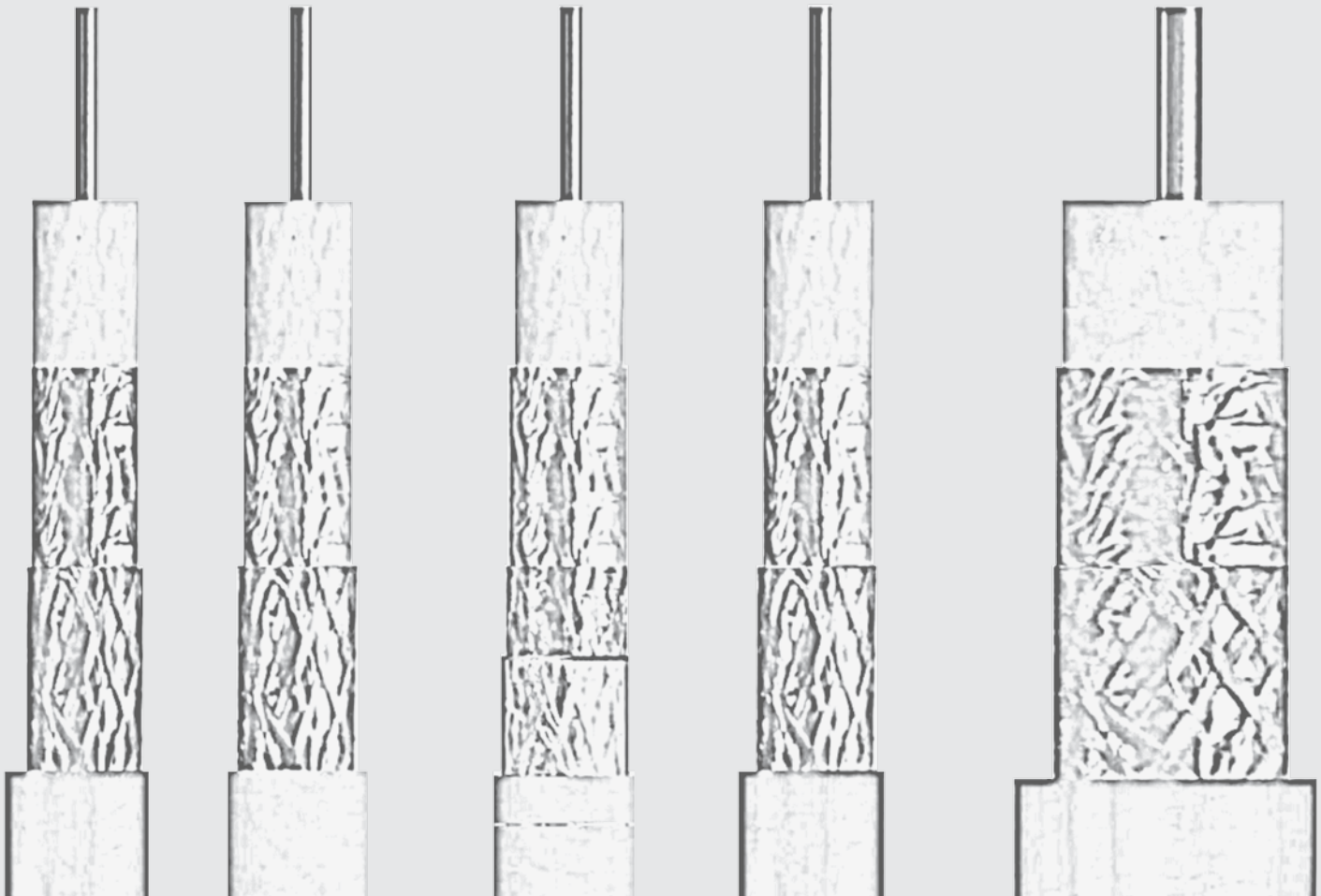
Televes

COAXIAL CABLE



100% CERTIFIED COAXIAL CABLE

The step ahead undertaken by Televés to improve its service and technical excellence, is now reflected in this new challenge. The new scenario arisen with the LTE/4G implementation, has caused Televés assume its role of guide and leader of the sector.

The certification of the coaxial cable and optical fiber, is a demonstration of Televés' commitment to the quality, European manufacturing and service to installers. For this reason, Televés is the only European company with the ability and knowledge to deal with this innovative service.

