



WTB (Wired Train Bus) Cables

Applications

The cables are designed for permanent installation inside of rolling stock to connect fixed parts. A typical application is a communication system in a locomotive. The system uses a wire backed bus system to the TCN standard for control and instrumentation and for diagnostics. This bus system consists of the rail bus WTB (Wired Train Bus) and the road bus MVB (Multifunction Vehicle Bus) which are connected via redundant gateways.

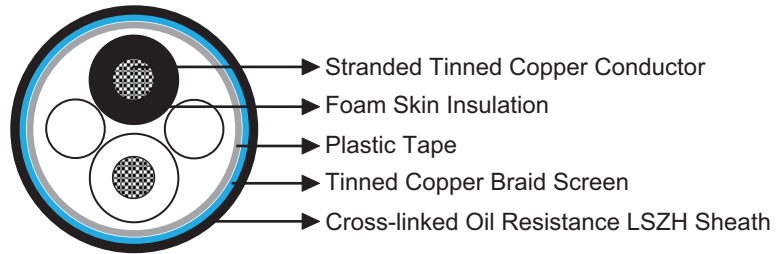


Standards

- DIN 5510-1

Construction

- Conductors: Stranded tinned copper conductor according to IEC 60228 class 5.
- Insulation: Foam skin-composite PE made of inner cellular layer and outer solid skin.
- Core Wrapping: Plastic tape(s).
- EMC Screen: Tinned copper braid.
- Outer Sheath: Cross-linked oil resistant LSZH compound.



Electrical Characteristics at 20°C

Nominal Cross Section	mm ²	0.75
Maximum Conductor Resistance	Ω/km	26.7
Impedance@1.0-10MHz	Ω	120+/-12
Maximum Attenuation @1MHz	dB/km	10
Maximum Attenuation @1.5MHz	dB/km	13
Maximum Attenuation @2MHz	dB/km	14
Maximum Attenuation @3MHz	dB/km	18
Maximum Transfer Impedance	mΩ/m	30
Nominal Voltage Rating	V	300

Mechanical and Thermal Properties

- Minimum Bending Radius: 6×OD (single); 12×OD (multiple)
- Temperature Range: -40°C to +100°C (during operation); -20°C +50°C (during installation)

➤ **Dimensions and Weight**

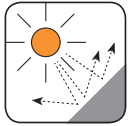
Cable Code	No. of cores & Nominal Conductor Cross Sectional Area No. x mm ²	Nominal Diameter of Strands No/mm	Nominal Sheath Thickness mm	Nominal Overall Diameter mm	Nominal Weight kg/km
RD-WTB-02YSCH-2C0.75S	2x0.75	19/0.22	1.4	8.3	97
RD-WTB-02YSCH-1P0.75S	1x2x0.75	19/0.22	1.4	9.0	110



Impact Resistant



Highly Flexible



UV Resistant



Weather Resistant



Oil Resistant



Flame Retardant
NF C32-070-2.1(C2)
IEC 60332-1/EN 50265-2-1



Fire Retardant
NF C32-070-2.2(C1)
IEC 60332-3/EN50266



Zero Halogen
IEC 60754-1/NF C20-454
EN 50267-2-1



Low Smoke Emission
IEC 61034/NFC20-902
EN 50268/NF C32-073



Low Corrosivity
EN 50267-2-2/NF C32-074
IEC 60754-2/NF C20-453



Low Toxicity





MVB (Multifunction Vehicle Bus) Cables

Applications

The cables are designed for transmission of digital signals under baud rate of 10M inside of rolling stock to connect fixed parts. The communication system in a locomotive uses a wire backed bus system to the TCN standard for control and instrumentation and for diagnostics. This bus system consists of the rail bus WTB (Wired Train Bus) and the road bus MVB (Multifunction Vehicle Bus) which are connected via redundant gateways.

