



Caledonian

Caledonian Coaxial Cables for Railway Application

www.caledonian-cables.co.uk
www.addison-cables.com

 **ADDISON**





INTERNATIONAL FIRST CERTIFICATION

CERTIFICATE

This certificate,

CALEDONIAN KABLO ELEKTRİK SANAYİ VE TİCARET LIMITED ŞİRKETİ

MERKEZ MİHALLETİ BAĞLAR CADDESİ 2/BLEK APARTMANI NO:24 Ç/4 KAGITHANE
İSTANBUL, TÜRKİYE

to do organisation,

DESIGN, SUPPLY, FABRICATION, INSTALLATION, ASSEMBLY, COMMISSIONING, TESTING AND
MAINTENANCE OF 10/10KV HV ENERGY CABLES, DATA CABLES, INSTRUMENTATION CABLES,
TELECOMMUNICATION CABLES, FIBER OPTIC CABLES, RAILWAY CABLES, ROLLING STOCK
CABLES, PHOTOVOLTAIC CABLES, MARINE CABLES, CABLING SYSTEM, CABLE ACCESSORIES, ABC,
AFC, ACSB, AFAAC, POWER AND DISTRIBUTION TRANSFORMERS, SWITCH GEARS,
COMMUNICATION SYSTEMS, IT SYSTEMS

According to the scope,

ISO 9001:2015

To certify that Quality Management System in accordance with standard's clauses is
established and being implemented.



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Issue Date : 03.08.2023
Date of Validity : 31.03.2024
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02530030

ISO 9001:2015, TÜRKİYE TÜRK STANDARDI EN İSO 9001:2015, İSTANBUL, TÜRKİYE
BETONLANMIŞ, 2003'ÜN 12. EKİNE GÖRE ÇELİK ÇATI İÇİN, 12000'İN ÜSTÜNÜNDE SİYERİTİMİNİN BAŞLIĞINDA
www.iascertification.com



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FRA 316 SW4

Applications

These cables are designed for flexible installations, inside and outside railway rolling stock.

Standards

- DIN 5510-2

Construction

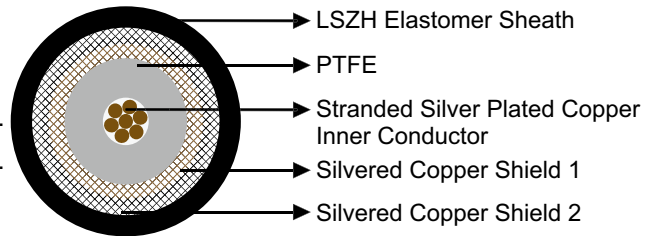
Inner conductor: Stranded silver plated copper.

Insulation: PTFE.

Outer conductor (shield 1): Silver plated copper.

Outer conductor (shield 2): Silver plated copper.

Sheath: LSZH Elastomer.



Electrical Characteristics at 20°C

Impedance	Ω	50+/-2
Nominal Capacitance	pF/m	94.5
Minimum Insulation Resistance	M Ω .km	100000
Inner Conductor Resistance	M Ω /km	29.9
Outer Conductor Resistance	M Ω /km	7.5
Attenuation		
@10MHz	dB/100m	7
@50MHz	dB/100m	17
@100MHz	dB/100m	24
@150MHz	dB/100m	30
@200MHz	dB/100m	35
@300MHz	dB/100m	44
@400MHz	dB/100m	52
@450MHz	dB/100m	56
@500MHz	dB/100m	59
@600MHz	dB/100m	66
@800MHz	dB/100m	78
@850MHz	dB/100m	81
@900MHz	dB/100m	83
@950MHz	dB/100m	86
@1000MHz	dB/100m	89
@1800MHz	dB/100m	127
@1900MHz	dB/100m	131

@2000MHz	dB/100m	135
@2400MHz	dB/100m	152
@3000MHz	dB/100m	175
@4000MHz	dB/100m	211
@5000MHz	dB/100m	245
@6000MHz	dB/100m	277
Velocity of propagation	%	70.7

➤ Mechanical and Thermal Properties

Minimum Bending Radius: 5mm (static)