We do believe that the best way to ensure the coaxial cable technical characteristics is by a quality close control in all its manufacturing processes.

In the field of LTE/4G, only certified coaxial cable will ensure the integrity of the signal.

A cable that is marked Televés, no doubt is a **CERTIFIED CABLE**

No Radiation · Interferences Free · eco · RoHS · Made in EU

The new facilities in Televés are designed to carry out all the services shown below:

Flexibility in manufacturing and servicing of markets

Close control of both quality and manufacturing processes of coaxial cable allows to offer our customers a whole range of benefits:

- **Availability**: Through this production model, stock availability of our warehouse is fully guaranteed. Self-management in the final production of the coaxial cable and the productive machinery involved, make it an item without problems in terms of stock lack and fast delivering.
- **Flexibility:** The factory is prepared to modify their production lines according to the needs of customers, regardless of the size and type of cable used.
- **Optical Fiber Certification:** Our new facilities have been designed to be compatible for manufacturing both coaxial cable and optical fiber. Optical Fiber Certification will incorporate the corresponding set of tools and procedures to assess the quality of the fiber to be supplied.

100% CERTIFIED COAXIAL CABLE

Control de calidad basado en la certificación de medidas

El control de calidad de un cable ha de aplicarse a cada uno de los elementos que lo configuran.

A check is made of the mechanical and electrical characteristics of all the manufactured cable. These tests are carried out along the manufacturing process of reels of coaxial cable, so that each one of the reels sent to our customer is checked and registered.

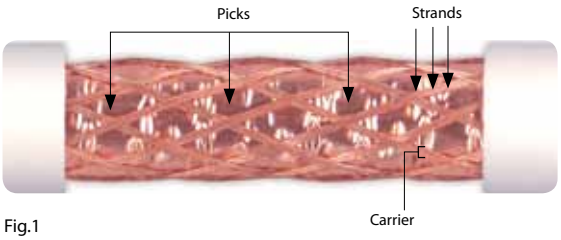


Fig.1

The above mentioned tests are undertaken on the following parameters:

- **Copper quality: T100 type coaxial cables are made of copper.** Unlike other cables made of cladded copper steel, the T100 is characterized by its excellent performance in DC, and in the transport of the signal at high and low frequencies.
- **Quality of gas injection (foam):** Televés cables feature EXPANDED DIELECTRIC, made of polyethylene being expanded by injection of gas within it. Coaxial cable life tests, during 21 days at 40 ºC and humidity 93%, have proved that cable attenuation increasing is less than 5%.

  Other coaxial cables featuring chemically expanded dielectric have increased their attenuation almost 70%.
- **Foil made of copper and polyester:** Copper plus polyester laminated film guarantees an excellent conductivity and shielding against interferences. Polyester film ensures the right flexibility of the assembly when it is being bent.
- **Braided mesh:** It is made up with 16 "groups of wires" (carriers) and 8 "wires" (strands) of copper each group, Ø 0.11 mm each strand (Fig.1); the T100 braid coverage achieved is higher than 73% . Braid covering is the most important parameter in terms of shielding.
- **Outer sheath quality:** Cable jacket protects against environmental conditions like sunlight, water, heat, chemicals. Televés cables are manufactured in three jacketing materials: PVC, PE and LSFH. Within the parameters to be evaluated in the outer covering is that of homogeneity of coverage.

  Whenever the sheath layout is not symmetric around the center of the cable (Fig. 2), means that there are thickness variations in the sheath that weaken the cable protection against external aggressions. Televés guarantees a symmetrical coverage over the entire length of the cable.
- **Attenuation vs length:** Attenuation tests indicate the continuity of the cable impedance. This ensures uniformity of impedance in order not to distort the signals in their journey through the cable. It is therefore a way of preserving the integrity of digital packets present in the distribution network and minimizing rippling in the network response and hence the signal echoes.
- **Continuity:** Continuity tests are performed in both inner conductor and braid. The first tests indicate the purity of the inner conductor, while the tests on the braid can lead to alarms on the cable shielding.
- **Traceability:** The internal control all production processes lead to a personalized information of all coaxial cable reels manufactured.

All the above tests are managed by proprietary software that detects any impact on the cable manufacturing and can accurately identify the stretch where non-compliance occurs.

