

# TE CONNECTIVITY CAT 7 HIGH SPEED RAIL DATA CABLES

## RAIL NETWORKING CABLE

TE Connectivity's high performance networking cables for railway deliver a bandwidth of 600MHz and support data rates up to 10Gbps, expanding design capabilities into broader bandwidth Ethernet applications. The enhanced design enables designers to balance performance requirements with installation time, lowering total costs and assuring system performance. Currently the 100MHz, Cat5e is the data cable type predominantly used within the rail industry, supporting data rates up to 1Gbps. The ongoing introduction of high speed data applications with ever increasing data rate demands allows future proofing to be built in whenever Cat 7 cables are installed or replaced.

## DESCRIPTION

- Four individually foiled twisted pairs with an overall braid-shield and available in a range of conductor sizes
- Supports data rates of up to 10Gbps
- Expanded design capabilities for higher bandwidth Ethernet applications.
- Stranded conductors for flexible cable application use
- Improve EMI shielding effectiveness, reduces external interference to signals and reduce noise
- High performance rail approved to EN45545-2 up to hazard level classification HL3
- Reduced toxicity solutions
- Cable constructions are also available with Radiation Cross-Linked Sheath for improved fluids resistance.
- Can produce bespoke design to meet customers exact needs available

## TWO FAMILIES AVAILABLE AS STANDARD

- High performance cables, rail approved to EN45545-2
- Ruggedized Cables, with a Radiation Cross-Linked Sheath designed for the most harsh environments as well as meeting EN45545-2 hazard level classification HL3

## CAT 7 DATA CABLES - STANDARD

### APPLICATIONS

- **Passenger Information:** Itinerary of Schedule, Announcements, Destination Information & Entertainment
- **Internet access:** News, Games, Video, Music & Advertising
- **Train Operating Systems:** On Board Ticketing, Passenger Counting, Automated Logistics & Train location
- **Staff information Systems:** Fault Reporting, Data Collection, Intranet Access & Diagnostics On Train Monitoring & Recording, CCTV, HVAC,
- **Broadband Data Transmission**

### MECHANICAL SPECIFICATIONS

- **Conductor:** Stranded Tinned Copper
- **Construction:** S/FTP
- **Number of Conductors:** 8
- **Number of Pairs:** 4
- **Cross Section:** 22 AWG, 24 AWG, 26 AWG
- **Temperature Range:** -20°C to +80°C

### MATERIALS

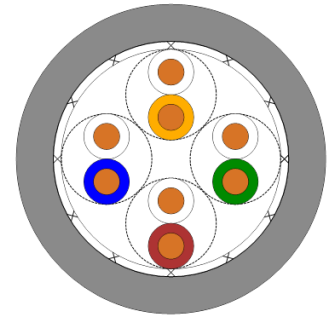
- **Insulation:** Colour Coded Foamed PE
- **Conductor:** Stranded, Tin-Plated Copper
- **Jacket:** Low Smoke, Fire Retardant, Zero Halogen

### STANDARDS & SPECIFICATIONS

- EN 45545-2
- IEC 61156-6
- ISO/IEC 11801
- DIN 5510-2
- LUL 1-085 A2
- R15/R16 - Hazard Level 3
- Category 7

