

# **POLYENEX<sup>®</sup>**

## **Rolling Stock Wires & Cables**



# Hitachi Metals' Rolling Stock Cables

Given the advancement and modernization of rail networks in various regions of the world, there is growing and evolving global demand for rolling stock and its components. To meet such global demand, Hitachi Metals offers a variety of cables to support rolling stock applications in various parts of the world. We have achieved key international fire safety certifications including but not limited to EN standard and make highly flexible products that satisfy individual requirements of our clients.

Hitachi Metals continues to develop products that are lightweight, combustion-resistant, durable and compliant with relevant international standards. Throughout our more than 50-year history of material development and innovation, we have been developing crosslinked polyolefin, engineering plastics, silicon rubber, and other halogen-free materials. At the same time we have decreased the incidence of fire spreading, emission of smoke and toxic gases that reduce safety in case of a fire and provided outstanding resistance to oils and fuels.

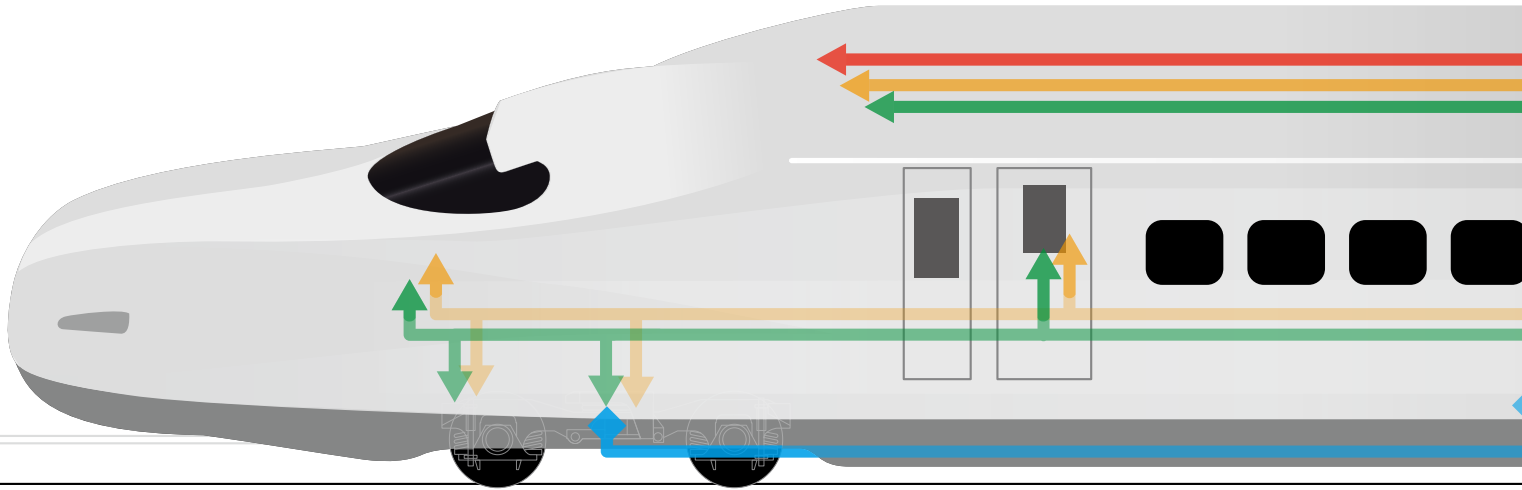
Based on its rich global experience Hitachi Metals remains very confident in its capability to satisfy demanding needs, supply wide-ranging products and contribute to the rolling stock industry.



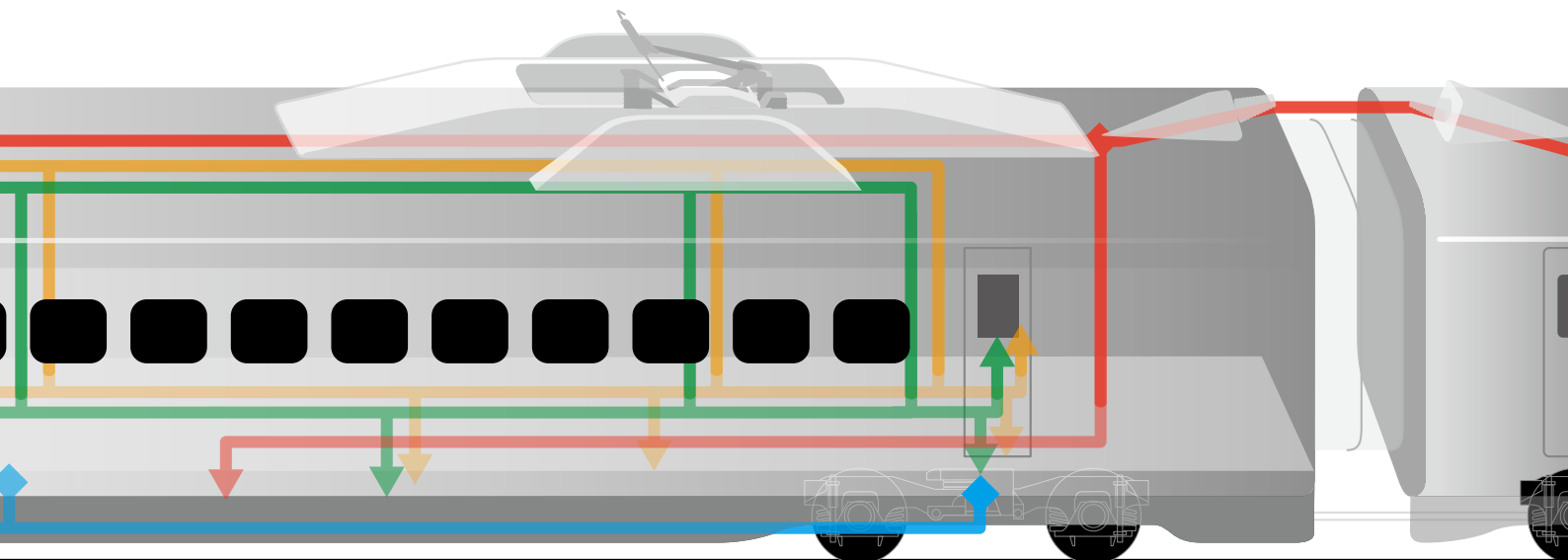
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# One Stop Shop Rolling Stock Cable Solutions (from floor to roof)



	<b>Main Circuit Cables</b>		<b>General Circuit Cables</b>	
<b>Application</b>	<b>Main Power Supply</b> - Traction Circuit - Circuit Breaker		<b>Auxiliary Power Supply &amp; Equipment Control Circuit</b> - Lighting - Door Operation - Control Circuit - Interlocking Circuit	
<b>Unified -FS Series</b>	HF-WP (TYPE-S)	<b>P9-10</b>	HF-WP (TYPE-S)	<b>P8</b>
			NH-WEXO 102S/103S/104S	<b>P11</b>
<b>EN compliant Series</b>	EN50264-3-1	<b>P16-18</b>	EN50306-2	<b>P12</b>
			EN50306-3	<b>P13</b>
			EN50306-4	<b>P14</b>
	EN50382-2	<b>P20-23</b>	EN50264-3-1	<b>P15</b>
			EN50264-3-2	<b>P19</b>
<b>NFPA compliant Series</b>	C-WFM2	<b>P25</b>	N-RFH1	<b>P24</b>
			WFHF 102S/103S/104S	<b>P26</b>



<b>Communication Cables</b>		<b>High Voltage Cable</b>	
<b>Data and Multimedia Transmission</b> <ul style="list-style-type: none"> <li>- Train Control system</li> <li>- Train Communication Network System</li> <li>- Passenger Information System</li> </ul>		<b>High Voltage Rooftop System</b> <ul style="list-style-type: none"> <li>- From Pantograph to Transformer</li> <li>- Power Distribution between Coaches</li> </ul>	
<b>Communication Series</b>		<b>High Voltage Cable</b>	
CAN CO-IREE-SB (X)	<b>P27</b>	26/45KV HF-WEP	<b>P33</b>
MVB CO-IREE-SB (X)	<b>P28</b>		
WTB CO-IREE-SB (X)	<b>P29</b>		
CAT5e CO-IREE-SB CX100 (X)	<b>P30</b>		
CAT7 CO-IREE-SB C7E (X)	<b>P31</b>		
COAXIAL50 CO-IREE-SX CX50	<b>P32</b>		

# SELECTION TABLE

Product Portfolio	Type of cable	Rated voltage Uo/U (V)	Operating temp.range (°C)	
Unified -FS Series	0.6/1.0kV HF-WP (TYPE-S)	AC 0.6/1.0 kV	-40 ~ 120°C	
	1.8/3.0kV HF-WP (TYPE-S)	AC 1.8/3.0 kV		
	3.6/6.0kV HF-WP (TYPE-S)	AC 3.6/6.0 kV		
	NH-WEXO 102S/103S/104S	AC 600V	-40 ~ 110°C	
EN compliant Series	EN50306-2 300V	AC 300/500 kV	-40 ~ 125°C	
	EN50306-3 300V	AC 300/500 kV	-40 ~ 125°C	
	EN50306-4 3P/3E 300V	AC 300/500 kV	-40 ~ 120°C	
	EN50264-3-1 600V	AC 0.6/1.0 kV	-40 ~ 120°C	
	EN50264-3-1 1800V	AC 1.8/3.0 kV		
	EN50264-3-1 1800V Sheathed	AC 1.8/3.0 kV		
	EN50264-3-1 3600V	AC 3.6/6.0 kV		
	EN50264-3-2 600V	AC 0.6/1.0 kV	-40 ~ 120°C	
	EN50382-2 1800V	AC 1.8/3.0 kV	-40 ~ 120°C	
	EN50382-2 1800V Sheathed	AC 1.8/3.0 kV		
	EN50382-2 3600V	AC 3.6/6.0 kV		-40 ~ 150°C
	EN50382-2 3600V Sheathed	AC 3.6/6.0 kV		
NFPA compliant Series	N-RFH1	AC 600V	-50 ~ 150°C	
	C-WFM2	AC 1500V	-50 ~ 200°C	
	WFHF 102S/103S/104S	AC 600V	-50 ~ 150°C	
Communication Series	CAN CO-IREE-SB (X)	AC 300V	-40 ~ 80°C	
	MVB CO-IREE-SB (X)	AC 300V	-40 ~ 80°C	
	WTB CO-IREE-SB (X)	AC 300V	-40 ~ 80°C	
	CAT5e CO-IREE-SB CX100 (X)	AC 30V	-40 ~ 80°C	
	CAT7 CO-IREE-SB C7E (X)	AC 30V	-40 ~ 80°C	
	COAXIAL50 CO-IREE-SX CX50	AC 300V	-40 ~ 80°C	
High Voltage Cable	26/45KV HF-WEP	AC 26/45 kV	Fixed: -40 ~ 90°C Moving: -25 ~ 90°C	

## Unified -FS Series

These are halogen-free cables compliant with European fire safety standards EN45545-2, BS6853 and DIN5510-2. When exposed to fire, these materials prove to be highly flame-retardant and resist the spread of fires. Should a fire break out, these cables emit very little smoke and toxic gases resulting in considerable health and safety improvements.

