequency (RF), Fiber Optics (FO) and Low Frequency (LF). As one of Europe's leading suppliers, HUBER+SUHNER offers a wide range of products which provides the platform to build modern rail vehicles. New and innovative products based on our proven technologies support you to fulfil the demanding requirements of the railway industry.

HUBER+SUHNER

Excellence in Connectivity Solutions

Railway products overview

HUBER+SUHNER
Excellence in Connectivity Solutions

Engineering services

Our years of experience in the field of Rail enable us to offer our customers individualised solution packages which – in addition to the selection of the most suitable products – also include the related services.

We are proud of the smooth collaboration with our customers, with whose assistance we continuously further develop our products. Our services are designed to make it easier for our customers to apply our components.

Design support
- Creation of customer-specific solutions by our applications engineers
- Determination and definition of customer-specific products
- Exchange of CAD data for ensuring optimal design-in of our components in our customers' systems
- Investigation of special effects in the application of our products
- Environmental tests in our in-house test facilities

Project development
- Project management
- Materials planning, compilation of component kits
- Assistance during installation

Training
- Local on-site product training courses by our specialists
- Individual compiled workshops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RADOX® traction cables

RADOX® traction cables

What does RADOX mean?
The HUBER+SUHNER registered trademark RADOX® stands for electron-beam crosslinked insulation materials. RADOX insulation materials deliver outstanding resistance to thermal, chemical, electrical and mechanical loads.

The advantages of RADOX materials
RADOX materials do not melt, even at extremely high temperatures, and retain dimensional stability in the event of a short circuit.

Due to their superlative insulating properties, RADOX railway cables do not need thick walls. This greatly reduces the amount of space required and the cable weight.

The RADOX railway cable range has been tested successfully in accordance with European cable standards EN 50264 and EN 50306, as well as standards GOST 20.57.406-81, Method 204-1 and GOST 17491-80. This gives customers an additional safety factor.

Temperature range of RADOX traction cables
–50	tested in Russian laboratories
+120 °C	with a service life of 20 000 hours

Insulation and sheath materials compliant with European cable standards
The European cable standards impose demanding requirements with regard to mechanical, thermal, chemical and fire safety properties. The fire safety stipulations are described in the cable standards EN 50264 and EN 50306, as well as in fire safety standard EN 45545-2.

The halogen-free, electron-beam crosslinked RADOX materials meet the highest requirements (M) for each standard and the hazard level (HL3).

Properties	Requirements
• Particularly low temperature	–40 °C
• Particularly oil-resistant	IRM 902, 24 hrs/72 hrs, 100 °C (duration dependent on cable standard, 24 hrs = EN 50306-2)
• Particularly fuel-resistant	IRM 903, 168 hrs, 70 °C

Assignment of hazard levels (HL) in acc. with EN 45545-2

	Operation categories / Design categories	N	A	D	S
		Standard vehicles	Automatic vehicles	Double decked vehicles	Sleeping cars
1	No underground sections Immediate evacuation possible	HL 1	HL 1	HL 1	HL 2
2	With underground sections Evacuation within a short time possible	HL 2	HL 2	HL 2	HL 2
3	With underground sections Evacuation within a long time possible	HL 2	HL 2	HL 2	HL 3
4	With underground sections Without side evacuation	HL 3	HL 3	HL 3	HL 3

RADOX® traction cables

As one of the leading providers of standard and customer-specific cables and cable systems, HUBER+SUHNER delivers the optimum solution for the wiring of rail vehicles such as regional trains, high-speed trains, underground railways, trams and locomotives.

Its many years of experience in the rail sector give customers the reassuring knowledge that, with HUBER+SUHNER, they will receive innovative products that work perfectly.

RADOX railway cables meet the demanding requirements of the rail market by virtue of the following key properties:

- Enhanced fire safety
- Enhanced mechanical resistance
- Enhanced media resistance
- Enhanced temperature range
- Secure signal and power transmission
- Weight reduction
- Space reduction
- Lower service cycle costs

The global sales organisation guarantees an on-site presence and local support.

RADOX® traction cables

RADOX cable code (example)

HUBER+SUHNER labels its traction cables in accordance with cable standards EN 50264 and EN 50306.