Temperature Range: -40°C ~ +105°C

➤ Dimensions and Weight

Conductor Construction No/mm	Nominal Inner Conductor Diameter mm	Nominal Outer Conductor Diameter mm	Nominal Overall Diameter mm	Nominal Weight kg/km
7/0.18	0.54	2.5	3.16	21



Impact Resistant



Oil Resistant



Acid&Alkaline Resistant



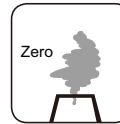
Highly Flexible



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 Emis:
IEC 61034/NFC20-902
EN 50268/NF C32-073



Low Corrosivity
N 50267-2-2/NF C32-07
EC 60754-2/NF C20-455



Low Toxicity



FRA 400 SW4

Applications

These cables are designed for flexible installations, inside and outside railway rolling stock.

Standards

- DIN 5510-2

Construction

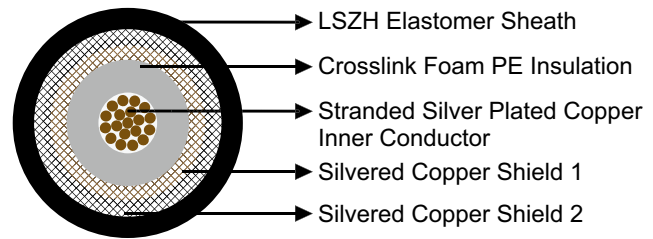
Inner conductor: Stranded silver plated copper.

Insulation: Crosslink Foam PE (SPEX).

Outer conductor (shield 1): Silver plated copper.

Outer conductor (shield 2): Silver plated copper.

Sheath: LSZH Elastomer.



Electrical Characteristics at 20°C

Impedance	Ω	50+/-2
Nominal Capacitance	pF/m	94.5
Minimum Insulation Resistance	M Ω .km	100000
Inner Conductor Resistance	M Ω /km	29.45
Outer Conductor Resistance	M Ω /km	7.6
Attenuation		
@10MHz	dB/100m	5
@50MHz	dB/100m	11
@100MHz	dB/100m	16
@150MHz	dB/100m	20
@200MHz	dB/100m	23
@300MHz	dB/100m	29
@400MHz	dB/100m	34
@450MHz	dB/100m	36
@500MHz	dB/100m	38
@600MHz	dB/100m	42
@800MHz	dB/100m	50
@850MHz	dB/100m	51
@900MHz	dB/100m	53
@950MHz	dB/100m	55

@1000MHz	dB/100m	56
@1800MHz	dB/100m	79
@1900MHz	dB/100m	82
@2000MHz	dB/100m	84
@2400MHz	dB/100m	94
@3000MHz	dB/100m	107
@4000MHz	dB/100m	128
@5000MHz	dB/100m	147
@6000MHz	dB/100m	165
Velocity of propagation	%	70.7

➤ Mechanical and Thermal Properties

Minimum Bending Radius: 25mm (static)

Temperature Range: -40°C ~ +105°C

➤ Dimensions and Weight

Conductor Construction No/mm	Nominal Inner Conductor Diameter mm	Nominal Outer Conductor Diameter mm	Nominal Overall Diameter mm	Nominal Weight kg/km
19/0.2	1.0	4.24	5.0	60



Impact Resistant



Oil Resistant



Acid&Alkaline Resistant



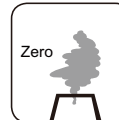
Highly Flexible



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 Emis:
IEC 61034/NFC20-902
EN 50268/NF C32-073



Low Corrosivity
NF 50267-2-2/NF C32-07
EC 60754-2/NF C20-455



Low Toxicity



FRA 213D SW4

Applications

These cables are designed for flexible installations, inside and outside railway rolling stock.

Standards

- DIN 5510-2

Construction

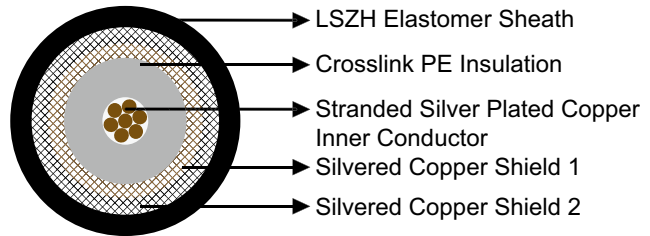
Inner conductor: Stranded silver plated copper.

Insulation: Crosslink PE (PEX).

