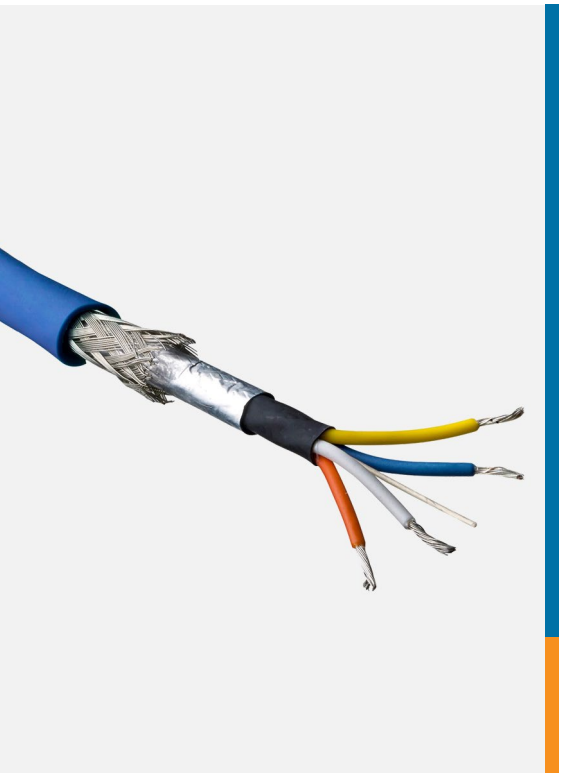


TE CONNECTIVITY CAT 5E HIGH SPEED RAIL DATA CABLES

RAIL NETWORKING CABLE

TE Connectivity's 100 MHz high performance networking cable for railway supports traditional train bus and fast Ethernet applications. The enhanced design enables designers to balance performance requirements with installation time, lowering total costs and assuring system performance. Currently Cat5e cables are the predominant data cable type used within the Rail industry.

DESCRIPTION

- Two twisted pairs (in a quad formation) with an overall braid-shield (can be supplied as a four pair construction if required)
- Supports fast Ethernet applications
- Standard design for most modern day rail applications
- Stranded conductors for flexible cable applications
- Improved EMI shielding effectiveness, prevent external interference to signals and reduce noise
- High performance rail qualified to EN 45545-2
- Cross linked outer jacket version available for harsh enviroments
- Can produce bespoke design to meet customers exact needs available

TWO FAMILIES AVAILABLE AS STANDARD

- High performance cables, rail approved to EN45545-2
- Ruggadizied Cables, with a Radiation Cross-Linked Sheath designed for the most harsh enviroments as well as meeting EN 45545-2 hazard classification level HL 3.

CAT 5E DATA CABLES – STANDARD

APPLICATIONS

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

MECHANICAL SPECIFICATIONS

- **Conductor:** Stranded Tinned Copper
- **Construction:** S/FTQ
- **Number of Conductors:** 4
- **Number of Pairs:** 2
- **Cross Section:** 22 AWG, 24 AWG, 26 AWG, 0.50mm²
- **Temperature Range:** -25°C to +75°C

MATERIALS

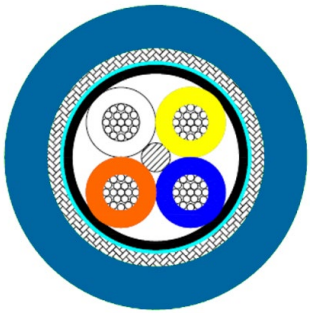
- **Insulation:** Colour Coded PE
- **Conductor:** Stranded, Tin-Plated Copper
- **Tapes:** Separating Tape
- **Shield:** Tinned Copper Braid
- **Jacket:** Low Smoke, Fire Retardant, Zero Halogen, TE Blue (Other colours available upon request)

STANDARDS & SPECIFICATIONS

- EN 45545-2
- IEC 61156-6
- ISO/IEC 11801
- R15/R16 – Hazard Level 3

CHARACTERISTICS

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



Physical Characteristics		0.50 mm² / 20 AWG	22 AWG	24 AWG
Structure	Construction	SF/UTP	SF/UTP	SF/UTP
	Number of pairs	4C / 2 Pair	4C / 2 Pair	4C / 2 Pair
Conductor	AWG	0.50mm²	22 AWG	24 AWG
	Conductor material	Stranded Tinned Copper	Stranded Tinned Copper	Solid Bare Copper
	Conductor dimension (mm)	19/0.185 ± 0.02 mm	19/0.16 ± 0.08 mm	0.52 ± 0.02 mm
Insulation	Insulation material	PE	Thermoplastic Polymer	PE
	Insulation dimension (mm)	2.00 ± 0.08 mm	1.55 ± 0.08 mm	1.02 ± 0.05 mm
	Nom. thickness (mm)	0.50 mm	0.45 mm	0.25 mm
Cabling	Twisting lay length	N/A	N/A	N/A
	Cabling lay length	≤100 mm	≤100mm	≤100 mm
Shield	Individual shield and material	N/A	N/A	AL-Foil
	Primary overall shield & material	Stranded Tinned Copper	Stranded Tinned Copper	Stranded Tinned Copper
	Shield nom. Coverage	80% Min.	85% Min.	80% Min.
Outer Jacket	Outer jacket material	LSFRZH	LSFRZH	LSFRZH
	Outer jacket thickness (mm)	1.00 mm Nom.	0.90 mm Nom.	0.80 mm Nom.
	Overall nom dimension (mm)	8.50 ± 0.50 mm	6.80 ± 0.50 mm	5.20 ± 0.30 mm
	Outer jacket colour	TE Blue	TE Blue	TE Blue