In satisfying various fire safety standards in one cable, this series of products can be used in a wide variety of applications.

## NFPA compliant Series

These cables conform to the American fire safety standard NFPA130 and the European fire safety standard EN45545-2. The insulating material uses fluororesin to ensure outstanding flame-retardance and resistance against scratches, while being highly resistant to heat and cold. This results in cables that can be used across a wide range of temperatures.

## EN compliant Series

These halogen-free cables comply with EN 50306, EN 50264, and EN 50382. The cables use engineering plastics blended with flexible elastomer, crosslinked polyolefin with superior oil-resistance & fuel-oil-resistance, or high heat-resistant & low smoke silicone materials. These materials provide very robust products that satisfy various performance requirements in one cable solution.

This series of products is highly flame-retardant, with low smoke emission and low toxicity, while offering excellent environmental, mechanical, and electrical characteristics.

## Communication Series

These halogen-free communication cables comply with European fire safety standards EN45545-2 and DIN5510-2. Offering excellent environmental characteristics, these materials are highly flame-retardant, offer low smoke emission and low toxicity, and thus provide a high degree of safety when exposed to fire.

This series of communication cables covers frequency band up to 6GHz.

	Cross section (mm <sup>2</sup> )	Number of cores	Fire safety				Page
			EN45545-2 <sup>※1</sup>	BS6853	DIN5510-2	NFPA130	
	0.5 ~ 150	1	○	○	○	—	8
	1.5 ~ 150	1	○	○	○	—	9
	1.5 ~ 150	1	○	○	○	—	10
	0.5 ~ 1.0	2 ~ 4	○	○	○	—	11
	0.5 ~ 2.5	1	○	—	—	—	12
	0.5 ~ 2.5	1 ~ 4	○	—	—	—	13
	0.5 ~ 2.5	3 ~ 4	○	—	—	—	14
	1.0 ~ 300	1	○	—	—	—	15
	10 ~ 300	1	○	—	—	—	16
	25 ~ 300	1	○	—	—	—	17
	25 ~ 300	1	○	—	—	—	18
	1.5 ~ 6	2 ~ 4	○	—	—	—	19
	1.5 ~ 240	1	○	—	—	—	20
	1.5 ~ 240	1	○	—	—	—	21
	4 ~ 240	1	○	—	—	—	22
	4 ~ 240	1	○	—	—	—	23
	1.25 ~ 3.5	1	○	—	—	○	24
	35 ~ 240	1	○	—	—	○	25
	0.75 ~ 2.0	2 ~ 4	○ <sup>※2</sup>	—	—	○	26
	0.5	3	○	—	○	—	27
	0.5	4	○	—	○	—	28
	0.5 ~ 1.5	2	○	—	○	—	29
	0.25 ~ 0.75	4 2×2	○	—	○	—	30
	24AWG	4×2	○	—	○	—	31
	0.5 ~ 4.5	1	○	—	○	—	32
	50 ~ 120	1	—	—	○	—	33

※1 Fire protection level : Interior HL3/Exterior HL3 ※2 Fire protection level : Interior HL2/Exterior HL3

## Symbols



Rated voltage  
U<sub>o</sub>/U



Operating  
temp. range



Flame  
retardant



Fire retardant



Smoke density



Gases toxicity



Gases  
corrosivity



Halogen free



Oil and fuel  
resistant



Acid and alkaline  
resistant



Ozone resistant



Cold resistant



Minimum bending  
radius when  
installed



Minimum bending  
radius when  
laying

(D: overall diameter of cable)

# POLYENEX – Unified-FS Series – 0.6/1.0kV HF-WP (TYPE-S)

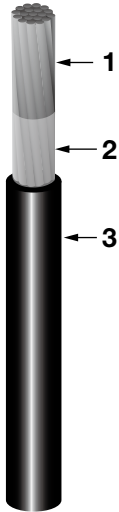
Single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext. HL3

BS6853  
Int. Ia / ext. Ia

DIN5510-2  
1, 2, 3, 4



## Properties

Halogen Free, High flame resistance, Low smoke fume, Low toxicity, Heat/cold resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Cross-linked polyolefin (black)

- Rated voltage  $U_0/U$   
AC 0.6/1.0kV
- Operating temp. range  
-40~120°C

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 0.6/1.0 kV



Operating  
temp. range  
-40~120°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305  
BS6853



Smoke density  
IEC61034-2  
BS6853  
DIN5510-2



Gases toxicity  
EN50305  
BS6853  
DIN5510-2



Halogen free



Oil and fuel  
resistant  
good



Acid and alkaline  
resistant  
good



Ozone resistant  
good



Cold resistant  
good



Minimum bending  
radius when  
installed  
4D



Minimum bending  
radius when  
laying  
4D

Conductor		Max. overall diameter (mm)	Max. conductor resistance at 20°C ( $\Omega/km$ )	Approx. weight (kg/km)
Nominal cross section (mm <sup>2</sup> )	Max. diameter of wires (mm)			
0.5	0.21	2.10	40.1	8.1
0.75	0.21	2.30	26.7	11
1.0	0.21	2.55	20.0	14
1.5	0.26	2.80	13.7	20
2.5	0.26	3.40	8.21	31
4	0.31	4.05	5.09	48
6	0.31	4.85	3.39	70
10	0.41	6.00	1.95	115
16	0.41	7.40	1.24	165
25	0.41	9.10	0.795	260
35	0.41	10.40	0.565	375
50	0.41	12.10	0.393	505
70	0.51	14.60	0.277	735
95	0.51	16.20	0.210	960
120	0.51	18.20	0.164	1240
150	0.51	20.60	0.132	1530



# POLYENEX – Unified-FS Series – 1.8/3.0kV HF-WP (TYPE-S)

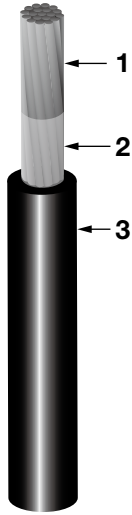
Single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

BS6853  
Int. Ia / ext. Ia

DIN5510-2  
1, 2, 3, 4



## Properties

Halogen Free, High flame resistance, Low smoke fume, Low toxicity, Heat/cold resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Cross-linked polyolefin (black)

- Rated voltage  $U_0/U$   
AC 1.8/3.0kV
- Operating temp. range  
-40~120°C

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 1.8/3.0 kV



Operating  
temp. range  
-40~120°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305  
BS6853



Smoke density  
IEC61034-2  
BS6853  
DIN5510-2



Gases toxicity  
EN50305  
BS6853  
DIN5510-2



Halogen free



Oil and fuel  
resistant  
good



Acid and alkaline  
resistant  
good



Ozone resistant  
good



Cold resistant  
good



Minimum bending  
radius when  
installed  
4D



Minimum bending  
radius when  
laying  
4D

Conductor		Max. overall diameter (mm)	Max. conductor resistance at 20°C ( $\Omega$ /km)	Approx. weight (kg/km)
Nominal cross section (mm <sup>2</sup> )	Max. diameter of wires (mm)			
1.5	0.26	3.65	13.7	26
2.5	0.26	3.85	8.21	35
4	0.31	4.60	5.09	55
6	0.31	5.35	3.39	75
10	0.41	6.55	1.95	120
16	0.41	8.60	1.24	185
25	0.41	10.50	0.795	290
35	0.41	12.00	0.565	410
50	0.41	13.80	0.393	550
70	0.51	16.10	0.277	790
95	0.51	17.80	0.210	995
120	0.51	20.10	0.164	1280
150	0.51	22.40	0.132	1560

# POLYENEX – Unified-FS Series – 3.6/6.0kV HF-WP (TYPE-S)

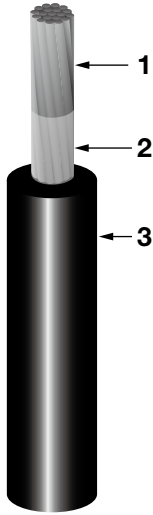
Single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

BS6853  
Int. Ia / ext. Ia

DIN5510-2  
1, 2, 3, 4



## Properties

Halogen Free, High flame resistance, Low smoke fume, Low toxicity, Heat/cold resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Cross-linked polyolefin (black)

- Rated voltage  $U_0/U$   
AC 3.6/6.0kV
- Operating temp. range  
-40~120°C

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 3.6/6.0 kV



Operating  
temp. range  
-40~120°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305  
BS6853



Smoke density  
IEC61034-2  
BS6853  
DIN5510-2



Gases toxicity  
EN50305  
BS6853  
DIN5510-2



Halogen free



Oil and fuel  
resistant  
good



Acid and alkaline  
resistant  
good



Ozone resistant  
good



Cold resistant  
good



Minimum bending  
radius when  
installed  
4D



Minimum bending  
radius when  
laying  
4D

Conductor		Max. overall diameter (mm)	Max. conductor resistance at 20°C ( $\Omega$ /km)	Approx. weight (kg/km)
Nominal cross section (mm <sup>2</sup> )	Max. diameter of wires (mm)			
1.5	0.26	4.60	13.70	35
2.5	0.26	5.20	8.21	50
4	0.31	5.80	5.09	70
6	0.31	6.40	3.39	90
10	0.41	7.65	1.95	140
16	0.41	9.65	1.24	210
25	0.41	11.30	0.795	315
35	0.41	12.90	0.565	430
50	0.41	14.90	0.393	600
70	0.51	17.00	0.277	825
95	0.51	19.00	0.210	1080
120	0.51	21.30	0.164	1380
150	0.51	23.50	0.132	1670