Outer conductor (shield 1): Silver plated copper.

Outer conductor (shield 2): Silver plated copper.

Sheath: LSZH Elastomer.



Electrical Characteristics at 20°C

Impedance	Ω	50+/-2
Nominal Capacitance	pF/m	101
Minimum Insulation Resistance	M Ω .km	100000
Inner Conductor Resistance	M Ω /km	5.8
Outer Conductor Resistance	M Ω /km	4.43
Attenuation		
@10MHz	dB/100m	2
@50MHz	dB/100m	5
@100MHz	dB/100m	8
@150MHz	dB/100m	10
@200MHz	dB/100m	12
@300MHz	dB/100m	15
@400MHz	dB/100m	17
@450MHz	dB/100m	19
@500MHz	dB/100m	20
@600MHz	dB/100m	22
@800MHz	dB/100m	27
@850MHz	dB/100m	28
@900MHz	dB/100m	29
@950MHz	dB/100m	30
@1000MHz	dB/100m	31
@1800MHz	dB/100m	45
@1900MHz	dB/100m	47

@2000MHz	dB/100m	49
@2400MHz	dB/100m	55
@3000MHz	dB/100m	64
@4000MHz	dB/100m	79
@5000MHz	dB/100m	93
@6000MHz	dB/100m	106
Velocity of propagation	%	66

↘ Mechanical and Thermal Properties

Minimum Bending Radius: 50mm (static)

Temperature Range: -40°C ~ +105°C

↘ Dimensions and Weight

Conductor Construction No/mm	Nominal Inner Conductor Diameter mm	Nominal Outer Conductor Diameter mm	Nominal Overall Diameter mm	Nominal Weight kg/km
7/0.75	2.25	8.7	10.8	202



Impact Resistant



Oil Resistant



Acid&Alkaline Resistant



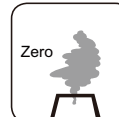
Highly Flexible



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/EN 50266



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



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



Low Corrosivity
EN 50267-2-2/NF C32-07
IEC 60754-2/NF C20-455



Low Toxicity



FRA 213 URM SW4

Applications

These cables are designed for flexible installations, inside and outside railway rolling stock.

Standards

- DIN 5510-2

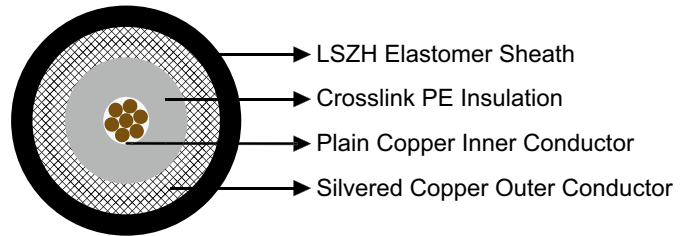
Construction

Inner conductor: Plain copper.

Insulation: Crosslink PE (PEX).

Outer conductor: Silver plated copper braid.

Sheath: LSZH Elastomer.



Electrical Characteristics at 20°C

Impedance	Ω	50+/-2
Nominal Capacitance	pF/m	101
Minimum Insulation Resistance	M Ω .km	100000
Inner Conductor Resistance	M Ω /km	5.74
Outer Conductor Resistance	M Ω /km	3.7
Attenuation		
@10MHz	dB/100m	2
@50MHz	dB/100m	4
@100MHz	dB/100m	6
@150MHz	dB/100m	8
@200MHz	dB/100m	9
@300MHz	dB/100m	12
@400MHz	dB/100m	14
@450MHz	dB/100m	15
@500MHz	dB/100m	16
@600MHz	dB/100m	18
@800MHz	dB/100m	22
@850MHz	dB/100m	23
@900MHz	dB/100m	24
@950MHz	dB/100m	25
@1000MHz	dB/100m	26
@1800MHz	dB/100m	40
@1900MHz	dB/100m	41
@2000MHz	dB/100m	43
Velocity of propagation	%	66

➤ **Mechanical and Thermal Properties**

Minimum Bending Radius: 50mm (static)

Temperature Range: -40°C ~ +105°C

➤ **Dimensions and Weight**

Conductor Construction No/mm	Nominal Inner Conductor Diameter mm	Nominal Outer Conductor Diameter mm	Nominal Overall Diameter mm	Nominal Weight kg/km
7/0.75	2.25	8.15	10.3	161



Impact Resistant



Oil Resistant



Acid&Alkaline Resistant



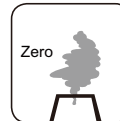
Highly Flexible



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 Emis:
IEC 61034/NFC20-902
EN 50268/NF C32-073



Low Corrosivity
EN 50267-2-2/NF C32-07
EC 60754-2/NF C20-455



Low Toxicity



FRA 3002 SW4

Applications

These cables are designed for flexible installations, inside and outside railway rolling stock.