This huge investment made by Televés for coaxial cable certification is based on the need to provide satisfaction and security to the installer against LTE/4G signals.

Fig.2

COAXIAL CABLE KEYS

Coaxial cable is an essential element of the system that determines the quality of the signal.

INNER CONDUCTOR

It plays an important role in the cable attenuation, the higher its diameter the lower the cable attenuation.

On the other hand it contributes to improve its mechanical tensile strength properties.

Inner conductors are manufactured in two materials: copper (Cu) and copper-clad steel (CCS).

Cu (copper), low electrical resistance and excellent response in both low and high frequencies.

CCS (copper-clad steel), better mechanical behavior but worst electrical resistance and attenuations.

Good quality of the inner conductor together with an appropriate expanded dielectric guarantee velocity ratios higher than 80% thus making these cables fully compatible with digital transmissions.

Low electrical DC resistance is an important parameter to take into account, e.g. when the cable is used to power devices like DiSEqC switches where the voltage controls their capacity to select horizontal or vertical polarisation; amplifiers being DC remote-powered through the coaxial cable, multi-switches, etc.

Regarding the inner conductor, from good to worse response the order is:

1. Copper (Cu)
2. Copper-clad aluminium (CCA)
3. Copper-clad steel (CCS)

DIELECTRIC

Televes cables feature **expanded dielectric,** made of polyethylene being expanded by injection of gas within it.

Coaxial cable life tests, during 21 days at 40ºC and humidity 93%, have proved that cable attenuation increasing is less than 5%.

Other coaxial cables featuring chemically expanded dielectric have increased their attenuation almost 70%.

SHIELDING FOIL

Two types are available:

A) Copper+Polyester.

B) Aluminium+Polyester+Aluminium.

Copper+polyester laminated film guarantees an excellent conductivity and shielding against interferences.

Polyester film ensures the right flexibility of the assembly when it is being bent.

The shielding foil combined with the additional braid provides higher shielding efficiency throughout frequency spectrum, since together they get good strength, low DC electrical resistance and 100% foil coverage.

2nd shielding foil is only available in SK2000 PLUS cables, providing additional shielding efficiency.

BRAID

Braid provides both a great cable integrity and good flexibility. It is especially effective against low frequency interferences.

On the other hand, braid has **lower DC resistance** than foil and together with the inner conductor determines the electrical resistance of the cable.

From low to higher resistance, materials are classified:

1. Copper (Cu)
2. Copper-clad aluminium (CCA)
3. Copper-clad steel (CCS)

ANTIMIGRATING FILM

Prevents migration of sheath additives and humidity within the cable, thus avoiding deterioration of the cable characteristics.

OUTER SHEATH

Cable jacket protects against environmental conditions like sunlight, water, heat, chemicals. Televes cables are manufactured in three jacketing materials: PVC, PE and LSFH.