# POLYENEX – Unified-FS Series – NH-WEXO 102S/103S/104S

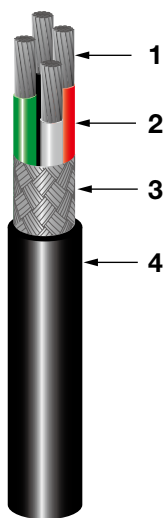
multi  
core  
screened

Fire Protection Levels

EN45545-2  
Int. HL3 / ext. HL3

BS6853  
Int. Ia / ext. Ia

DIN5510-2  
1, 2, 3, 4



- Rated voltage  
AC 600V
- Operating temp. range  
-40~110°C

## Properties

Halogen Free, High flame resistance, Low smoke fume, Low toxicity, Heat/cold resistance

## Application

Multi core cable that is applied to fixed internal/external wiring for rolling stock

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. INSULATION

Cross-linked polyethylene (black, white, red, green)

### 3. SCREEN

Tin-coated annealed copper braid shield

### 4. SHEATH

Cross-linked polyolefin (black)

## Cable characteristics



Rated voltage  
AC 600V



Operating  
temp. range  
-40~110°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305  
BS6853



Smoke density  
IEC61034-2  
BS6853  
DIN5510-2



Gases toxicity  
EN50305  
BS6853  
DIN5510-2



Halogen free



Oil and fuel  
resistant  
good



Acid and alkaline  
resistant  
good



Ozone resistant  
good



Cold resistant  
good  
-40°C



Minimum bending  
radius when  
installed  
4D



Minimum bending  
radius when  
laying  
4D

No. of cond. x Cross section (mm <sup>2</sup> )	Insulation thickness (mm)	Screen thickness (mm)	Sheath thickness (mm)	Overall diameter(mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
				min	max		
2x0.5	0.3	0.3	1.0	5.2	6.2	39.8	47
2x0.75	0.3	0.3	1.0	5.5	6.5	26.6	55
2x1.0	0.3	0.3	1.0	5.9	6.9	20.6	60
3x0.5	0.3	0.3	1.0	5.4	6.4	39.8	60
3x0.75	0.3	0.3	1.0	5.9	6.9	26.6	65
3x1.0	0.3	0.3	1.0	6.2	7.2	20.6	75
4x0.5	0.3	0.3	1.0	5.8	6.8	39.8	60
4x0.75	0.3	0.3	1.0	6.2	7.2	26.6	80
4x1.0	0.3	0.3	1.0	6.6	7.6	20.6	90

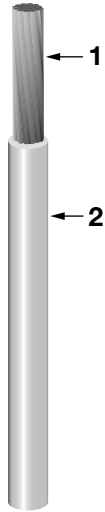
# POLYENEX – EN compliant Series – EN50306-2 300V

Single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50306-2



## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Single core cable that is applied to fixed internal wiring for rolling stock (Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. INSULATION

Engineering plastic (white)

Category M according to EN50306-1

- Rated voltage  $U_0/U$   
AC 300/500V
- Operating temp. range  
-40~125°C

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 300/500 kV



Operating  
temp. range  
-40~125°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases  
corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel  
resistant  
EN50305



Acid and alkaline  
resistant  
EN50305



Ozone resistant  
EN50305



Cold resistant  
IEC60811-1-4



Minimum bending  
radius when  
installed  
3D



Minimum bending  
radius when  
laying  
4D

Nominal cross section (mm <sup>2</sup> )	Min. insulation thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
		min	max		
0.5	0.18	1.15	1.45	40.1	5.5
0.75	0.18	1.35	1.65	26.7	8.1
1.0	0.18	1.45	1.80	20.0	10
1.5	0.22	1.95	2.30	13.7	17
2.5	0.28	2.50	2.85	8.21	27

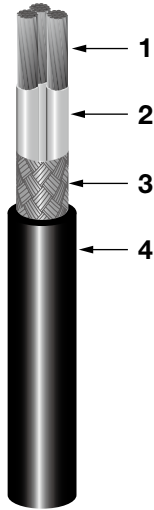
# POLYENEX – EN compliant Series – EN50306-3 300V

multi core  
screened

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50306-3



- Rated voltage  $U_0/U$   
AC 300/500V
- Operating temp. range  
-40~125°C

## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Multi core cable that is applied to fixed internal wiring for rolling stock  
(Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. INSULATION

Engineering plastic (white)  
Category M according to EN50306-1

### 3. SCREEN

Tin-coated annealed copper braid shield

### 4. SHEATH

Crosslinked polyolefin (black)  
Category M according to EN50306-1

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 300/500 kV



Operating temp. range  
-40~125°C



Flame retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel resistant  
EN50305



Acid and alkaline resistant  
EN50305



Ozone resistant  
EN50305



Cold resistant  
EN50305



Minimum bending radius when installed  
10D



Minimum bending radius when laying  
10D

No. of cond. x Cross section (mm <sup>2</sup> )	Min. insulation thickness (mm)	Approx. screen thickness (mm)	Min. sheath thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
				min	max		
1x0.5	0.18	0.3	0.20	2.3	2.8	40.1	15
2x0.5	0.18	0.3	0.20	3.5	4.3	40.1	29
3x0.5	0.18	0.3	0.20	3.7	4.5	40.1	37
4x0.5	0.18	0.3	0.20	4.0	5.0	40.1	43
1x0.75	0.18	0.3	0.20	2.5	3.0	26.7	20
2x0.75	0.18	0.3	0.20	3.9	4.7	26.7	37
3x0.75	0.18	0.3	0.20	4.0	5.0	26.7	47
4x0.75	0.18	0.3	0.20	4.5	5.5	26.7	55
1x1.0	0.18	0.3	0.20	2.7	3.2	20.0	22
2x1.0	0.18	0.3	0.20	4.2	5.2	20.0	43
3x1.0	0.18	0.3	0.20	4.5	5.5	20.0	55
4x1.0	0.18	0.3	0.20	5.0	6.0	20.0	65
1x1.5	0.22	0.3	0.20	3.1	3.6	13.7	31
2x1.5	0.22	0.3	0.20	5.1	6.1	13.7	65
3x1.5	0.22	0.3	0.20	5.4	6.4	13.7	80
4x1.5	0.22	0.3	0.20	6.0	7.0	13.7	105
1x2.5	0.28	0.3	0.20	3.6	4.4	8.21	44
2x2.5	0.28	0.3	0.20	6.4	7.4	8.21	90
3x2.5	0.28	0.3	0.20	6.8	7.8	8.21	120
4x2.5	0.28	0.3	0.20	7.5	8.5	8.21	145

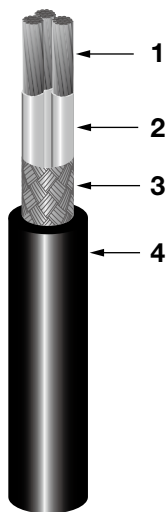
# POLYENEX – EN compliant Series – EN50306-4 3P/3E 300V

multi core  
screened

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50306-4



- Rated voltage  $U_0/U$   
AC 300/500V
- Operating temp. range  
-40~120°C

## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity,  
High chemical resistance, High mechanical properties, Heat/cold resistance,  
Ozone resistance

## Application

Multi core cable that is applied to fixed internal wiring for rolling stock  
(Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. INSULATION

Engineering plastic (white)  
Category M according to EN50306-1

### 3. SCREEN

Tin-coated annealed copper braid shield

### 4. SHEATH

Crosslinked polyolefin (black)  
Category M according to EN50306-1

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 300/500 kV



Operating  
temp. range  
-40~120°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases  
corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel  
resistant  
IEC60811-2-1



Acid and alkaline  
resistant  
IEC60811-2-1



Ozone resistant  
IEC60811-2-1  
EN50305



Cold resistant  
IEC60811-1-4  
EN50305



Minimum bending  
radius when  
installed  
10D



Minimum bending  
radius when  
laying  
10D

No. of cond. x Cross section (mm <sup>2</sup> )	Min. insulation thickness (mm)	Approx. screen thickness (mm)	Min. sheath thickness (mm)		Overall diameter (mm)				Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)	
			3P	3E	3P		3E			3P	3E
					min	max	min	max			
3X0.5	0.18	0.3	0.42	1.00	4.3	5.3	5.7	6.7	40.1	42	60
4X0.5	0.18	0.3	0.42	1.00	4.7	5.7	6.1	7.1	40.1	50	70
3X0.75	0.18	0.3	0.42	1.00	4.7	5.7	6.2	7.2	26.7	55	75
4X0.75	0.18	0.3	0.42	1.00	5.2	6.2	6.5	7.5	26.7	65	85
3X1.0	0.18	0.3	0.42	1.00	5.1	6.0	6.5	7.5	20.0	65	80
4X1.0	0.18	0.3	0.42	1.00	5.5	6.5	6.9	7.9	20.0	75	95
3X1.5	0.22	0.3	0.42	1.00	6.0	7.0	7.4	8.4	13.7	90	110
4X1.5	0.22	0.3	0.42	1.00	6.6	7.6	8.0	9.0	13.7	110	135
3X2.5	0.28	0.3	0.56	1.00	7.7	8.7	8.6	9.8	8.21	135	150
4X2.5	0.28	0.3	0.56	1.00	8.4	9.6	9.4	10.6	8.21	160	180

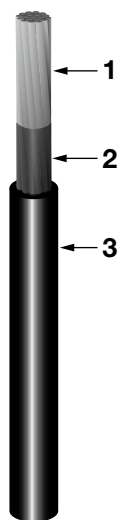
# POLYENEX – EN compliant Series – EN50264-3-1 600V

single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50264-3-1



- Rated voltage  $U_0/U$   
AC 0.6/1.0kV
- Operating temp. range  
-40~120°C

## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock (Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Crosslinked polyolefin (Inner : white Outer : black)  
Type E1107 or E1109 according to EN50264-1

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 0.6/1.0 kV



Operating  
temp. range  
-40~120°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases  
corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel  
resistant  
IEC60811-2-1