CAT 5E DATA CABLES – STANDARD

Mechanical Characteristics		0.50 mm² / 20 AWG	22 AWG	24 AWG
Outer Jacket	Operating temp range	-25°C to +75°C	-25°C to +75°C	-25°C to +75°C
	Bulk cable weight	95 kg/km	66 kg/km	41 kg/km
	Max. recommended pulling tension	80 N	80 N	80 N
	Min. bend radius (Install)	70 mm	70 mm	8 x O.D.
	Tensile strength	≥9 Mpa	≥9 Mpa	≥9 Mpa
	Elongation	≥100%	≥125%	≥100%
	Ageing condition	100°C x 168hrs	100°C x 168hrs	100°C x 168hrs
	After ageing tensile strength	≥70% of Unaged	≥70% of Unaged	≥70% of Unaged
	After ageing elongation	≥50% of Unaged	≥50% of Unaged	≥50% of Unaged
	Cold bend	No cracks (-25°C/4hrs)	No cracks (-25°C x 4hrs)	No cracks (-20°C x 4hrs)

Electrical Characteristics		0.50 mm² / 20 AWG	22 AWG	24 AWG
Finished Cable	Nom. mutual capacitance	≤5.6 nF/100m (@ 1kHz)	≤5.6 nF/100m (@ 1kHz)	≤5.6 nF/100m (@ 1kHz)
	Pair-ground capacitance unbalance	≤160 pF/100m	≤160 pF/100m	≤160 pF/100m
	Nominal velocity of propagation	70%	66%	66%
	Max. delay skew	N/A	N/A	45 ns/100m
	Max. conductor DC resistance	40.1 Ω/km (@ 20°C)	60 Ω/km (@ 20°C)	93.8 Ω/km (@ 20°C)
	Max. conductor resistance unbalance	5% (@ 20°C)	2% (@ 20°C)	2% (@ 20°C)
	Min. insulation resistance	150 MΩ·km	500 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
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, 24h 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	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 5E DATA CABLES

MECHANICAL SPECIFICATIONS

- **Conductor:** Stranded Tinned Copper
- **Construction:** S/FTQ
- **Number of Conductors:** 4
- **Number of Pairs:** 2
- **Cross Section:** 22 AWG, 24 AWG, 26 AWG, 0.50mm²
- **Temperature Range:** -25°C to +75°C

STANDARDS & SPECIFICATIONS

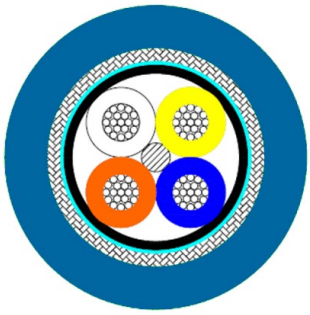
- EN 45545-2
- IEC 61156-6
- ISO/IEC 11801
- EN 50264-1
- R15/R16 – Hazard Level 3
- EM104

MATERIALS

- **Insulation:** Colour Coded PE
- **Conductor:** Stranded, Tin-Plated Copper
- **Tapes:** Separating Tape
- **Shield:** Tinned Copper Braid
- **Jacket:** EM104 – Blue

CHARACTERISTICS

- Flame Retardant
- Halogen Free
- Low toxicity
- Low smoke
- Oil Resistant
- Fuel Resistant
- Acid / Alkali Resistant



Physical Characteristics		0.50 mm² / 20 AWG	22 AWG	24 AWG
Structure	Construction	SF/UTP	SF/UTP	SF/UTP
	Number of pairs	4C / 2 Pair	4C / 2 Pair	4C / 2 Pair
Conductor	AWG	0.50mm²	22 AWG	24 AWG
	Conductor material	Stranded Tinned Copper	Stranded Tinned Copper	Solid Bare Copper
	Conductor dimension (mm)	19/0.185 ± 0.02 mm	19/0.16 ± 0.08 mm	0.52 ± 0.02 mm
Insulation	Insulation material	PE	Thermoplastic Polymer	PE
	Insulation dimension (mm)	2.00 ± 0.08 mm	1.55 ± 0.08 mm	1.02 ± 0.05 mm
	Nom. thickness (mm)	0.60 mm	0.45 mm	0.25 mm
Cabling	Twisting lay length	N/A	N/A	N/A
	Cabling lay length	≤100 mm	≤100mm	≤100 mm
Shield	Individual shield and material	N/A	N/A	AL-Foil
	Primary overall shield & material	Stranded Tinned Copper	Stranded Tinned Copper	Stranded Tinned Copper
	Shield nom. Coverage	80% Min.	85% Min.	80% Min.
Outer Jacket	Outer jacket material	EM 104	EM 104	EM 104
	Outer jacket thickness (mm)	1.00 mm Nom.	0.90 mm Nom.	0.80 mm Nom.
	Overall nom dimension (mm)	8.50 ± 0.50 mm	6.80 ± 0.50 mm	5.20 ± 0.30 mm
	Outer jacket colour	TE Blue	TE Blue	TE Blue