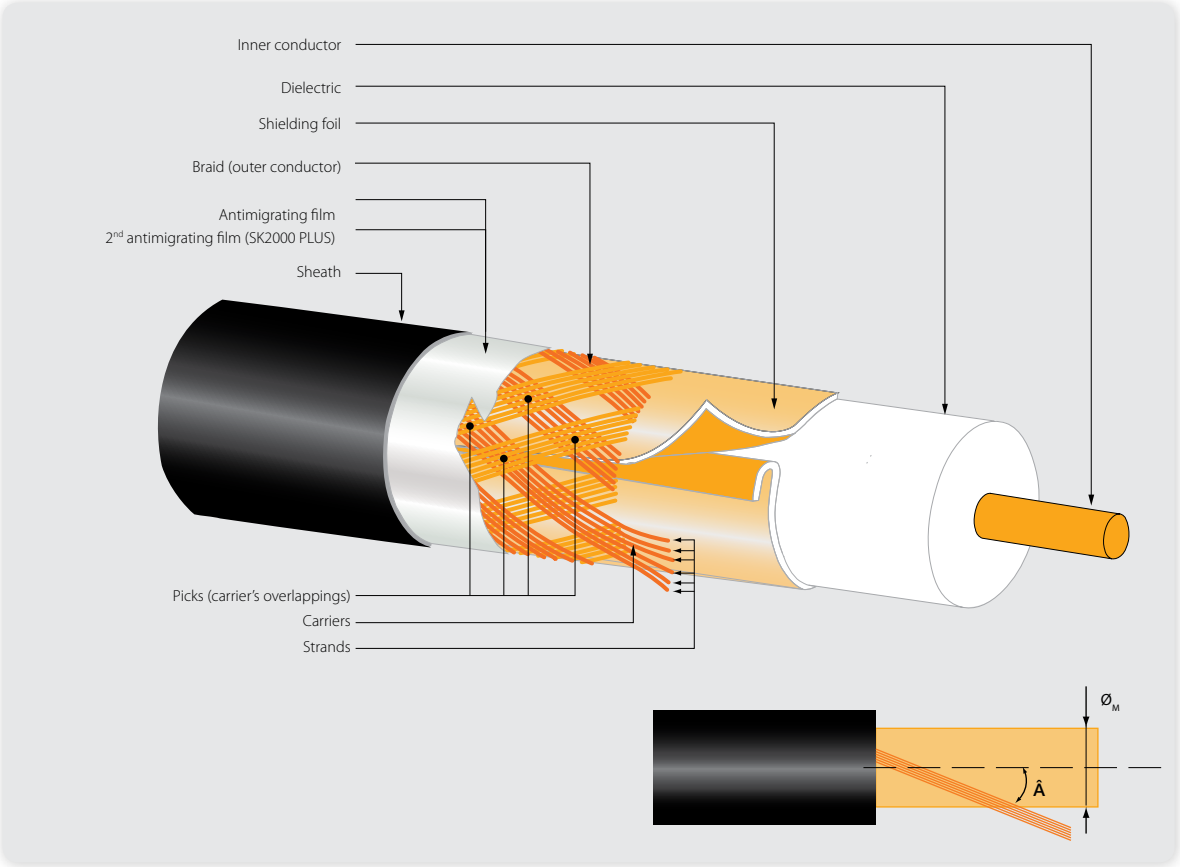
PVC (*Polivynyl Clorhidre*) is suitable for **indoor use**. It features a good flexibility as well as good response against heat. Nevertheless it deteriorates rapidly if it is exposed to sunlight or water.

PE (*Polyethylene*) is the right solution for **outdoor use** since it is waterproof.

LSFH (*Low Smoke Free Hallogen*) strongly recommended for **especial installations** like hospitals, schools, airports, tunnels, shopping centers, hotels, theatres, transport stations; or buildings that receive/house high valued patrimonial objects: libraries, art galleries, museums; or control systems, industrial installations, alarms, etc.

Cable sheath is permanent marked all along it, meter by meter, with type, reference, length marks, ...

Braid covering calculation



Coaxial cable specifications			
Frecuency band (MHz)	Screening (dB)		
	class A +	class A	class B
30 – 1000	≥95	≥85	≥75
1000 – 2000	≥85	≥75	≥65
2000 – 3000	≥75	≥65	≥55

% coverage = (2·F-F²)·100

where:

F = $N_S \cdot N_P \cdot Ø_S \cdot$/ sen Â, and

Â = $\tan^{-1} 2 \cdot \pi \cdot (Ø_B + 2 \cdot Ø_S) \cdot (N_P / N_C)$

N_C: No. of carriers

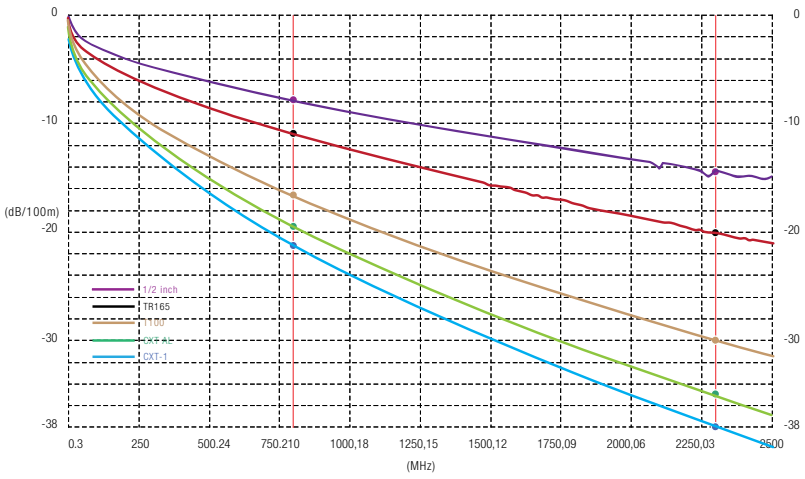
N_S: No. of strands per carrier

N_P: No. of picks

$Ø_S$: strand diameter in inches

$Ø_B$: diameter of structure beneath braid

Â: angle between cable axis and carrier



ATTENUATION CURVES FOR DIFFERENT TYPES OF COAXIAL CABLES

PRODUCT RANGE

Coaxial cables:
T-100 / T-200 PLUS / SK2000 PLUS / CXT-5 / TR-165 / 1/2" / CXT / CXT-50 / CXT-60 / CXT-1