Acid and alkaline  
resistant  
IEC60811-2-1



Ozone resistant  
EN50305



Cold resistant  
IEC60811-1-4  
EN50305



Minimum bending  
radius when  
installed  
( $D \leq 12$ ) 3D  
( $D > 12$ ) 4D



Minimum bending  
radius when  
laying  
( $D \leq 12$ ) 4D  
( $D > 12$ ) 5D

Nominal cross section (mm <sup>2</sup> )	Ave. insulation thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C ( $\Omega$ /km)	Approx.weight (kg/km)
		min	max		
1.0	0.6	2.4	2.8	20.0	15
1.5	0.7	2.8	3.3	13.7	23
2.5	0.7	3.2	3.8	8.21	33
4	0.7	3.8	4.4	5.09	49
6	0.7	4.2	5.0	3.39	70
10	0.7	5.1	5.9	1.95	110
16	0.7	6.1	7.2	1.24	160
25	0.9	7.8	9.1	0.795	260
35	0.9	9.0	10.6	0.565	360
50	1.0	10.6	12.4	0.393	505
70	1.1	12.5	14.6	0.277	715
95	1.1	13.9	16.3	0.210	935
120	1.2	15.7	18.4	0.164	1180
150	1.4	17.6	20.6	0.132	1470
185	1.6	19.6	22.9	0.108	1800
240	1.7	22.2	26.0	0.0817	2370
300	1.8	24.6	28.8	0.0654	2900

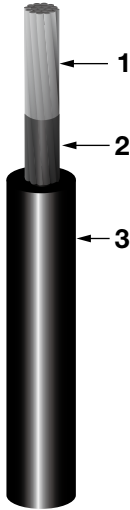
# POLYENEX – EN compliant Series – EN50264-3-1 1800V

single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50264-3-1



## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock (Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Crosslinked polyolefin (Inner : white Outer : black)

Type EI107 or EI109 according to EN50264-1

- Rated voltage  $U_0/U$   
AC 1.8/3.0kV
- Operating temp. range  
-40~120°C

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 1.8/3.0 kV



Operating  
temp. range  
-40~120°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases  
corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel  
resistant  
IEC60811-2-1



Acid and alkaline  
resistant  
IEC60811-2-1



Ozone resistant  
EN50305



Cold resistant  
IEC60811-1-4  
EN50305



Minimum bending  
radius when  
installed  
( $\varnothing \leq 12$ ) 3D  
( $\varnothing > 12$ ) 4D



Minimum bending  
radius when  
laying  
( $\varnothing \leq 12$ ) 4D  
( $\varnothing > 12$ ) 5D

Nominal cross section (mm <sup>2</sup> )	Ave. insulation thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C ( $\Omega/\text{km}$ )	Approx. weight (kg/km)
		min	max		
10	2.0	7.5	8.8	1.95	160
16	2.0	8.6	10.0	1.24	220
25	2.0	9.9	11.6	0.795	315
35	2.0	11.1	13.0	0.565	420
50	2.0	12.5	14.6	0.393	565
70	2.0	14.2	16.6	0.277	775
95	2.2	16.0	18.7	0.210	1040
120	2.2	17.6	20.6	0.164	1280
150	2.2	19.1	22.3	0.132	1550
185	2.4	20.9	24.4	0.108	1900
240	2.4	23.7	27.5	0.0817	2460
300	2.4	25.6	30.1	0.0654	2990



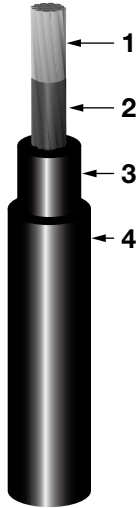
# POLYENEX – EN compliant Series – EN50264-3-1 1800V Sheathed

single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50264-3-1



- Rated voltage  $U_0/U$   
AC 1.8/3.0kV
- Operating temp. range  
-40~120°C

## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock (Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Crosslinked polyolefin (Inner : white Outer : black)

Type EI107 or EI109 according to EN50264-1

### 4. SHEATH

Crosslinked polyolefin (black)

Type EM102 or EM104 according to EN50264-1

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 1.8/3.0 kV



Operating  
temp. range  
-40~120°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases  
corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel  
resistant  
IEC60811-2-1



Acid and alkaline  
resistant  
IEC60811-2-1



Ozone resistant  
EN50305



Cold resistant  
IEC60811-1-4  
EN50305



Minimum bending  
radius when  
installed  
( $D \leq 12$ ) 3D  
( $D > 12$ ) 4D



Minimum bending  
radius when  
laying  
( $D \leq 12$ ) 4D  
( $D > 12$ ) 5D

Nominal cross section (mm <sup>2</sup> )	Ave. insulation thickness (mm)	Ave. sheath thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
			min	max		
25	1.8	1.0	11.5	13.4	0.795	385
35	1.8	1.0	12.7	14.9	0.565	485
50	1.8	1.0	14.1	16.5	0.393	655
70	1.8	1.0	15.8	18.5	0.277	855
95	2.2	1.0	18.0	21.0	0.210	1140
120	2.2	1.0	19.6	22.9	0.164	1380
150	2.2	1.2	21.4	25.1	0.132	1700
185	2.4	1.2	23.4	27.4	0.108	2050
240	2.4	1.2	25.9	30.3	0.0817	2650
300	2.4	1.2	28.1	32.9	0.0654	3190

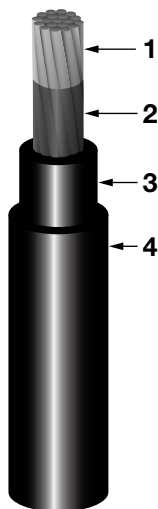
# POLYENEX – EN compliant Series – EN50264-3-1 3600V

single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50264-3-1



- Rated voltage  $U_0/U$   
AC 3.6/6.0kV
- Operating temp. range  
-40~120°C

## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock (Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Crosslinked polyolefin (Inner : white Outer : black)  
Type EI107 or EI109 according to EN50264-1

### 4. SHEATH

Crosslinked polyolefin (black)  
Type EM102 or EM104 according to EN50264-1

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 3.6/6.0 kV



Operating  
temp. range  
-40~120°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases  
corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel  
resistant  
IEC60811-2-1



Acid and alkaline  
resistant  
IEC60811-2-1



Ozone resistant  
EN50305



Cold resistant  
IEC60811-1-4  
EN50305



Minimum bending  
radius when  
installed  
( $D \leq 12$ ) 3D  
( $D > 12$ ) 4D



Minimum bending  
radius when  
laying  
( $D \leq 12$ ) 4D  
( $D > 12$ ) 5D

Nominal cross section (mm <sup>2</sup> )	Ave. insulation thickness (mm)	Ave. sheath thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
			min	max		
25	2.9	1.0	13.7	16.1	0.795	455
35	2.9	1.0	14.9	17.5	0.565	590
50	2.9	1.0	16.4	19.1	0.393	740
70	2.9	1.0	18.0	21.1	0.277	985
95	2.9	1.0	19.5	22.8	0.210	1230
120	2.9	1.2	21.4	25.1	0.164	1520
150	2.9	1.2	22.9	26.8	0.132	1820
185	3.2	1.2	25.1	29.4	0.108	2200
240	3.4	1.4	28.3	33.1	0.0817	2880
300	3.4	1.4	30.6	35.8	0.0654	3420

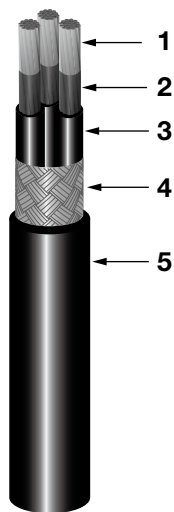
# POLYENEX – EN compliant Series – EN50264-3-2 600V

multi core  
screened

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50264-3-2



- Rated voltage  $U_0/U$   
AC 0.6/1.0kV
- Operating temp. range  
-40~120°C

## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Multi core cable that is applied to fixed internal/external wiring for rolling stock (Reference: EN50355:2003 EN50343:2003)

## Construction

- 1. CONDUCTOR**  
Stranded with tin-coated annealed copper wire
- 2. SEPARATING TAPE**  
Add appropriate tape if necessary
- 3. INSULATION**  
Crosslinked polyolefin (black)  
Type EI110 according to EN50264-1
- 4. SCREEN**  
Tin-coated annealed copper braid shield
- 5. SHEATH**  
Crosslinked polyolefin (black)  
Type EM102 or EM104 according to EN50264-1

## Cable characteristics



No. of cond. x Cross section (mm <sup>2</sup> )	Ave. insulation thickness (mm)	Approx. screen thickness (mm)	Ave. sheath thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
				min	max		
2x1.5	0.7	0.3	0.7	7.9	9.9	13.7	100
3x1.5	0.7	0.3	0.7	8.4	10.4	13.7	125
4x1.5	0.7	0.3	0.7	9.1	11.3	13.7	155
2x2.5	0.7	0.3	0.7	8.7	10.7	8.21	125
3x2.5	0.7	0.3	0.7	9.2	11.4	8.21	165
4x2.5	0.7	0.3	0.8	10.4	12.9	8.21	205
2x4	0.7	0.3	0.8	10.2	12.7	5.09	165
3x4	0.7	0.3	0.8	10.8	13.3	5.09	230
4x4	0.7	0.3	0.8	11.8	14.5	5.09	285
2x6	0.7	0.3	0.8	10.9	13.6	3.39	225
3x6	0.7	0.3	0.8	11.6	14.3	3.39	305
4x6	0.7	0.3	1.0	13.1	16.1	3.39	400

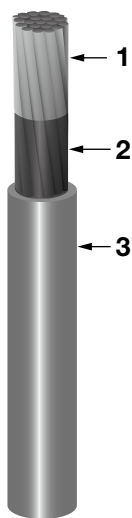
# POLYENEX – EN compliant Series – EN50382-2 1800V

single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50382-2



## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock (Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated (120°C) or plain (150°C) annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Cross-linked silicone rubber (white or black)

Type EI111 according to EN50382-1

- Rated voltage  $U_0/U$   
AC 1.8/3.0kV
- Operating temp. range  
-40~120°C  
-40~150°C

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 1.8/3.0 kV



Operating  
temp. range  
-40~120°C  
-40~150°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases  
corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel  
resistant  
IEC60811-2-1