Labelling examples

HUBER+SUHNER	RADOX	4 GKW-AX	1800 V	3 × 2.5	MM	12564186	7654321
1	2	3	6	7	8 9	12	13

HUBER+SUHNER	RADOX	EN 50306-4	3 P	300 V	4 × 0.75	MM	S	90	12564186	7654321	Date of production
1	2	3	4 5	6	7	8 9	10	11	12	13	14

Description

1.	Name of producer	HUBER+SUHNER
2.	Registered brand of HUBER+SUHNER	RADOX®
3.	Name of cable familia	4 GKW-AX oder EN 50306 oder 3 GKW ...
4.	Construction according to table in EN 50306-standard	1. unscreened; 3. screened; 5. pairs screened
5.	Installation of the cable	P: protected installation; E: unprotected installation
6.	Voltage rating	V AC
7.	Number of cores and conductor nominal cross section	(mm^2)
8.	Hazard level for insulation	M
9.	Hazard level for sheath	M
10.	Screen	S
11.	Nominal temperature	°C only for EN 50306 cores/cables
12.	Item no.	
13.	Production number	
14.	Date of production	ww-yyyy (optional)

RADOX® railway cables – selection table

Voltage	RADOX® cable family	Cross section	Number of cores	Temperature range	Single core		
		mm^2		°C	un-screened	screened	
300/500 V AC	EN 50306-2	0.5 - 2.5	1	–40 to +120	X		
	EN 50306-3	0.5 - 2.5	1- 4	–40 to +120		X	
	EN 50306-4 1P	0.5 - 2.5	2 - 48	–40 to +120			
	EN 50306-4 1E						
	EN 50306-4 3P	0.5 - 2.5	2 - 8	–40 to +120			
	EN 50306-4 3E						
	EN 50306-4 5P	0.5 - 1.5	2 - 7 pairs	–40 to +120			
	EN 50306-4 5E						
	3 GKW 300V M FR RW	1 - 2.5	1	–50 to +120	X		
	3 GKW 300V MM FR RW	0.5 - 2.5	2 - 25				
	3 GKW 300V MM S FR RW	0.5 - 2.5	2 - 20				
600/1000 V AC	TENUIS-TW 600V M	0.5 - 4.0	1	–50 to +120	X		
	TENUIS-TW 600V MM	0.5 - 4.0	2 - 95				
	TENUIS-TW 600V MM S	0.5 - 4.0	2 - 95				
	GKW-LW 600V M	0.5 - 2.5	1	–50 to +120	X		
	GKW-LW 600V MM	0.5 - 2.5	2 - 50				
	GKW-LW 600V MM S	0.5 - 2.5	2 - 50				
	3 GKW 600V	0.5 - 400	1	–50 to +120	X		
	3 GKW 600V XM	0.5 - 35	2 - 50				
	3 GKW 600V XM S	0.5 - 50	2 - 50				
	EN 50264-3-1 600V M	1 - 400	1	–50 to +120	X		
	EN 50264-3-2 600V MM	1.5 - 50	2 - 4				
	EN 50264-3-2 600V MM S	1.5 - 50	2 - 4				
	3 GKW 600V FR	1 - 50	1	–50 to +120	X		
	3 GKW 600V XM FR	1.5 - 50	3 - 7				
1800/3000 V AC	4 GKW-AX 1800V M	0.5 - 400	1	–50 to +120	X		
	4 GKW-AX 1800V MM S	1.5 - 400	1			X	
	4 GKW-AX 1800V MM S	1.5 - 95	2 - 20				
	EN 50264-3-1 1800V M	1.5 - 400	1	–50 to +120	X		
	EN 50264-3-1 1800V MM				X		
	4 GKW-AX 1800V M J	16 - 300	1	–50 to +120	X		
	4 GKW-AX 1800V M FR	1.5 - 240	1	–50 to +120	X		
3600/6000 V AC	9 GKW-AX 3600V M	1.5 - 300	1	–50 to +120	X		
	9 GKW-AX 3600V MM S	1.5 - 300	1			X	
	9 GKW-AX 3600V MM S	1.5 - 300	2				
	EN 50264-3-1 3600V MM	2.5 - 400	1	–50 to +120			

	With additional sheath	Multi core		Multipair	Installation		Insulation		Detailed information
		un-screened	screened		protected	exposed	thin wall	reduced wall	page
							X		18
			X		X		X		20
		X			X		X		22
		X				X	X		24
			X		X		X		26
			X			X	X		28
				X	X		X		30
				X		X	X		32
							X		126
		X					X		128
			X				X		130
							X		36
		X		X			X		38
			X	X			X		40
							X		44
		X		X			X		46
			X	X			X		48
								X	52
		X		X				X	54
			X	X				X	56
								X	80
		X						X	88
			X					X	90
								X	132
		X						X	134
								X	60
								X	62
			X					X	64
								X	82
	X							X	84
					X			X	68
								X	138
								X	72
								X	74
			X						76
	X							X	86