RADIATION CROSS LINKED CAT 5E DATA CABLES

Mechanical Characteristics		O.50 mm² / 20 AWG	22 AWG	24 AWG
Outer Jacket	Operating temp range	-25°C to +75°C	-25°C to +75°C	-25°C to +75°C
	Bulk cable weight	100 kg/km	66 kg/km	41 kg/km
	Max. recommended pulling tension	80 N	80 N	80 N
	Min. bend radius (Install)	70 mm	70 mm	8 x O.D.
	Tensile strength	≥10 Mpa	≥9 Mpa	≥9 Mpa
	Elongation	≥125%	≥125%	≥100%
	Ageing condition	120°C x 240hrs	120°C x 240hrs	120°C x 240hrs
	After ageing tensile strength	≥70% of Unaged	≥70% of Unaged	≥70% of Unaged
	After ageing elongation	≥70% of Unaged	≥70% of Unaged	≥70% of Unaged
	Cold bend	No cracks (-25°C/4hrs)	No cracks (-25°C x 4hrs)	No cracks (-25°C x 4hrs)

Electrical Characteristics		O.50 mm² / 20 AWG	22 AWG	24 AWG
Finished Cable	Nom. mutual capacitance	≤5.6 nF/100m (@ 1kHz)	≤5.6 nF/100m (@ 1kHz)	≤5.6 nF/100m (@ 1kHz)
	Pair-ground capacitance unbalance	≤160 pF/100m	≤160 pF/100m	≤160 pF/100m
	Nominal velocity of propagation	70%	66%	66%
	Max. delay skew	N/A	N/A	45 ns/100m
	Max. conductor DC resistance	40.1 Ω/km (@ 20°C)	60 Ω/km (@ 20°C)	93.8 Ω/km (@ 20°C)
	Max. conductor resistance unbalance	5% (@ 20°C)	2% (@ 20°C)	2% (@ 20°C)
	Min. insulation resistance	150 MΩ·km	500 MΩ·km	5000 MΩ·km
	Max. operating voltage - UL	300 V	300 V	300 V

RADIATION CROSS LINKED CAT 5E DATA CABLES

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/cm2 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.
Assessment of Halogens	EN 50267-2-2, EN 50267-2-1, EN 60684-2	HCL and HBr ≤ 0.5% Ph ≥ 4.3 Conductivity ≤ 10.0 µS/m HF Content ≤ 0.1%
Toxicity	EN 50305:2002 Clause 9.2	ITC Max. 3
Acid Resistance	EN 60811-2-1 Clause 10	Tensile – ±30% Max. Elongation – 100% Min.
Alkali Resistance	EN 60811-2-1 Clause 10	Tensile – ±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	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

CAT 5E High Speed Rail Data Cables

PART NUMBERS

Part Description	Hazard Performance	Sheath Performance	Part Code	TE Part Number
CAT5E 4 x 0.5MM² QUAD CABLE LSZH	EN 45545-2 HL3	-	TECC0029C5	2332021-1
CAT5E 4 x 22AWG QUAD CABLE LSZH	EN 45545-2 HL3	-	TECC0030C5	2332022-1
CAT5E 4 x 24AWG QUAD CABLE LSZH	EN 45545-2 HL3	-	TECC0052C5	2351921-1
CAT5E 4 X 22AWG CAT5E RXL	EN 45545-2 HL3	EN 50264-1 - EM 104	TECC0026C5	2320808-1
CAT5E 4 x 0.5MM² QUAD CABLE RXL	EN 45545-2 HL3	EN 50264-1 - EM 104	TECC0029C5-XL	2358579-1
CAT5E 4 x 22AWG QUAD CABLE RXL	EN 45545-2 HL3	EN 50264-1 - EM 104	TECC0030C5-XL	2358580-1
CAT5E 4 x 24AWG QUAD CABLE RXL	EN 45545-2 HL3	EN 50264-1 - EM 104	TECC0052C5-XL	2358581-1

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TE Connectivity Ltd. is a $14 billion global technology and manufacturing leader creating a safer, sustainable, productive, and connected future. For more than 75 years, our connectivity and sensor solutions, proven in the harshest environments, have enabled advancements in transportation, industrial applications, medical technology, energy, data communications, and the home. With 80,000 employees, including more than 8,000 engineers, working alongside customers in approximately 140 countries, TE ensures that EVERY CONNECTION COUNTS. Learn more at www.te.com and on LinkedIn, Facebook, WeChat and Twitter.

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