Acid and alkaline  
resistant  
IEC60811-2-1



Ozone resistant  
EN50305



Cold resistant  
IEC60811-1-4  
EN50305



Minimum bending  
radius when  
installed  
( $D \leq 12$ ) 3D  
( $D > 12$ ) 4D



Minimum bending  
radius when  
laying  
( $D \leq 12$ ) 4D  
( $D > 12$ ) 5D

Nominal cross section (mm <sup>2</sup> )	Ave. insulation thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C ( $\Omega$ /km)	Approx. weight (kg/km)
		min	max		
1.5	2.5	6.3	7.3	13.7	65
2.5	2.5	6.7	7.8	8.21	85
4	2.5	7.2	8.4	5.09	105
6	2.5	7.7	9.0	3.39	130
10	2.5	8.5	10.0	1.95	175
16	2.5	9.6	11.2	1.24	240
25	2.5	10.9	12.7	0.795	335
35	2.5	12.1	14.1	0.565	445
50	2.5	13.5	15.8	0.393	580
70	2.5	15.2	17.8	0.277	800
95	2.7	17.0	19.9	0.210	1050
120	2.7	18.6	21.7	0.164	1290
150	2.7	20.1	23.5	0.132	1570
185	2.7	21.7	25.4	0.108	1950
240	2.7	24.1	28.2	0.0817	2450

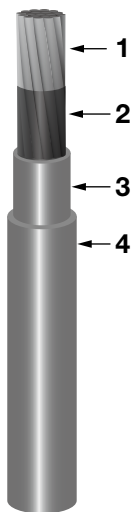
# POLYENEX – EN compliant Series – EN50382-2 1800V Sheathed

single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50382-2



- Rated voltage  $U_0/U$   
AC 1.8/3.0kV
- Operating temp. range  
-40~120°C  
-40~150°C

## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock (Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated (120°C) or plain (150°C) annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Cross-linked silicone rubber (white or black)

Type EI111 according to EN50382-1

### 4. SHEATH

Cross-linked silicone rubber (black)

Type EM106 or EM107 according to EN50382-1

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 1.8/3.0 kV



Operating  
temp. range  
-40~120°C  
-40~150°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases  
corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel  
resistant  
IEC60811-2-1



Acid and alkaline  
resistant  
IEC60811-2-1



Ozone resistant  
EN50305



Cold resistant  
IEC60811-1-4  
EN50305



Minimum bending  
radius when  
installed  
( $D \leq 12$ ) 3D  
( $D > 12$ ) 4D



Minimum bending  
radius when  
laying  
( $D \leq 12$ ) 4D  
( $D > 12$ ) 5D

Nominal cross section (mm <sup>2</sup> )	Ave. insulation thickness (mm)	Ave. sheath thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
			min	max		
1.5	1.3	1.4	6.8	7.9	13.7	75
2.5	1.3	1.4	7.2	8.4	8.21	90
4	1.3	1.4	7.7	9.0	5.09	110
6	1.3	1.4	8.2	9.6	3.39	140
10	1.5	1.4	9.4	11.0	1.95	195
16	1.5	1.4	10.5	12.2	1.24	260
25	1.8	1.4	12.3	14.4	0.795	375
35	1.8	1.4	13.6	15.9	0.565	490
50	1.8	1.4	15.0	17.5	0.393	635
70	1.8	1.5	16.8	19.7	0.277	870
95	2.2	1.5	19.0	22.2	0.210	1150
120	2.2	1.6	20.8	24.3	0.164	1410
150	2.2	1.6	22.3	26.1	0.132	1700
185	2.4	1.7	24.5	28.6	0.108	2060
240	2.4	1.8	27.1	31.7	0.0817	2660

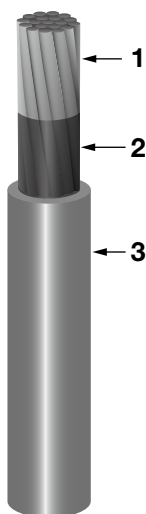
# POLYENEX – EN compliant Series – EN50382-2 3600V

single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50382-2



## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock (Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated (120°C) or plain (150°C) annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Cross-linked silicone rubber (white or black)

Type EI111 according to EN50382-1

- Rated voltage  $U_0/U$   
AC 3.6/6.0kV
- Operating temp. range  
-40~120°C  
-40~150°C

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 3.6/6.0 kV



Operating  
temp. range  
-40~120°C  
-40~150°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases  
corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel  
resistant  
IEC60811-2-1



Acid and alkaline  
resistant  
IEC60811-2-1



Ozone resistant  
EN50305



Cold resistant  
IEC60811-1-4  
EN50305



Minimum bending  
radius when  
installed  
( $D \leq 12$ ) 3D  
( $D > 12$ ) 4D



Minimum bending  
radius when  
laying  
( $D \leq 12$ ) 4D  
( $D > 12$ ) 5D

Nominal cross section (mm <sup>2</sup> )	Ave. insulation thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
		min	max		
4	3.0	8.1	9.5	5.09	130
6	3.0	9.0	10.6	3.39	155
10	3.0	9.5	11.1	1.95	205
16	3.0	10.5	12.3	1.24	265
25	3.0	11.8	13.8	0.795	365
35	3.0	13.0	15.2	0.565	480
50	3.0	14.4	16.9	0.393	625
70	3.0	16.1	18.9	0.277	860
95	3.0	17.5	20.5	0.210	1090
120	3.1	19.3	22.6	0.164	1340
150	3.1	20.8	24.4	0.132	1620
185	3.2	22.6	26.5	0.108	1950
240	3.4	25.4	29.8	0.0817	2560

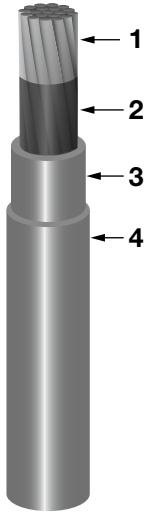
# POLYENEX – EN compliant Series – EN50382-2 3600V Sheathed

single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

Standard  
EN50382-2



- Rated voltage  $U_0/U$   
AC 3.6/6.0kV
- Operating temp. range  
-40~120°C  
-40~150°C

## Properties

Halogen free, Flame resistance, Low smoke fume, Low toxicity, High chemical resistance, High mechanical properties, Heat/cold resistance, Ozone resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock (Reference: EN50355:2003 EN50343:2003)

## Construction

### 1. CONDUCTOR

Stranded with tin-coated (120°C) or plain (150°C) annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Cross-linked silicone rubber (white or black)

Type EI111 according to EN50382-1

### 4. SHEATH

Cross-linked silicone rubber (black)

Type EM106 or EM107 according to EN50382-1

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 3.6/6.0 kV



Operating  
temp. range  
-40~120°C  
-40~150°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2



Gases toxicity  
EN50305



Gases  
corrosivity  
EN50267-2-2



Halogen free  
EN50267-2-1  
EN60684-2



Oil and fuel  
resistant  
IEC60811-2-1



Acid and alkaline  
resistant  
IEC60811-2-1



Ozone resistant  
EN50305



Cold resistant  
IEC60811-1-4  
EN50305



Minimum bending  
radius when  
installed  
( $D \leq 12$ ) 3D  
( $D > 12$ ) 4D



Minimum bending  
radius when  
laying  
( $D \leq 12$ ) 4D  
( $D > 12$ ) 5D

Nominal cross section (mm <sup>2</sup> )	Ave. insulation thickness (mm)	Ave. sheath thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
			min	max		
4	2.6	1.4	10.4	12.2	5.09	180
6	2.6	1.4	10.9	12.8	3.39	210
10	2.6	1.4	11.8	13.8	1.95	265
16	2.6	1.4	12.8	15.0	1.24	335
25	2.9	1.4	14.7	17.2	0.795	465
35	2.9	1.4	15.9	18.6	0.565	585
50	2.9	1.5	17.5	20.5	0.393	750
70	2.9	1.5	19.2	22.4	0.277	985
95	2.9	1.6	20.8	24.3	0.210	1250
120	2.9	1.6	22.4	26.2	0.164	1500
150	2.9	1.7	24.1	28.2	0.132	1810
185	3.2	1.8	26.4	30.9	0.108	2190
240	3.4	1.9	29.4	34.4	0.0817	2840

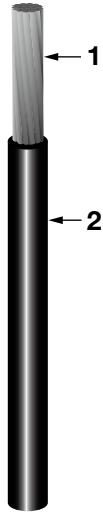
# POLYENEX – NFPA compliant Series – N-RFH1

single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

NFPA130



## Properties

Flame resistance, Low smoke fume, Low toxicity, Chemical resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. INSULATION

Ethylene Tetrafluoro Ethylene (black)

- Rated voltage  
AC 600V
- Operating temp. range  
-50~150°C

## Cable characteristics



Rated voltage  
AC 600V



Operating  
temp. range  
-50~150°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
EN50305  
FT4/IEEE1202



Smoke density  
IEC61034-2  
FT4/IEEE1202



Gases toxicity  
EN50305



Oil resistant  
good



Acid and alkaline  
resistant  
good



Ozone resistant  
good



Cold resistant  
good  
-50°C



Minimum bending  
radius when  
installed  
4D



Minimum bending  
radius when  
laying  
4D

Nominal cross section (mm <sup>2</sup> )	Insulation thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
		min	max		
1.25	0.5	2.3	2.5	15.5	17
2	0.5	2.7	2.9	9.91	24
3.5	0.5	3.4	3.6	5.38	41



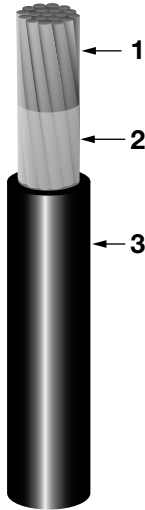
# POLYENEX – NFPA compliant Series – C-WFM2

single  
core

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

NFPA130



## Properties

Flame resistance, Low smoke fume, Low toxicity, Chemical resistance

## Application

Single core cable that is applied to fixed internal/external wiring for rolling stock

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. SEPARATING TAPE

Add appropriate tape if necessary

### 3. INSULATION

Ethylene Tetrafluoro Ethylene (black)

- Rated voltage  
AC 1500V
- Operating temp. range  
-50~200°C

## Cable characteristics



Rated voltage  
AC 1500V



Operating  
temp. range  
-50~200°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
EN50305  
FT4/IEEE1202