### CHARACTERISTICS

- Flame Retardant
- Halogen Free
- Low toxicity
- Low smoke



Physical Characteristics		22 AWG	24 AWG	26 AWG
Structure	Construction	S/FTP	S/FTP	S/FTP
	Number of pairs	4 Pairs	4 Pairs	4 Pairs
Conductor	AWG	22 AWG	24 AWG	26 AWG
	Conductor material	Stranded Tinned Copper	Stranded Tinned Copper	Stranded Tinned Copper
	Conductor dimension (mm)	7/0.245 ± 0.05mm	7/0.20 ± 0.02mm	7/0.155 ± 0.02mm
Insulation	Insulation material	Foamed PE	Foamed PE	Foamed PE
	Insulation dimension (mm)	1.65 ± 0.05mm	1.32 ± 0.05mm	0.99 ± 0.05mm
	Nom. thickness (mm)	0.42mm	0.36mm	0.28mm
Cabling	Twisting lay length	≤ 30mm	≤ 30mm	≤ 30mm
	Cabling lay length	≤ 200mm	≤ 200mm	≤ 200mm
Shield	Individual shield and material	AL-Foil	AL-Foil	AL-Foil
	Primary overall shield & material	Stranded Tinned Copper	Tinned Copper Wire	Stranded Tinned Copper
	Shield nom. coverage	35% Nom.	35% Nom.	35% Nom.
Outer Jacket	Outer jacket material	LSFRZH	LSFRZH	LSFRZH
	Outer jacket thickness (mm)	1.00mm Nom.	1.00mm Nom.	1.00mm Nom.
	Overall nom dimension (mm)	9.90 ± 0.30mm	8.40 ± 0.30mm	7.20 ± 0.30mm
	Outer jacket colour	TE Blue	TE Blue	TE Blue

## CAT 5E DATA CABLES – STANDARD

Mechanical Characteristics		22 AWG	24 AWG	26 AWG
Outer Jacket	Operating temp range	-20°C to +80°C	-20°C to +80°C	-20°C to +80°C
	Bulk cable weight	94kg/km	70kg/km	54kg/km
	Max. recommended pulling tension	80 N	80 N	80 N
	Min. bend radius (Install)	8 x O.D.	8 x O.D.	8 x O.D.
	Tensile strength	≥9 Mpa	≥9 Mpa	≥9 Mpa
	Elongation	≥100%	≥100%	≥100%
	Ageing condition	100°C x 168hrs	100°C x 168hrs	100°C x 168hrs
	After ageing tensile strength	≥70% of Unaging	≥70% of Unaging	≥70% of Unaging
	After ageing elongation	≥50% of Unaging	≥50% of Unaging	≥50% of Unaging
	Cold bend	No cracks (-20°C/4hrs)	No cracks (-20°C x 4hrs)	No cracks (-20°C x 4hrs)

Electrical Characteristics		22 AWG	24 AWG	26 AWG
Finished Cable	Nom. mutual capacitance	≤56 pF/m (@ 1kHz)	≤56 nF/100m (@ 1kHz)	≤56 pF/m (@ 1kHz)
	Pair-ground capacitance unbalance	≤160 pF/100m	≤160 pF/100m	≤160 pF/100m
	Nominal velocity of propagation	65%	65%	65%
	Max. delay skew	25 ns/100m	25 ns/100m	25 ns/100m
	Max. conductor DC resistance	145 Ω/km (@ 20°C)	145 Ω/km (@ 20°C)	145 Ω/km (@ 20°C)
	Max. conductor resistance unbalance	2%	2%	2%
	Min. insulation resistance	5000 MΩ·km	5000 MΩ·km	5000 MΩ·km
	Max. operating voltage - UL	300 V	300 V	300 V

### GENERAL PROPERTIES

Test	Method	Result
Ozone Resistance	EN 50305:2002 Clause 7.4.1	No Cracks
Abrasion Resistance	EN 50305 Clause 5.2	Load 8N Mean ≥ 150 cycles Minimum 100 Cycles
Mineral Oil Resistance	EN 60811-2-1 Clause 10	IRM 902, 24h at 23±2°C
Fuel Resistance	EN 60811-2-1 Clause 10	IRM 903, 168h at 23±2°C
Acid Resistance	EN 60811-2-1 Clause 10	Acid, 168h at 23±2°C
Alkali Resistance	EN 60811-2-1 Clause 10	Alkali, 168h at 23±2°C
Flame Propagation - Single Cable	IEC 60332-1-2	Charring Confined to between 50mm to 540mm
Flame Propagation - Bunched Cable	EN 50305 Clause 9.1.1 (EN 60332-3-25)	Max. burn length 2.5m
Smoke Testing	EN 61034-2	3m cube box 70% min. transmittance
Toxicity of Sheath	EN 50305 Clause 9.2	ITC Max. 6