75Ω

T-100							T-200 PLUS	SK2000 PLUS
2141 214107	214102 214104	214105 2155 215503	214108 215501 215502	215101	2126 212601 212604	212602 212603	213001 213002	4138 413801
								

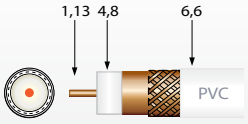
CXT-5	TR-165	1/2"	CXT			CXT-50	CXT-60	CXT-1	
210603 210601 210602	214901	2140	2138 213802	2139	2128 212801	210101	210201	2127 212703 212704	212701 212702
									

TECHNICAL SPECIFICATIONS

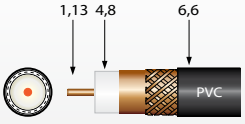
QR-A00110

INNER CONDUCTOR - BRAID COMPOSITION			COPPER - COPPER										
Televes Model			T-100										
References			2141	214107	214105	214102	214104	214108	2155	215503	215501	215502	215101
Inner Conductor	Ø	mm	1,13										1,12
	material	-	Copper										Copper
	resistance	Ω/Km	20										18
Dielectric	Ø	mm	4,8										4,7
	material	-	Foam Polyethylene										
Overlapping shielding foil		composition	Copper + Polyester										
Braid	resistance	Ω/Km	<20			<12			<20		<13		≤14
	material	-	Copper										
Antimigrating film			Yes										Yes
Petrol jelly			No										No
Outer sheath	Ø	mm	6,6										6,6
	color	-	White		Black	White		Black					Grey
	material	-	PVC						PEE				PVC - LSFH
Minimum bending radius		mm	33										33
Screening efficiency		dB	>75										
Capacitance		pF/m	55										
Environmental use			Indoor						Outdoor				Indoor
Packaging	meters/reel	m	100	250	100	100	250	100	100	250	100	250	100

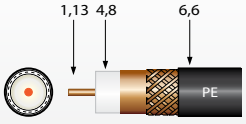
Frequency Attenuation (MHz)										
	200	dB/m	0,08							0,07
	500		0,12							0,12
	800		0,15							0,15
	1000		0,18							0,17
	1350		0,21							0,20
	1750		0,24							0,23
	2050		0,27							0,25
	2300		0,28							0,27



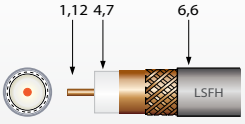
2141
214107
214102
214104



214105
214108



2155
215503
215501
215502



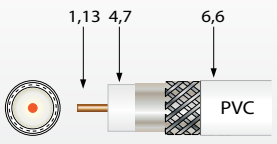
215101

TECHNICAL SPECIFICATIONS

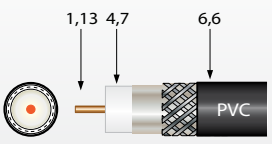
QR-A00012

INNER CONDUCTOR - BRAID COMPOSITION			COPPER - CCS (copper-clad steel)				
Televes Model			T-100				
References			2126	212601	212602	212603	212604
Inner conductor	Ø	mm	1,13				
	material	-	Copper				
	resistance	Ω/Km	<20				
Dielectric	Ø	mm	4,7				
	material	-	Foam Polyethylene				
Overlapping shielding foil		composition	Aluminium + Polyester + Aluminium				
Braid	resistance	Ω/Km	<27				
	material	-	CCS (copper-clad steel)				
Antimigrating film			No				
Petrol jelly			No				
Outer sheath	Ø	mm	6,6				
	color	-	White		Black		White
	material	-	PVC				
Minimum bending radius		mm	33				
Screening efficiency		dB	>75				
Capacitance		pF/m	55				
Environmental use			Indoor				
Packaging	meters/reel	m	100	250	250	100	250 Easy Box