Standards

- DIN 5510-2

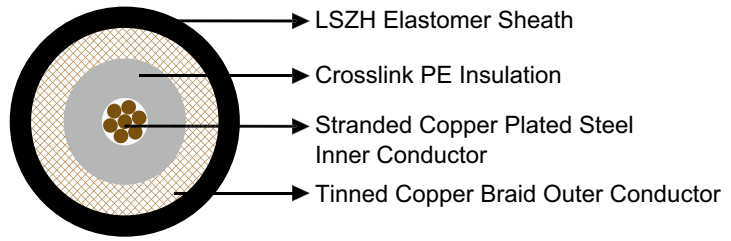
Construction

Inner conductor: Stranded copper plated steel.

Insulation: Crosslink PE (PEX).

Outer conductor: Tinned copper braid.

Sheath: LSZH Elastomer.



Electrical Characteristics at 20°C

Impedance	Ω	75+/-3
Nominal Capacitance	pF/m	67
Minimum Insulation Resistance	M Ω .km	100000
Inner Conductor Resistance	M Ω /km	236
Attenuation		
@10MHz	dB/100m	6
@50MHz	dB/100m	14
@100MHz	dB/100m	20
@150MHz	dB/100m	25
@200MHz	dB/100m	29
@300MHz	dB/100m	36
@400MHz	dB/100m	42
@450MHz	dB/100m	45
@500MHz	dB/100m	47
@600MHz	dB/100m	52
@800MHz	dB/100m	62
@850MHz	dB/100m	64
@900MHz	dB/100m	66
@950MHz	dB/100m	68
@1000MHz	dB/100m	70
Velocity of propagation	%	66

➤ **Mechanical and Thermal Properties**

Minimum Bending Radius: 25mm (static)

Temperature Range: -40°C ~ +105°C

➤ **Dimensions and Weight**

Conductor Construction No/mm	Nominal Inner Conductor Diameter mm	Nominal Outer Conductor Diameter mm	Nominal Overall Diameter mm	Nominal Weight kg/km
7/0.14	0.42	2.9	3.7	21



Impact Resistant



Oil Resistant



Acid&Alkaline Resistant



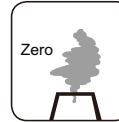
Highly Flexible



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/EN 50266



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



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



Low Corrosivity
EN 50267-2-2/NF C32-07
IEC 60754-2/NF C20-455



Low Toxicity



FRA 59 SW4

Applications

These cables are designed for flexible installations, inside and outside railway rolling stock.

Standards

- DIN 5510-2

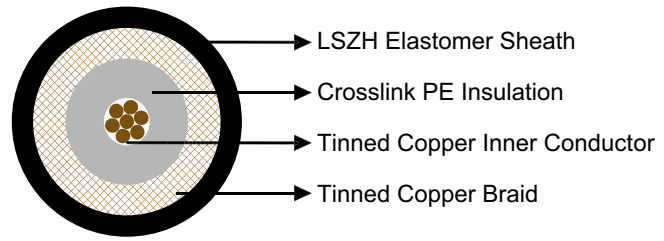
Construction

Inner conductor: Tinned copper.

Insulation: Crosslink PE (PEX).

Outer conductor: Tinned copper braid.

Sheath: LSZH Elastomer.