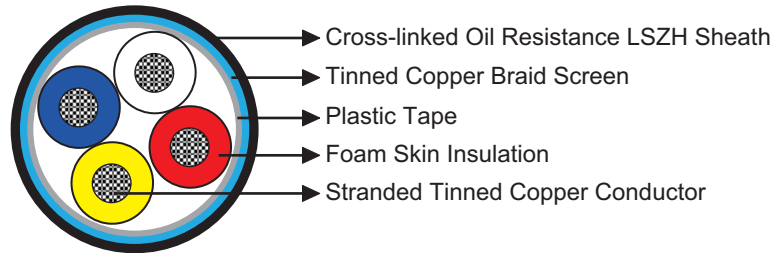


Standards

- DIN 5510-1

Construction

- Conductors: Stranded tinned copper conductor according to IEC 60228 class 5.
- Insulation: Foam skin-composite PE made of inner cellular layer and outer solid skin.
- Core Wrapping: Plastic tape(s).
- EMC Screen: Tinned copper braid.
- Outer Sheath: Cross-linked oil resistant LSZH compound.



Electrical Characteristics at 20°C

Nominal Cross Section	mm ²	0.5
Maximum Conductor Resistance	Ω/km	41
Impedance @0.5-2MHz	Ω	120+/-12
Maximum Attenuation @1MHz	dB/km	12.5
Maximum Attenuation @1.5MHz	dB/km	15
Maximum Attenuation @2MHz	dB/km	18
Maximum Attenuation @3MHz	dB/km	21
Maximum Transfer Impedance	mΩ/m	20
Nominal Voltage Rating	V	300

Mechanical and Thermal Properties

- Minimum Bending Radius: 5×OD (single); 10×OD (multiple)
- Temperature Range: -40°C to +90°C (during operation); -20°C +50°C (during installation)

➤ **Dimensions and Weight**

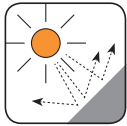
Cable Code	No. of cores & Nominal Conductor Cross Sectional Area No. × mm ²	Nominal Diameter of Strands No/mm	Nominal Sheath Thickness mm	Nominal Overall Diameter mm	Nominal Weight kg/km
RD-MVB-02YSCH-1P0.5S+1C0.5S	1×2×0.5+1×0.5	19/0.18	1.2	6.8	62
RD-MVB-02YSCH-2P0.5S	2×2×0.5	19/0.18	1.2	8.3	100



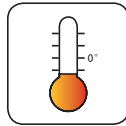
Impact Resistant



Highly Flexible



UV Resistant



Weather Resistant



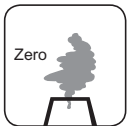
Oil Resistant



Flame Retardant
NF C32-070-2.1(C2)
IEC 60332-1/EN 50265-2-1



Fire Retardant
NF C32-070-2.2(C1)
IEC 60332-3/EN50266



Zero Halogen
IEC 60754-1/NF C20-454
EN 50267-2-1



Low Smoke Emission
IEC 61034/NFC20-902
EN 50268/NF C32-073



Low Corrosivity
EN 50267-2-2/NF C32-074
IEC 60754-2/NF C20-453



Low Toxicity

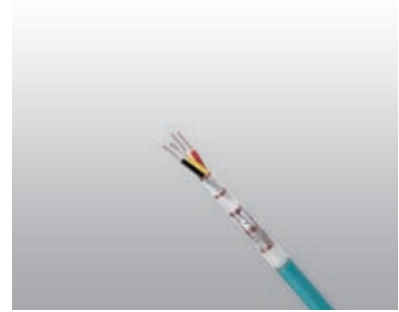




MVB (Multifunction Vehicle Bus) Cables (Redundant Version)

Applications

The cables are designed for permanent installation inside of rolling stock to connect fixed parts. A typical application is a communication system in a locomotive. The system uses a wire backed bus system to the TCN standard for control and instrumentation and for diagnostics. This bus system consists of the rail bus WTB (Wired Train Bus) and the road bus MVB (Multifunction Vehicle Bus) which are connected via redundant gateways.

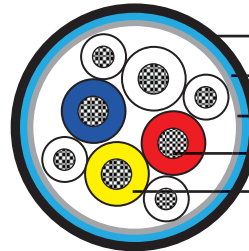


Standards

- DIN 5510-2

Construction

- Conductors: Stranded tinned copper conductor according to IEC 60228 class 5.
- Insulation: Foam skin-composite PE made of inner cellular layer and outer solid skin.
- Core Wrapping: Plastic tape(s).
- EMC Screen: Tinned copper braid.
- Outer Sheath: Cross-linked oil resistant LSZH compound.