## RADIATION CROSS LINKED CAT 7 DATA CABLES

### MECHANICAL SPECIFICATIONS

- **Conductor:** Stranded Tinned Copper
- **Construction:** S/FTP
- **Number of Conductors:** 8
- **Number of Pairs:** 4
- **Cross Section:** 22 AWG, 24 AWG, 26 AWG
- **Temperature Range:** -20°C to +80°C

### MATERIALS

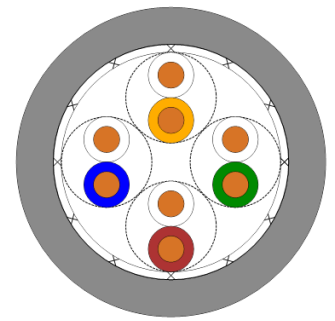
- **Insulation:** Colour Coded Foamed PE
- **Conductor:** Stranded, Tin-Plated Copper
- **Jacket:** EM104 - Blue

### STANDARDS & SPECIFICATIONS

- EN 45545-2
- IEC 61156-6
- ISO/IEC 11801
- EN 50264-1
- R15/R16 - Hazard Level 3
- Category 7
- EM104

### CHARACTERISTICS

- Flame Retardant
- Halogen Free
- Flexible
- Low toxicity
- Low smoke
- Extra Oil Resistant
- Extra Fuel Resistant



Physical Characteristics		22 AWG	24 AWG	26 AWG
Structure	Construction	S/FTP	S/FTP	S/FTP
	Number of pairs	4 Pairs	4 Pairs	4 Pairs
Conductor	AWG	22 AWG	24 AWG	26 AWG
	Conductor material	Stranded Tinned Copper	Stranded Tinned Copper	Stranded Tinned Copper
	Conductor dimension (mm)	7/0.245 ± 0.05mm	7/0.20 ± 0.02mm	7/0.155 ± 0.02mm
Insulation	Insulation material	Foamed PE	Foamed PE	Foamed PE
	Insulation dimension (mm)	1.65 ± 0.05mm	1.32 ± 0.05mm	0.99 ± 0.05mm
	Nom. thickness (mm)	0.42mm	0.36mm	0.28mm
Cabling	Twisting lay length	≤ 30mm	≤ 30mm	≤ 30mm
	Cabling lay length	≤ 200mm	≤ 200mm	≤ 200mm
Shield	Individual shield and material	AL-Foil	AL-Foil	AL-Foil
	Primary overall shield & material	Stranded Tinned Copper	Tinned Copper Wire	Stranded Tinned Copper
	Shield nom. coverage	35% Nom.	35% Nom.	35% Nom.
Outer Jacket	Outer jacket material	EM104	EM104	EM104
	Outer jacket thickness (mm)	1.00mm Nom.	1.00mm Nom.	1.00mm Nom.
	Overall nom dimension (mm)	9.90 ± 0.30mm	8.40 ± 0.30mm	7.20 ± 0.30mm
	Outer jacket colour	TE Blue	TE Blue	TE Blue

## RADIATION CROSS LINKED CAT 7 DATA CABLES

Mechanical Characteristics		22 AWG	24 AWG	26 AWG
Outer Jacket	Operating temp range	-20°C to +80°C	-20°C to +80°C	-20°C to +80°C
	Bulk cable weight	94kg/km	70kg/km	54kg/km
	Max. recommended pulling tension	80 N	80 N	80 N
	Min. bend radius (Install)	8 x O.D.	8 x O.D.	8 x O.D.
	Tensile strength	≥9 Mpa	≥9 Mpa	≥9 Mpa
	Elongation	≥100%	≥100%	≥100%
	Ageing condition	100°C x 168hrs	100°C x 168hrs	100°C x 168hrs
	After ageing tensile strength	≥70% of Unaging	≥70% of Unaging	≥70% of Unaging
	After ageing elongation	≥50% of Unaging	≥50% of Unaging	≥50% of Unaging
	Cold bend	No cracks (-20°C/4hrs)	No cracks (-20°C x 4hrs)	No cracks (-20°C x 4hrs)