Smoke density  
IEC61034-2  
FT4/IEEE1202



Gases toxicity  
EN50305



Oil resistant  
good



Acid and alkaline  
resistant  
good



Ozone resistant  
good



Cold resistant  
good  
-50°C



Minimum bending  
radius when  
installed  
4D



Minimum bending  
radius when  
laying  
4D

Nominal cross section (mm <sup>2</sup> )	Insulation thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
		min	max		
35	1.5	10.9	12.1	0.569	405
50	1.6	12.9	14.3	0.394	570
70	1.6	14.4	16.0	0.286	760
95	1.7	16.5	18.3	0.210	1020
120	1.8	18.5	20.3	0.166	1280
150	2.1	20.9	22.9	0.133	1570
185	2.1	22.7	24.7	0.108	1950
240	2.2	25.6	27.8	0.084	2500

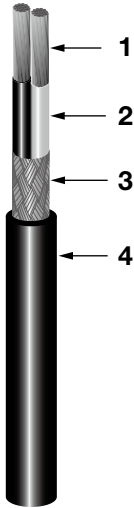
# POLYENEX – NFPA compliant Series – WFHF 102S/103S/104S

multi core  
screened

Fire Protection Levels

EN45545-2  
Int. HL2 / ext.HL3

NFPA130



- Rated voltage  
AC 600V
- Operating temp. range  
-50~150°C

## Properties

Flame resistance, Low smoke fume, Low toxicity, Chemical resistance

## Application

Multi core cable that is applied to fixed internal/external wiring for rolling stock

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. INSULATION

Ethylene Tetrafluoro Ethylene (black, white)

### 3. SCREEN

Tin-coated annealed copper braid shield

### 4. SHEATH

Ethylene Tetrafluoro Ethylene (black)

## Cable characteristics



Rated voltage  
AC 600V



Operating  
temp. range  
-50~150°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
EN50305  
FT4/IEEET202



Smoke density  
IEC61034-2  
FT4/IEEET202



Gases toxicity  
EN50305



Oil resistant  
good



Acid and alkaline  
resistant  
good



Ozone resistant  
good



Cold resistant  
good  
-50°C



Minimum bending  
radius when  
installed  
4D



Minimum bending  
radius when  
laying  
4D

No. of cond. x Cross section (mm <sup>2</sup> )	Insulation thickness (mm)	Approx. screen thickness (mm)	Sheath thickness (mm)	Overall diameter (mm)		Max. conductor resistance at 20°C (Ω/km)	Approx. weight (kg/km)
				min	max		
2x0.75	0.2	0.3	1.0	5.7	6.7	26.6	65
2x1.25	0.2	0.3	1.0	6.4	7.6	16.0	80
2x2	0.2	0.3	1.0	7.0	8.2	10.2	105
3x0.75	0.2	0.3	1.0	5.8	6.8	26.6	75
3x1.25	0.2	0.3	1.0	6.6	7.8	16.0	100
3x2	0.2	0.3	1.1	7.4	8.6	10.2	135
4x0.75	0.2	0.3	1.0	6.3	7.3	26.6	85
4x1.25	0.2	0.3	1.1	7.4	8.6	16.0	120
4x2	0.2	0.3	1.1	8.0	9.4	10.2	165

\* To be released in April 2017.

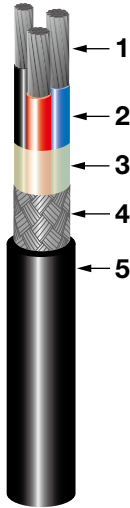
# POLYENEX – Communication Series – CAN CO-IREE-SB (X)

120Ω

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

DIN5510-2  
1, 2, 3, 4



- Rated voltage  
AC 300V
- Operating temp. range  
-40~80°C

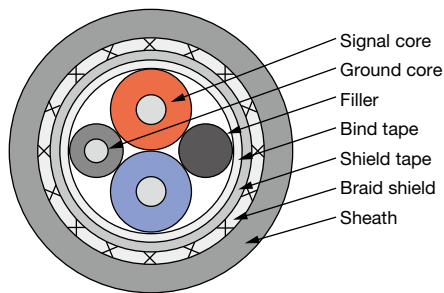
## Properties

Flame resistance, Low smoke fume, Low toxicity

## Application

On-board digital signal transmission cables

## Construction



### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. INSULATION

Single core: cross-linked polyethylene (blue,red)  
Power core: cross-linked polyethylene (black)

### 3. BIND TAPE

Add appropriate tape if necessary

### 4. SCREEN

Metal tape shield and tin-coated annealed copper braid shield

### 5. SHEATH

Cross-linked polyolefin (black)

## Cable characteristics



Rated voltage  
AC 300V



Operating  
temp. range  
-40~80°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2  
DIN5510-2



Gases toxicity  
EN50305  
DIN5510-2



Halogen free



Oil and fuel  
resistant  
good



Acid and alkaline  
resistant  
good



Ozone resistant  
good



Cold resistant  
good  
-40°C



Minimum bending  
radius when  
installed  
4D



Minimum bending  
radius when  
laying  
4D

No. of cond. x Cross section (mm <sup>2</sup> )	Inner conductor diameter (Nom.) (mm)	Insulation diameter (Nom.) (mm)	Overall diameter (mm)	Max. conductor resistance at 20°C (Ω/km)	Characteristic impedance 0.75-3.0MHz (Ω/km)	Transfer impedance 20MHz (mΩ/m)	Attenuation		Approx. weight (kg/km)
							1.0MHz (dB/100m)	3.0MHz (dB/100m)	
2X0.5 (Signal) 1X0.5SQ (Ground)	0.9 0.9	2.3 1.48	6.8 ± 0.3	40.1	120±12	≤20	≤1.25	≤2.3	70

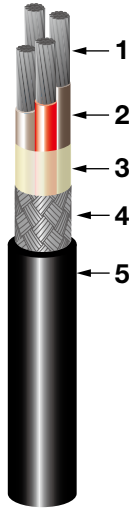
# POLYENEX – Communication Series – MVB CO-IREE-SB (X)

120Ω

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

DIN5510-2  
1, 2, 3, 4



- Rated voltage  
AC 300V
- Operating temp. range  
-40~80°C

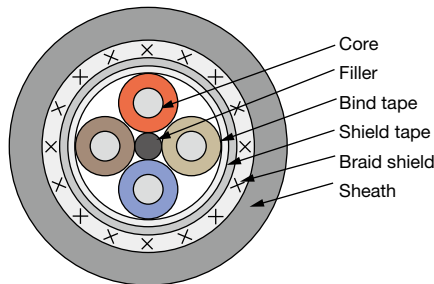
## Properties

Flame resistance, Low smoke fume, Low toxicity

## Application

On-board digital signal transmission cables

## Construction



### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. INSULATION

Cross-linked polyethylene (blue,brown,red,gray)

### 3. BIND TAPE

Add appropriate tape if necessary

### 4. SCREEN

Metal tape shield and tin-coated annealed copper braid shield

### 5. SHEATH

Cross-linked polyolefin (black)

## Cable characteristics



Rated voltage  
AC 300V



Operating  
temp. range  
-40~80°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2  
DIN5510-2



Gases toxicity  
EN50305  
DIN5510-2



Halogen free



Oil and fuel  
resistant  
good



Acid and alkaline  
resistant  
good



Ozone resistant  
good



Cold resistant  
good  
-40°C



Minimum bending  
radius when  
installed  
4D



Minimum bending  
radius when  
laying  
4D

No. of cond. x Cross section (mm <sup>2</sup> )	Inner conductor diameter (Nom.) (mm)	Insulation diameter (Nom.) (mm)	Overall diameter (mm)	Max. conductor resistance at 20°C (Ω/km)	Capacitance 1kHz (pF/m)	Characteristic impedance 0.75-3.0MHz (Ω)	Transfer impedance 20MHz (mΩ/m)	Near end crosstalk 0.75-3.0MHz (dB)	Attenuation		Approx. weight (kg/km)
									1.5MHz (dB/100m)	3.0MHz (dB/100m)	
4X0.5	1.0	2.4	8.2±0.3	33.7	<46	120±12	<20	>45	<1.5	<2.2	100

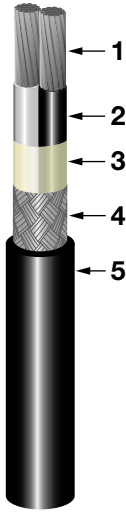
# POLYENEX – Communication Series – WTB CO-IREE-SB (X)

120Ω

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

DIN5510-2  
1, 2, 3, 4



- Rated voltage  
AC 300V
- Operating temp. range  
-40~80°C

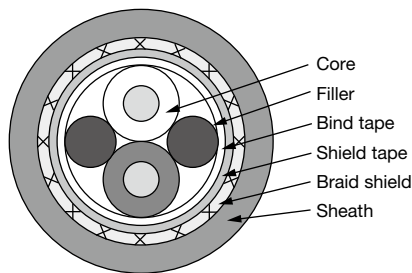
## Properties

Flame resistance, Low smoke fume, Low toxicity

## Application

On-board digital signal transmission cables

## Construction



### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. INSULATION

Cross-linked polyethylene (white,black)

### 3. BIND TAPE

Add appropriate tape if necessary

### 4. SCREEN

Metal tape shield and tin-coated annealed copper braid shield

### 5. SHEATH

Cross-linked polyolefin (black)

## Cable characteristics



No. of cond. x Cross section (mm <sup>2</sup> )	Inner conductor diameter (Nom.) (mm)	Insulation diameter (Nom.) (mm)	Overall diameter (mm)	Max. conductor resistance at 20°C (Ω/km)	Capacitance 1.0kHz (pF/m)	Characteristic impedance 1.0~2.0MHz (Ω)	Transfer impedance 20MHz (mΩ/m)	Attenuation		Approx. weight (kg/km)
								1.0MHz (dB/km)	2.0MHz (dB/km)	
2X0.75*	1.21	2.7	8.5 ± 0.3	26.7	<65	120±12	<20	<10	<15	100

\* Conductor sizes in the range from 0.5mm<sup>2</sup> to 1.5mm<sup>2</sup> are available upon request