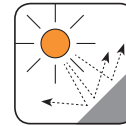
- Cross-linked Oil Resistance LSZH Sheath
- Tinned Copper Braid Screen
- Plastic Tape
- Stranded Tinned Copper Conductor
- Foam Skin Insulation



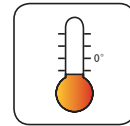
Impact Resistant



Highly Flexible



UV Resistant



Weather Resistant

Electrical Characteristics at 20°C

Nominal Cross Section	mm ²	0.5
Maximum Conductor Resistance	Ω/km	41
Impedance @0.75-3MHz	Ω	120+/-12
Maximum Attenuation @1.5MHz	dB/km	17
Maximum Attenuation @3MHz	dB/km	25
Maximum Transfer Impedance	mΩ/m	20
Nominal Voltage Rating	V	300

Mechanical and Thermal Properties

- Minimum Bending Radius: 6×OD (single); 10×OD (multiple)
- Temperature Range: -40°C to +100°C (during operation); -20°C +50°C (during installation)

Dimensions and Weight

Cable Code	No. of cores & Nominal Conductor Cross Sectional Area No. × mm ²	Nominal Diameter of Strands No./mm	Nominal Sheath Thickness mm	Nominal Overall Diameter mm	Nominal Weight kg/km
RD-MVB-02YSCH-1Q0.5S+4C0.25S	1×4×0.5+4×1×0.25	19/0.18	1.2	7.9	95



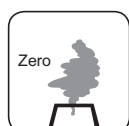
Oil Resistant



Flame Retardant
NF C32-070-2.1(C2)
IEC 60332-1/EN 50265-2-1



Fire Retardant
NF C32-070-2.2(C1)
IEC 60332-3/EN50266



Zero Halogen
IEC 60754-1/NF C20-454
EN 50267-2-1



Low Smoke Emission
IEC 61034/NFC20-902
EN 50268/NF C32-073



Low Corrosivity
EN 50267-2-2/NF C32-074
IEC 60754-2/NF C20-453



Low Toxicity

WTB (Wired Train Bus)/MVB (Multifunction Vehicle Bus) Cables

Applications

The cables are used as connecting cables to transmit digital signals inside railway rolling stocks. The communication system in a locomotive uses a wire backed bus system to the TCN standard for control and instrumentation and for diagnostics. This bus system consists of the rail bus WTB (Wired Train Bus) and the road bus MVB (Multifunction Vehicle Bus) which are connected via redundant gateways.

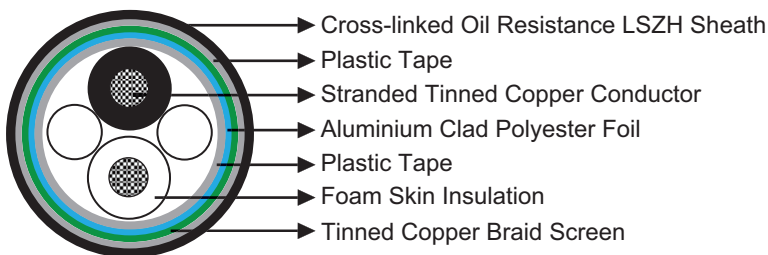


Standards

- DIN 5510-1

Construction

- Conductors: Stranded tinned copper conductor according to IEC 60228 class 5.
- Insulation: Foam skin-composite PE made of inner cellular layer and outer solid skin.
- Cable Element: Twisted pair.
- Core Wrapping: Plastic tape(s).
- EMC Screen1: Aluminium clad polyester foil.
- EMC Screen2: Tinned copper braid.
- Core Wrapping: Plastic tape(s).
- Outer Sheath: Cross-linked oil resistant LSZH compound.