Electrical Characteristics		22 AWG	24 AWG	26 AWG
Finished Cable	Nom. mutual capacitance	≤56 pF/m (@ 1kHz)	≤56 nF/100m (@ 1kHz)	≤56 pF/m (@ 1kHz)
	Pair-ground capacitance unbalance	≤160 pF/100m	≤160 pF/100m	≤160 pF/100m
	Nominal velocity of propagation	65%	65%	65%
	Max. delay skew	25 ns/100m	25 ns/100m	25 ns/100m
	Max. conductor DC resistance	145 Ω/km (@ 20°C)	145 Ω/km (@ 20°C)	145 Ω/km (@ 20°C)
	Max. conductor resistance unbalance	2%	2%	2%
	Min. insulation resistance	5000 MΩ·km	5000 MΩ·km	5000 MΩ·km
	Max. operating voltage - UL	300 V	300 V	300 V

### GENERAL PROPERTIES

Test	Method	Result
Properties in the State as Delivered	EN 60811-1-1 Clause 9.2	Tensile - 10.0 mPa Min., Elongation - 125% Min.
Properties After Ageing in Air Oven	EN 60811-1-1 Clause 8.1	Tensile - ±30% Max., Elong. - ±30% Max.
Hot Set Test	EN 60811-2-1 Clause 9	Under Load ≤ 100%, After Unloading ≤ 25%
Water Absorption (Gravimetric)	EN 60811-1-3 Clause 9.3	15 mg/cm <sup>2</sup> Maximum
Ozone Resistance	EN 50305:2002 Clause 7.4.2	No Cracks
Mineral Oil Resistance	EN 60811-2-1 Clause 10	Tensile - ±30% Max., Elongation - ±40% Max.
Fuel Resistance	EN 60811-2-1 Clause 10	Tensile - ±30% Max., Elongation - ±40% Max.
Bending Test at Low Temperature	EN 60811-1-4 Clause 8.2	No Cracks at -40°C
Elongation Test at Low Temperature	EN 60811-1-4 Clause 8.4	30% Min.

## RADIATION CROSS LINKED CAT 7 DATA CABLES

Test	Method	Result
Assessment of Halogens	EN 50267-2-2, EN 50267-2-1, EN 60684-2	HCL and HBr $\leq$ 0.5% Ph $\geq$ 4.3 Conductivity $\leq$ 10.0 $\mu$ S/m HF Content $\leq$ 0.1%
Toxicity	EN 50305:2002 Clause 9.2	ITC Max. 3
Acid Resistance	EN 60811-2-1 Clause 10	Tensile - $\pm$ 30% Max., Elongation - 100% Min.
Alkali Resistance	EN 60811-2-1 Clause 10	Tensile - $\pm$ 30% Max., Elongation - 100% Min.
Flame Propagation - Single Cable	IEC 60332-1-2	Charring Confined to between 50mm to 540mm
Flame Propagation - Bunched Cable	EN 50305 Clause 9.1.1 (EN 60332-3-25)	Max. burn length 2.5m
Smoke Testing	EN 61034-2	3m cube box 70% min. transmittance
Toxicity of Sheath	EN 50305 Clause 9.2	ITC Max. 3

### PART NUMBERS

Part Description	Hazard Performance	Sheath Performance	Part Code	TE Part Number
FOUR PAIR 22AWG S/FTP CAT7 LSZH	EN 45545-2 HL3	-	TECC0019C7	2297801-1
FOUR PAIR 24AWG S/FTP CAT7 LSZH	EN 45545-2 HL3	-	TECC0011C7	2297799-1
FOUR PAIR 26AWG S/FTP CAT7 LSZH	EN 45545-2 HL3	-	TECC0018C7	2297800-1
FOUR PAIR 22AWG S/FTP CAT7 RXL	EN 45545-2 HL3	EN 50264-1 - EM 104	TECC0019C7-XL	2358582-1
FOUR PAIR 24AWG S/FTP CAT7 RXL	EN 45545-2 HL3	EN 50264-1 - EM 104	TECC0011C7-XL	2358583-1
FOUR PAIR 26AWG S/FTP CAT7 RXL	EN 45545-2 HL3	EN 50264-1 - EM 104	TECC0018C7-XL	2358584-1

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