Electrical Characteristics at 20°C

Impedance	Ω	75+/-3
Nominal Capacitance	pF/m	67
Minimum Insulation Resistance	M Ω .km	100000
Inner Conductor Resistance	M Ω /km	58
Outer Conductor Resistance	M Ω /km	16.1
Attenuation		
@10MHz	dB/100m	3
@50MHz	dB/100m	8
@100MHz	dB/100m	12
@150MHz	dB/100m	15
@200MHz	dB/100m	18
@300MHz	dB/100m	23
@400MHz	dB/100m	27
@450MHz	dB/100m	29
@500MHz	dB/100m	31
@600MHz	dB/100m	35
@800MHz	dB/100m	42
@850MHz	dB/100m	44
@900MHz	dB/100m	46
@950MHz	dB/100m	47
@1000MHz	dB/100m	49
Velocity of propagation	%	66

➤ **Mechanical and Thermal Properties**

Minimum Bending Radius: 30mm (static)

Temperature Range: -40°C ~ +105°C

➤ **Dimensions and Weight**

Conductor Construction No/mm	Nominal Inner Conductor Diameter mm	Nominal Outer Conductor Diameter mm	Nominal Overall Diameter mm	Nominal Weight kg/km
7/0.22	0.66	4.45	6.1	57



Impact Resistant



Oil Resistant



Acid&Alkaline Resistant



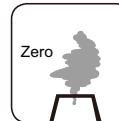
Highly Flexible



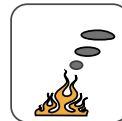
Flame Retardant
NF C32-070-2.1(C2)
IEC 60332-1/EN 50265-2-1



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



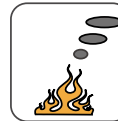
Zero Halogen
IEC 60754-1/NF C20-454
EN 50267-2-1



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



Low Corrosivity
EN 50267-2-2/NF C32-07
IEC 60754-2/NF C20-455



Low Toxicity



FRA 179 SW4

Applications

These cables are designed for flexible installations, inside and outside railway rolling stock.

Standards

- DIN 5510-2

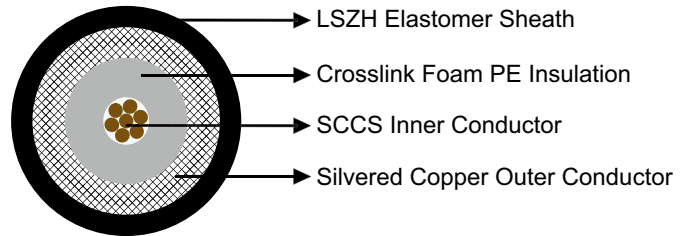
Construction

Inner conductor: Stranded silver plated copper clad steel.

Insulation: Crosslink Foam PE (SPEX).

Outer conductor: Silver plated copper.

Sheath: LSZH Elastomer.



Electrical Characteristics at 20°C

Impedance	Ω	75+/-3
Nominal Capacitance	pF/m	60
Minimum Insulation Resistance	M Ω .km	100000
Inner Conductor Resistance	M Ω /km	800.5
Outer Conductor Resistance	M Ω /km	27.9
Attenuation		
@50MHz	dB/100m	16
@100MHz	dB/100m	24
@150MHz	dB/100m	30
@200MHz	dB/100m	34
@250MHz	dB/100m	39
@300MHz	dB/100m	43
@350MHz	dB/100m	47
@400MHz	dB/100m	51
@450MHz	dB/100m	54
@500MHz	dB/100m	57
@550MHz	dB/100m	61
@600MHz	dB/100m	64
@650MHz	dB/100m	67
@700MHz	dB/100m	70
@750MHz	dB/100m	72
@800MHz	dB/100m	75
@850MHz	dB/100m	78

@900MHz	dB/100m	81
@950MHz	dB/100m	83
@1000MHz	dB/100m	86
Velocity of propagation	%	69.8

↘ Mechanical and Thermal Properties

Minimum Bending Radius: 5mm (static)

Temperature Range: -40°C ~ +105°C

↘ Dimensions and Weight

Conductor Construction No/mm	Nominal Inner Conductor Diameter mm	Nominal Outer Conductor Diameter mm	Nominal Overall Diameter mm	Nominal Weight kg/km
7/0.1	0.305	2.13	2.54	11.1



Impact Resistant



Oil Resistant



Acid&Alkaline Resistant



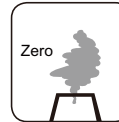
Highly Flexible



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 Emis:
IEC 61034/NFC20-902
EN 50268/NF C32-073



Low Corrosivity
N 50267-2-2/NF C32-07
EC 60754-2/NF C20-45:



Low Toxicity

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SHANGHAI

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