# POLYENEX – Communication Series – CAT5e CO-IREE-SB CX100 (X)

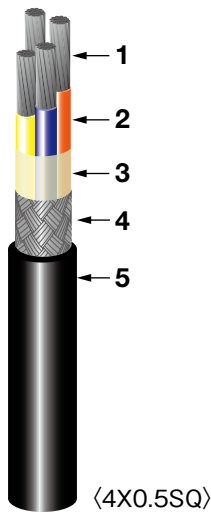
100Ω

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

DIN5510-2  
1, 2, 3, 4

Standard  
IEC61156-6



- Rated voltage  
AC 30V
- Operating temp. range  
-40~80°C

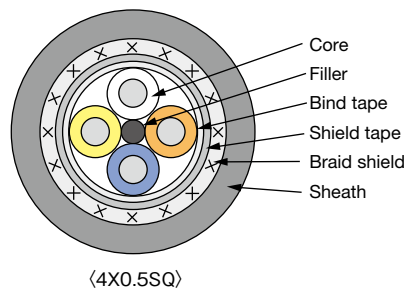
## Properties

Flame resistance, Low smoke fume, Low toxicity

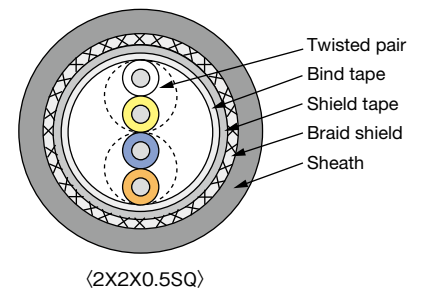
## Application

On-board railway Ethernet cables up to 100MHz

## Construction



- 1. CONDUCTOR**  
Stranded with tin-coated annealed copper wire
- 2. INSULATION**  
Cross-linked polyethylene (white, yellow, blue, orange)
- 3. BIND TAPE**  
Add appropriate tape if necessary
- 4. SCREEN**  
Metal tape shield and tin-coated annealed copper braid shield
- 5. SHEATH**  
Cross-linked polyolefin (black)



- 1. CONDUCTOR**  
Stranded with tin-coated annealed copper wire
- 2. INSULATION**  
Cross-linked polyethylene  
(Pair No.1: white/yellow)  
(Pair No.2: blue/orange)
- 3. BIND TAPE**  
Add appropriate tape if necessary
- 4. SCREEN**  
Metal tape shield and tin-coated annealed copper braid shield
- 5. SHEATH**  
Cross-linked polyolefin (black)

## Cable characteristics



Rated voltage  
AC 30V



Operating temp. range  
-40~80°C



Flame retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2  
DIN5510-2



Gases toxicity  
EN50305  
DIN5510-2



Halogen free



Oil and fuel  
resistant  
good



Acid and alkaline  
resistant  
good



Ozone resistant  
good



Cold resistant  
good  
-40°C



Minimum bending  
radius when  
installed  
10D



Minimum bending  
radius when  
laying  
10D

No. of cond. x Cross section (mm <sup>2</sup> )	Inner conductor diameter (Nom.) (mm)	Insulation diameter (Nom.) (mm)	Overall diameter (mm)	Max. conductor resistance at 20°C (Ω/km)	Capacitance 1kHz (pF/m)	Characteristic impedance 1-100MHz (Ω)	Near end crosstalk			Attenuation			Approx. weight (kg/km)
							1.0MHz (dB/100m)	31.25MHz (dB/100m)	100MHz (dB/100m)	1.0MHz (dB/100m)	31.25MHz (dB/100m)	100MHz (dB/100m)	
4X0.5	0.94	2.2	7.7± 0.4	40.1	≤55	100±15	≥59	≥37	≥29	≤2.1	≤11.8	≤22	85
2X2X0.5*	0.94	1.86	9.5 ± 0.4	40.1	≤55	100±15	≥68	≥44	≥47	≤2.1	≤11.8	≤22	100

\* Conductor sizes in the range from 0.25mm<sup>2</sup> to 0.75mm<sup>2</sup> are available upon request

# POLYENEX – Communication Series – CAT7 CO-IREE-SB C7E (X)

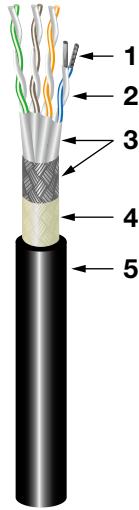
100Ω

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

DIN5510-2  
1, 2, 3, 4

Standard  
IEC61156-6



- Rated voltage  
AC 30V
- Operating temp. range  
-40~80°C

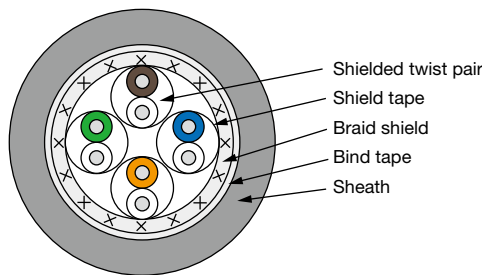
## Properties

Flame resistance, Low smoke fume, Low toxicity

## Application

On-board railway Ethernet cables up to 600MHz

## Construction



### 1. INNER CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. INSULATION

Cross-linked polyethylene

(Pair No1:blue/white, Pair No.2:orange/white)  
(Pair No3:green/white, Pair No.4:brown/white)

### 3. SCREEN

Metal tape shield and tin-coated annealed copper braid shield

### 4. BIND TAPE

Add appropriate tape if necessary

### 5. SHEATH

Cross-linked polyolefin (black)

## Cable characteristics



No. of cond. x Cross section (AWG)	Inner conductor diameter (mm)	Insulation diameter (Nom.) (mm)	Overall diameter (mm)	Max. conductor resistance at 20°C (Ω/km)	Characteristic impedance 0.4-100MHz (Ω)	Attenuation			Approx. weight (kg/km)
						1.0MHz (dB/100m)	31.25MHz (dB/100m)	600MHz (dB/100m)	
4X2X24	0.62	1.4	8.8± 0.3	145	100±15	≤3.0	≤15.6	≤75.1	105

	Near end crosstalk			Far end crosstalk		
	31.25MHz (dB)	100MHz (dB)	600MHz (dB)	31.25MHz (dB/100m)	100MHz (dB/100m)	600MHz (dB/100m)
NEXT	78≤	72.4≤	60.7≤	64.1≤	54.0≤	38.4≤
PSNEXT	75≤	69.4≤	57.7≤	61.1≤	51.0≤	35.4≤

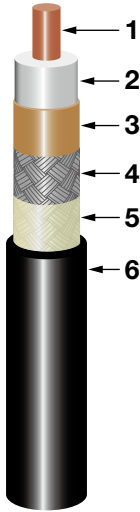
# POLYENEX – Communication Series – COAXIAL50 CO-IREE-SX CX50

50Ω

Fire Protection Levels

EN45545-2  
Int. HL3 / ext.HL3

DIN5510-2  
1, 2, 3, 4



- Rated voltage  
AC 300V
- Operating temp. range  
-40~80°C

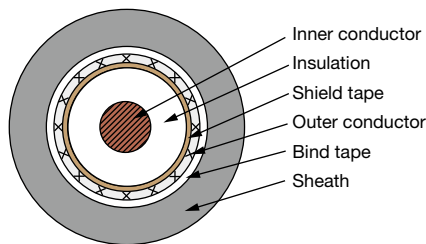
## Properties

Flame resistance, Low smoke fume, Low toxicity

## Application

On-board coaxial radio frequency cables up to 6GHz

## Construction



### 1. INNER CONDUCTOR

Annealed copper wire

### 2. INSULATION

Cross-linked polyethylene (white)

### 3. SHILED TAPE

Metal tape shield

### 4. OUTER CONDUCTOR

Tin-coated annealed copper braid

### 5. BIND TAPE

Add appropriate tape if necessary

### 6. SHEATH

Cross-linked polyolefin (black)

## Cable characteristics



Rated voltage  
AC 300V



Operating temp. range  
-40~80°C



Flame retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24  
IEC60332-3-25  
EN50305



Smoke density  
IEC61034-2  
DIN5510-2



Gases toxicity  
EN50305  
DIN5510-2



Halogen free



Oil and fuel resistant  
good



Acid and alkaline resistant  
good



Ozone resistant  
good



Cold resistant  
-40°C  
good



Minimum bending radius when installed  
4D



Minimum bending radius when laying  
4D

No. of cond. x Cross section (mm)	Inner conductor diameter (Nom.) (mm)	Insulation diameter (Nom.) (mm)	Max. Overall diameter (mm)	Max. conductor resistance at 20°C (Ω/km)	Capacitance 1.0kHz (pF/m)	Characteristic impedance TDR (Ω)	Time delay (nS/m)	Attenuation (dB/100m)			Approx. weight (kg/km)
								1500MHz	2500MHz	5800MHz	
1X1.78*	1.78	4.83	8.10	7.35	≤78.4	50±5	≤4.1	≤28.5	≤37.5	≤59.5	85
1X2.25*	2.3	7.1	11.0	4.5	≤85	50±5	≤4.8	2000MHz ≤36.0	5000MHz ≤68.0	6000MHz ≤75.0	100

\* Conductor sizes in the range from 0.5mm<sup>2</sup> to 4.5mm<sup>2</sup> are available upon request

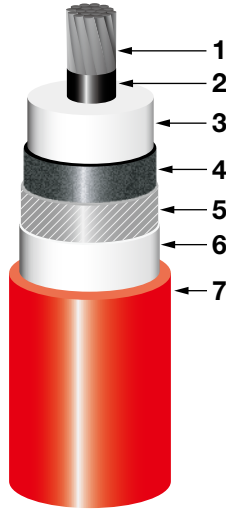


# POLYENEX – High Voltage Cable – 26/45kV HF-WEP

single  
core  
screened

Fire Protection Levels

DIN5510-2  
1, 2, 3, 4



- Rated voltage  $U_0/U$   
AC 26/45kV
- Operating temp. range  
Fixed: -40~90°C  
Moving: -25~90°C

## Properties

Halogen Free, Flame retardant, Low smoke fume, Low toxicity, Flexible

## Application

For inside and outside use in rolling stock high voltage circuit in rolling stock

## Construction

### 1. CONDUCTOR

Stranded with tin-coated annealed copper wire

### 2. CONDUCTOR SCREEN

Semi-conducting tape and semi-conducting compound

### 3. INSULATION

Ethylene propylene rubber (white)

### 4. INSULATION SCREEN

Semi-conducting compound

### 5. SCREEN

Tin-coated annealed copper wrap shield

### 6. BIND TAPE

Add appropriate tape if necessary

### 7. SHEATH

Polyolefin elastomer (red or black)