Frequency Attenuation (MHz)	200	dB/m	0,08
	500		0,13
	800		0,16
	1000		0,19
	1350		0,22
	1750		0,25
	2050		0,28
	2300		0,30



▲ 2126 / 212601 / 212604



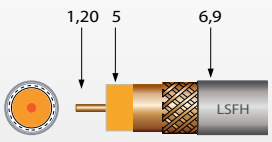
▲ 212602 / 212603

TECHNICAL SPECIFICATIONS

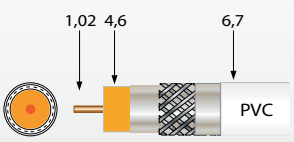
QR-A00108

INNER CONDUCTOR - BRAID COMPOSITION			COPPER - COPPER		COPPER - CCS (copper-clad steel)		
Televes Model			T-200 PLUS		SK2000 PLUS		
References			213001	213002	4138	413801	413802
			Class A		Class A+		
Inner conductor	Ø	mm	1,20		1,02		
	material	-	Copper		Copper		
	resistance	Ω/Km	< 16		22		
Dielectric	Ø	mm	5,0		4,6		
	material	-	Foam Polyethylene		Foam Polyethylene		
Overlapping shielding foil		composition	Copper +Polyester		Aluminium+Polyester		
Braid	resistance	Ω/Km	< 12		<11		
	material	-	Copper		CCS (copper-clad steel)		
2ª Overlapping shielding foil		composition	No		Aluminium+Polyester		
Antimigrating film			Yes		No		
Petrol jelly			No		No		
Outer sheath	Ø	mm	6,9		6,7		
	color	-	Grey (RAL7001)		White		
	material	-	PVC LSFH		PVC		
Minimum bending radius		mm	34,5		33		
Screening efficiency		dB	>85 (30-1000MHz) >75 (1-2GHz) >65 (2-3GHz)		>95 (30-1000MHz) >85 (1-2GHz) >75 (2-3GHz)		
Capacitance		pF/m	55		55		
Environmental use			Indoor		Indoor		
Packaging	meters/reel	m	100	250	100	500	250

Frequency Attenuation (MHz)				
	200	dB/m	0,07	0,08
	500		0,12	0,14
	800		0,15	0,18
	1000		0,17	0,21
	1350		0,20	0,24
	1750		0,23	0,28
	2050		0,25	0,30
	2300		0,27	0,32



▲ 213001 / 213002



▲ 4138 / 413801 / 413802

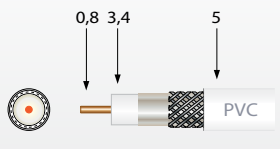
TECHNICAL SPECIFICATIONS

QR-A00109

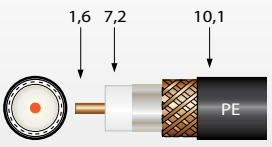
INNER CONDUCTOR - BRAID COMPOSITION			COPPER - CCS (copper-clad steel)			COPPER - COPPER	
Televes Model			CTX-5 (5 mm) *			TR-165	1/2"
References			210603	210602	210601	214901	2140
			Class A	Class B	Class B	Class A	
Inner conductor	Ø	mm	0,80			1,63	2,7
	material	-	Copper				
	resistance	Ω/Km	<37			9	3,2
Dielectric	Ø	mm	3,4			7,2	11,5
	material	-	Foam Polyethylene				
Overlapping shielding foil			Alu+Polyester+Alu			Alu+ Polyester + Alu	Copper+Polyester
Braid	resistance	Ω/Km	<35		<28	7,2	7
	material	-	CCS (copper-clad steel)			Copper	
Antimigrating film			No			No	No
Petrol jelly			No			No	Yes
Outer sheath	Ø	mm	5			10,1	15
	color	-	White			Black	
	material	-	PVC			PE	
Minimum bending radius		mm	25			50	75
Screening efficiency		dB	>75				
Capacitance		pF/m	53			55	55
Environmental use			Indoor			Outdoor	Outdoor / CATV
Packaging	meters/reel	m	100	150 *(Plastified coil)*		250	500

Frequency Attenuation (MHz)		dB/m					
	200		0,11			0,05	0,03
	500		0,19			0,10	0,05
	800		0,23			0,12	0,07
	1000		0,26			0,14	0,08
	1350		0,31			0,17	0,10
	1750		0,35			0,19	0,12
	2050		0,39			0,20	0,13
	2300		0,42			0,22	0,14