Electrical Characteristics at 20°C

Nominal Cross Section/AWG	mm ²	0.62/20
Maximum Conductor Resistance	Ω/km	33.1
Impedance @0.5-2MHz	Ω	120+/-12
Maximum Attenuation @1MHz	dB/km	10
Maximum Attenuation @2MHz	dB/km	15
Nominal Voltage Rating	V	300

Mechanical and Thermal Properties

- Minimum Bending Radius: 6×OD (single); 12×OD (multiple)
- Temperature Range: -40°C to +100°C (during operation); -20°C +50°C (during installation)



Dimensions and Weight

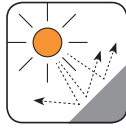
Cable Code	No. of cores & Nominal Conductor Cross Sectional Area No. x mm ²	Nominal Diameter of Strands No/mm	Nominal Sheath Thickness mm	Nominal Overall Diameter mm	Nominal Weight kg/km
RD-WTB/MVB--02YS(ST+C)H-1P20A	1×2×0.62	19/0.2	1.2	8.3	80



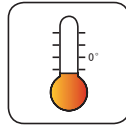
Impact Resistant



Highly Flexible



UV Resistant



Weather Resistant



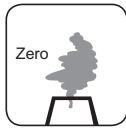
Oil Resistant



Flame Retardant
NF C32-070-2.1(C2)
IEC 60332-1/EN 50265-2-1



Fire Retardant
NF C32-070-2.2(C1)
IEC 60332-3/EN50266



Zero Halogen
IEC 60754-1/NF C20-454
EN 50267-2-1



Low Smoke Emission
IEC 61034/NFC20-902
EN 50268/NF C32-073



Low Corrosivity
EN 50267-2-2/NF C32-074
IEC 60754-2/NF C20-453



Low Toxicity



Integrated 9/11/18/20 Cores 0.75mm² UIC Databus Cables

Applications

The cables are used as connecting cables to transmit digital signals inside railway rolling stocks.

Standards

- DIN 5510-1



Construction

For 9 cores UIC databus cables:

- 4 cores: 10 mm² stranded tinned copper conductor with LSZH insulation.
- Combined Element: 3 cores (with Cu-strand 2×6mm², 1×2.5mm²) are twisted with a filling element to a combined element. Wrapping: Overlapped plastic-foil(s). Elements sheaths: TPE

- UIC Data Bus 0.75mm²: Two foam skin insulated tinned copper stranded conductors are twisted together with two filling elements to a pair.

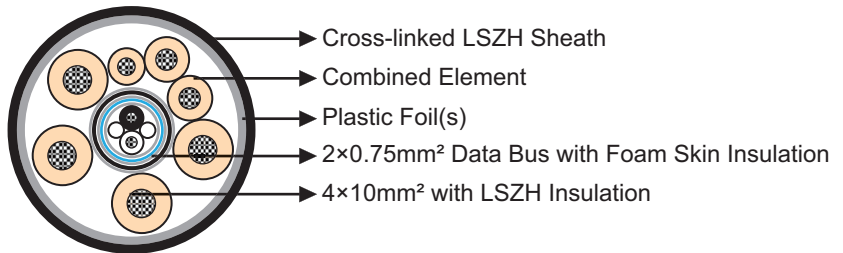
Wrapping: Overlapped plastic-foil(s).

Screen: Tinned copper wire braid screen

Element sheaths: TPE.

Wrapping: Overlapped plastic-foil(s).

- Stranding: 4 strands are twisted to a core together with 3 cored element, the UIC data bus and two fillers
- Core Wrapping: Overlapped plastic-foil(s).
- Outer Sheath: Cross-linked oil resistant LSZH compound.



For 11 cores UIC databus cables:

- 4 cores: 10 mm² stranded tinned copper conductor with LSZH insulation.
- Combined Element: 5 cores (with Cu-strand 2×6mm², 1×2.5mm² and 2×1.0 mm²) are twisted with a filling element to form a combined element.

Wrapping: Overlapped plastic-foil(s).

Elements sheaths: TPE.

- UIC Data Bus 0.75mm²: Two foam skin insulated tinned copper r stranded conductors are twisted together with two filling elements to a pair.

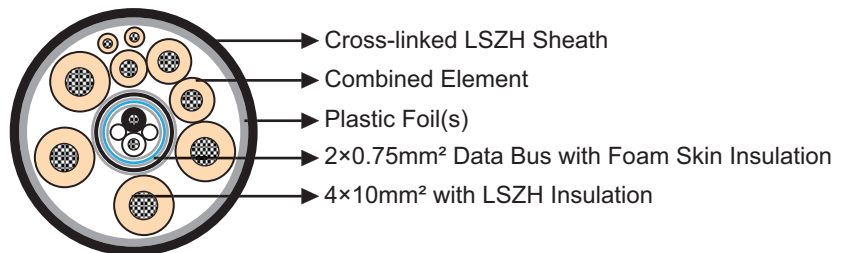
Wrapping: Overlapped plastic-foil(s).