## Cable characteristics



Rated voltage  
 $U_0/U$   
AC 26/45 kV



Operating  
temp. range  
Fixed: -40~90°C  
Moving: -25~90°C



Flame  
retardant  
IEC60332-1-2



Fire retardant  
IEC60332-3-24



Smoke density  
IEC61034-2  
DIN5510-2



Gases toxicity  
DIN5510-2



Halogen free



Oil resistant  
IEC60811-2-1



Acid and alkaline  
resistant  
IEC60811-2-1



Ozone resistant  
IEC60811-2-1



Cold resistant  
IEC60811-1-4



Minimum bending  
radius when  
laying  
Fixed:5D  
Moving:10D

Nominal cross section (mm <sup>2</sup> )	Insulation thickness (mm)	Insulation diameter (mm)		Screen wire diameter (mm)	Overall diameter (mm)		Approx. weight (kg/km)
		min	max		min	max	
1×50	8.0	25.8	27.8	0.4	36.0	38.0	1830
1×70	8.0	27.7	29.7	0.4	38.0	40.0	2160
1×95	8.0	29.7	31.7	0.5	40.0	42.0	2520
1×120	8.0	31.8	33.8	0.6	42.0	44.0	2790

# Hitachi Metals' Railway Business

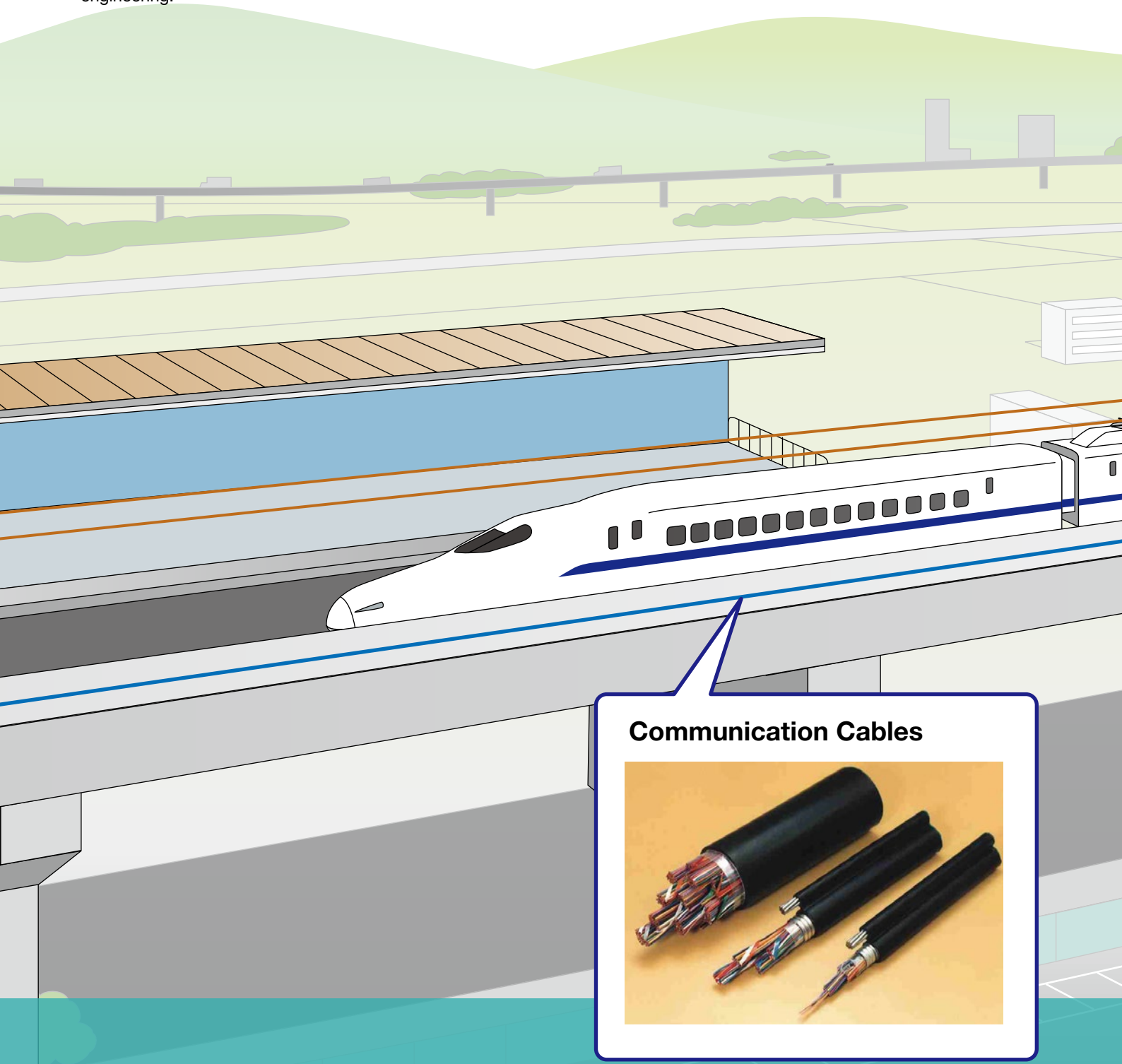
Over 50 years of experience in railway markets, Hitachi Metals has been substantially active in business development for products fundamental to the rail industry, particularly in cables and related components, where Hitachi Metals continues to pursue products and technologies used in rolling stock and rail infrastructure.

In the rolling stock segment, Hitachi Metals supplies cables and harnesses for various applications in the main power circuit, control circuit, communication circuit, as well as high voltage cables, cable terminations and joints used in feeding high-voltage power from pantographs. In onboard electrical appliances segment, we offer small-diameter cables and magnet wire.

In the field of rail infrastructure, we supply contact wires for power feed and other overhead lines, signaling cables, outdoor LAN cables for communications networking and leakage coaxial cables for train radio communications.

Through these wide-ranging products and technologies along with an extensive sales record and technical expertise, we provide comprehensive support to the railway industry on a global scale.

We hope for your continued expectations as we intend to continue developing the railway business with our advanced engineering.



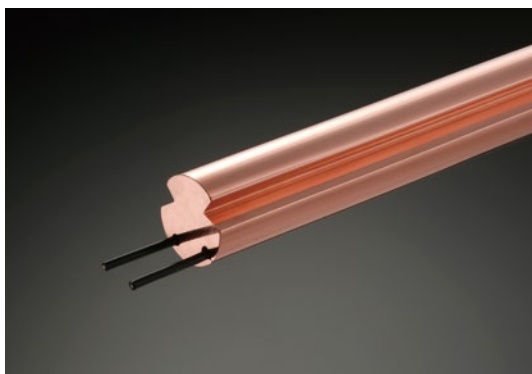
## Communication Cables



**Signal Cables**



**Contact Wires**



**Leaky Coaxial Cables for Train Radio System**



**Coaxial Cables for Train Radio System**



# Hitachi Metals, Ltd.

## **Cable Materials Company**

Shinagawa Season Terrace, 2-70, Konan 1-chome, Minato-ku,  
Tokyo 108-8224, Japan  
Tel: +81-3-6774-3587

## **Hitachi Metals Europe GmbH**

### **Head Office**

Immermannstrasse 14-16, 40210 Dusseldorf, Germany  
Tel: +49-211-16009-0

### **South Germany Office, Munich**

Business Center Bavaria Radtkoferstrasse 281737 Munich Germany  
Tel: +49-(0)89-741185-114

### **Milano Branch Office**

Via Modigliani 45, 20090 Segrate, Milano, Italy  
Tel: +39-02-7530188/7532613/7533782

### **London Branch Office**

Whitebrook Park, Lower Cookham Road, Maidenhead,  
Berkshire, SL6 8YA, United Kingdom  
Tel: +44-1628-585534

## **Hitachi Cable America Inc.**

2 Manhattanville Road, Suite 301, Purchase, NY 10577, U.S.A.  
Tel: +1-914-694-9200

## **Hitachi Metals Singapore Pte. Ltd.**

### **Head Office**

12 Gul Avenue, Singapore 629656  
Tel: +65-6861-7711

### **Hanoi Representative Office**

Sun Red River Building., 5F  
23 Phan Chu Trinh Street  
Hoan Kiem District, Hanoi, Vietnam  
Tel: +84-4-3933-3123

### **Philippine Representative Office**

Unit 1006 Prime Land, Market St.,  
Madrigal Business Park, Ayala Alabang,  
Muntinlupa City, Metro Manila, Philippines  
Tel: +63-2-808-8083/89

## **Hitachi Metals (Thailand) Ltd.**

### **Bangkok Sales Office**

Unit 13A, 13<sup>th</sup> Floor, Ploenchit Tower, 898, Ploenchit Road,  
Lumpini, Pathumwan, Bangkok 10330, Thailand  
Tel: +66-2-252-9309

## **Hitachi Metals (India) Private Limited**

Plot No 94 & 95, Sector 8, IMT Manesar, Gurgaon-122050, Haryana, India  
Tel: +91-124-4124812

## **Hitachi Metals Hong Kong Ltd.**

Suites 1809-13 18/F Tower 6 The Gateway, Harbour City  
Tsimshatsui Kowloon Hong Kong  
Tel: +852-2724-4183

## **Hitachi Metals Taiwan, Ltd.**

### **Taipei Branch**

11F, No.9, Xiangyang Road, Zhongzheng District, Taipei City 10046, Taiwan  
Tel: +886-2-2311-2777

## **Hitachi Metals (China), Ltd.**

### **Head Office**

11F, Chong Hing Finance Center, NO. 288, Nan Jing Road (West),  
Shanghai, 200003, China  
Tel: +86-21-3366-3000

### **Beijing Branch Office**

No.2120, Beijing Fortune Building No.5, Dong San Huan Road (North),  
Chao Yang District, Beijing 100004, China  
Tel: +86-10-6590-8440

### **Guangzhou Branch Office**

Room 1001, Goldlion Digital Network Center, NO.138, Tiyu Road (East),  
Tianhe, Guangzhou, 510620, China  
Tel: +86-20-3878-0319

### **Suzhou Branch Office**

Room 801, Building No.1, Gold River international Center, No.88 Shishan Rd,  
New District, Suzhou City, Jiangsu, 215011, China  
Tel: +86-512-6818-7055

### **Dalian Branch Office**

Room 1102, Tiancheng IFC, 128 Jinma Road, Dalian Development Area,  
Dalian, 116600, China  
Tel: +86-411-8733-2112

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