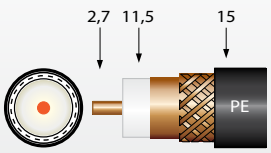
▲ Plastified coil



▲ 210603



▲ 214901



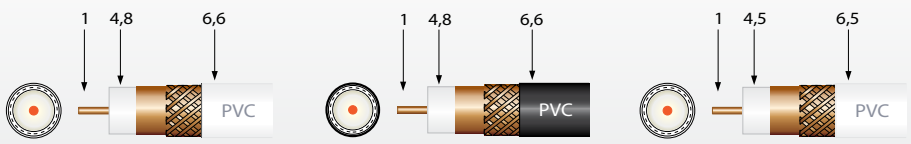
▲ 2140

TECHNICAL SPECIFICATIONS

QR-A00014

INNER CONDUCTOR - BRAID COMPOSITION			COPPER - CCS (copper-clad aluminium)			COPPER - CCS (copper-clad steel)	
Televes Model			CXT				
References			2138	213802	2139	2128	212801
						Class A	
Inner conductor	Ø	mm	1			1	
	material	-	Copper			Copper	
	resistance	Ω/Km	23			<23	
Dielectric	Ø	mm	4,8			4,5	
	material	-	Foam Polyethylene			Foam Polyethylene	
Overlapping shielding foil			Copper +Polyester			Aluminium + Polyester	
Braid	resistance	Ω/Km	35			<23	
	material	-	CCS (copper-clad aluminium)			CCS (copper-clad steel)	
Antimigrating film			No			No	
Petrol jelly			No			No	
Outer sheath	Ø	mm	6,6			6,5	
	color	-	White		Black	White	
	material	-	PVC			PVC	
Minimum bending radius		mm	33			33	
Screening efficiency		dB	>75			>75	
Capacitance		pF/m	55			54	
Environmental use			Indoor			Indoor	
Packaging	meters/reel	m	100	250	100	100	250

Frequency Attenuation (MHz)							
	200	dB/m	0,09			0,08	
	500		0,14			0,14	
	800		0,18			0,18	
	1000		0,20			0,21	
	1350		0,23			0,25	
	1750		0,27			0,29	
	2050		0,29			0,32	
	2300		0,31			0,35	



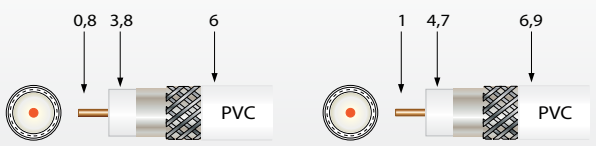
▲ 2138 / 213802 ▲ 2139 ▲ 2128 / 212801

TECHNICAL SPECIFICATIONS

QR-A00149

INNER CONDUCTOR - BRAID COMPOSITION			CCS (copper-clad steel) - ALUMINIUM	
Televes Model			CXT-50	CXT-60
References			210101	210201
Inner conductor	Ø	mm	0,8	1,0
	material	-	CCS (copper-clad steel)	
	resistance	Ω/Km	< 140	< 95
Dielectric	Ø	mm	3,8	4,7
	material	-	Foam Polyethylene	
Overlapping shielding foil		composition	Aluminium +Polyester+Aluminium	
Braid	resistance	Ω/Km	< 32	< 30
	material	-	Aluminium	
Antimigrating film			No	
Petrol jelly			No	
Outer sheath	Ø	mm	6,0	6,9
	color	-	White	
	material	-	PVC	
Minimum bending radius		mm	30,0	34,5
Screening efficiency		dB	≥ 65 (2···3 GHz)	
Capacitance		pF/m	54	
Environmental use			Indoor	
Packaging	m /reel	m	100	100

Frequency Attenuation (MHz)		dB/m		
	200		0,11	0,09
	500		0,18	0,15
	860		0,23	0,19
	1000		0,26	0,21
	1350		0,30	0,25
	1750		0,35	0,29
	2050		0,38	0,32
	2300		0,41	0,34