Screen: Tinned copper wire braid screen.

Element sheaths: TPE.

Wrapping: Overlapped plastic-foil(s).

- Stranding: 4 strands are twisted to a core together with 5 cored element, the UIC data bus and two fillers.
- Core Wrapping: Overlapped plastic-foil(s).
- Outer Sheath: Cross-linked oil resistant LSZH compound.

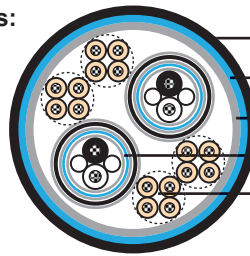




For 18/20 cores UIC databus cables:

- Star Quad: Four LSZH insulated 1mm² stranded tinned copper conductors are twisted to form a star quad.

- UIC Data Bus 0.75mm²: Two foam skin insulated tinned copper stranded conductors are twisted together with two filling elements to form a pair.



- Cross-linked LSZH Sheath
- Tinned Copper Wire Braid Screen
- Plastic Foil(s)
- 2x0.75mm² Data Bus with Foam Skin Insulation
- Star Quad

Wrapping: Overlapped plastic-foil(s)
 Screen: Tinned copper wire braid screen
 Element sheaths: TPE.

Wrapping: Overlapped plastic-foil(s)

- Stranding: 4 star quads are stranded together with 2 or 4 UIC data bus cable and several fillers.
- Core Wrapping: Overlapped plastic-foil(s).
- Screen: Tinned copper-wire braid screen.
- Outer Sheath: Cross-linked oil resistant LSZH compound.

Electrical Characteristics at 20°C

Nominal Cross Section	mm ²	0.75	1	2.5	6	10
No of Strand/Strand Diameter		19/0.22	19/0.25	37/0.29	84/0.3	80/0.4
Maximum Conductor Resistance	Ω/km	26.7	20	8.21	3.39	1.95
Impedance@1.0-10MHz	Ω	120+/-12	-	-	-	-
Maximum Attenuation @1MHz	dB/km	10	-	-	-	-
Maximum Attenuation @1.5MHz	dB/km	13	-	-	-	-
Maximum Attenuation @2MHz	dB/km	14	-	-	-	-
Maximum Attenuation @3MHz	dB/km	18	-	-	-	-
Maximum Transfer Impedance	mΩ/m	30	-	-	-	-
Nominal Voltage Rating	V	300	-	-	-	-

Mechanical and Thermal Properties

- Minimum Bending Radius: 6×OD (single); 12×OD (multiple)
- Temperature Range: -40°C to +90°C (during operation); -20°C +50°C (during installation)

Dimensions and Weight

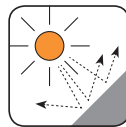
Cable Code	No. of cores & Nominal Conductor Cross Sectional Area No. × mm ²	Nominal Sheath Thickness mm	Nominal Overall Diameter mm	Nominal Weight kg/km
RD-UIC-4C10S+2C6S+1C2.5S+2C0.75S	4×10+2×6+1×2.5+2×0.75	1.8	25	917
RD-UIC-4C10S+2C6S+1C2.5S+2C1S+2C0.75S	4×10+2×6+1×2.5+2×1.0+2×0.75	1.8	25	969
RD-UIC-4Q1S+2C0.75S	4×4×1.0+ 2×0.75	1.8	18.5	498
RD-UIC-4Q1S+2P0.75S	4×4×1.0+ 2×2×0.75	1.8	23	530



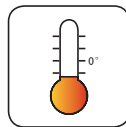
Impact Resistant



Highly Flexible



UV Resistant



Weather Resistant



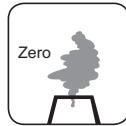
Oil Resistant



Flame Retardant
 NF C32-070-2.1(C2)
 IEC 60332-1/EN 50265-2-1



Fire Retardant
 NF C32-070-2.2(C1)
 IEC 60332-3/EN50266



Zero Halogen
 IEC 60754-1/NF C20-454
 EN 50267-2-1



Low Smoke Emission
 IEC 61034/NFC20-902
 EN 50268/NF C32-073



Low Corrosivity
 EN 50267-2-2/NF C32-074
 IEC 60754-2/NF C20-453



Low Toxicity



Category 5E Data Cables

Applications

The cables are designed for permanently protected installation, inside and outside railway rolling stock, buses and other vehicles to connect fixed parts. Ethernet based networks as: infotainment, multimedia, passenger information system etc.



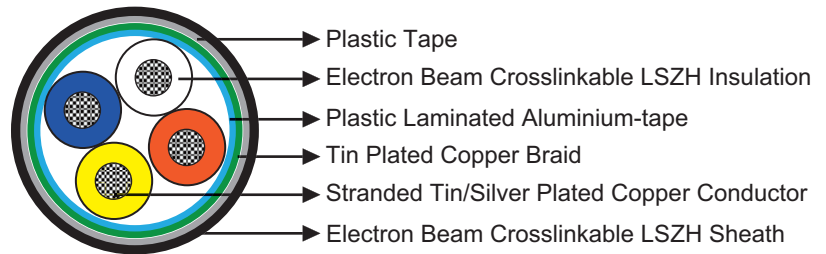
Standards

- DIN 5510-2
- EN 50228-2-2
- BS 6853
- EN 50306-3 par 4.8/4.9/4.10

Construction

For 4×0.5mm², 4×22AWG cables:

- Conductors: Stranded tin plated copper conductor (for 0.5mm² cables) or stranded silver plated copper conductor (for 22AWG cables) according to IEC 60228 class 5.



- Insulation: Electron beam crosslinkable compound.
- Cable Element: Individual conductor stranded together.
- EMC Screen1: Plastic laminated aluminium-tape.
- EMC Screen2: Tinned copper braid.
- Separator (s): Plastic tape.
- Outer Sheath: Electron beam crosslinkable compound.

For 4×2×22AWG cables:

- Center: PE filler.
- 4 pairs 2×22AWG: Stranded tinned copper conductor according to IEC 60228 class 5.
- Insulation: Electron beam crosslinkable compound.
- EMC Screen1: Plastic laminated aluminium-tape.
- EMC Screen2: Tinned copper braid.
- Separator(s): Plastic tape.
- Outer Sheath: Electron beam crosslinkable compound.



Electrical Characteristics at 20°C

Nominal Cross Section	mm ²	0.5	-
AWG		-	22
Nominal Conductor Resistance	Ω/km	40.1	54.4
Maximum Resistance Unbalance	Ω/km	1.1	1.1
Maximum Capacitance			
Core to Core	pF/m	65	65
Core to Screen	pF/m	100	100
Characteristic Impedance @100MHz	Ω	100+/-5	100+/-5
Transfer Impedance f≤30MHz	mΩ/m	200	200
Nominal Voltage Rating	V	300	300

Mechanical and Thermal Properties

- Minimum Bending Radius: 6×OD
- Temperature Range: -40°C to +90°C

Dimensions and Weight

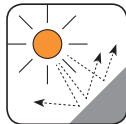
Cable Code	No. of cores & Nominal Conductor Cross Sectional Area No. × mm ²	Nominal Diameter of Strands No./mm	Nominal Sheath Thickness mm	Nominal Overall Diameter mm	Nominal Weight kg/km
RD-Cat5E-4C0.5S	4×0.5	19/0.18	1.2	8.3	102
RD-Cat5E-4C22A	4×22AWG	19/0.16	1.2	7.25	81
RD-Cat5E-4P22A	4×2×22AWG	19/0.16	1.2	12.6	174



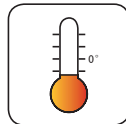
Impact Resistant



Highly Flexible



UV Resistant



Weather Resistant



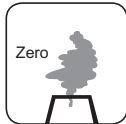
Oil Resistant



Flame Retardant
NF C32-070-2.1(C2)
IEC 60332-1/EN 50265-2-1



Fire Retardant
NF C32-070-2.2(C1)
IEC 60332-3/EN50266



Zero Halogen
IEC 60754-1/NF C20-454
EN 50267-2-1



Low Smoke Emission
IEC 61034/NFC20-902
EN 50268/NF C32-073



Low Corrosivity
EN 50267-2-2/NF C32-074
IEC 60754-2/NF C20-453



Low Toxicity