▲ 210101 ▲ 210201

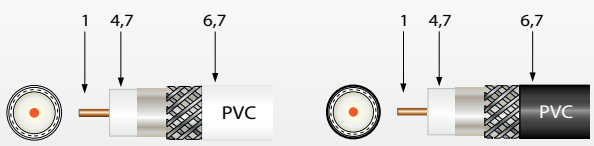
TECHNICAL SPECIFICATIONS

Class A coaxial cable

QR-A00013

INNER CONDUCTOR - BRAID COMPOSITION			CCS (copper-clad steel) - ALUMINIUM				
Televes Model			CXT-1				
References			2127	212703	212704	212701	212702
Inner conductor	Ø	mm	1				
	material	-	CCS (copper-clad steel)				
	resistance	Ω/Km	<120				
Dielectric	Ø	mm	4,7				
	material	-	Foam Polyethylene				
Overlapping shielding foil			Aluminium + Polyester				
Braid	resistance	Ω/Km	<30				
	material	-	Aluminium				
Antimigrating film			No				
Petrol jelly			No				
Outer sheath	Ø	mm	6,7				
	color	-	White			Black	
	material	-	PVC				
Minimum bending radius		mm	33,5				
Screening efficiency		dB	>75				
Capacitance		pF/m	54				
Environmental use			Indoor				
Packaging	meters/reel	m	100	250	500	100	250

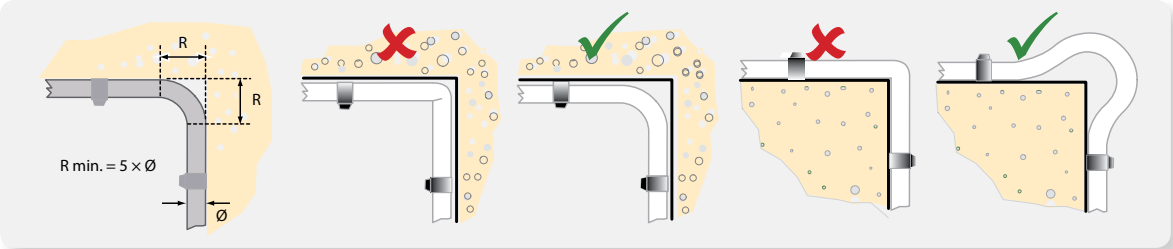
Frequency Attenuation (MHz)		dB/m
	200	0,09
	500	0,15
	800	0,20
	1000	0,23
	1350	0,27
	1750	0,32
	2050	0,35
	2300	0,37



▲ 2127 / 212703 / 212704 ▲ 212701 / 212702

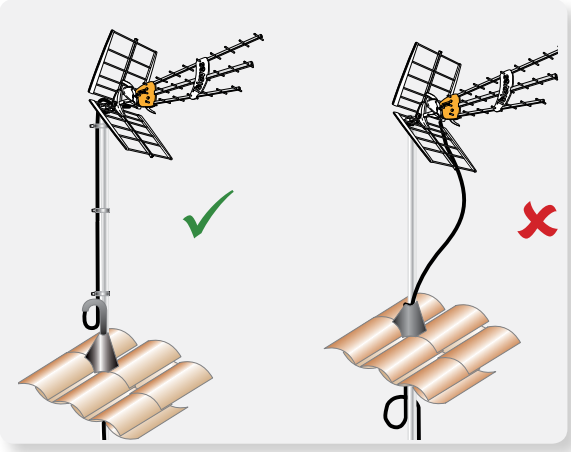
INSTALLATION TIPS

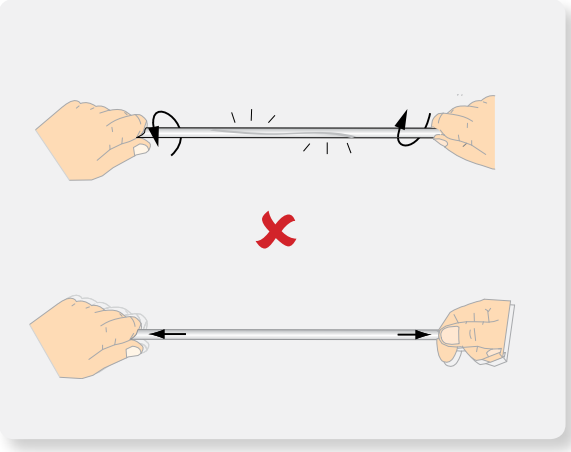
Keep in mind that coaxial cable has a minimum bending radius to be respected.



Fix coaxial cable correctly

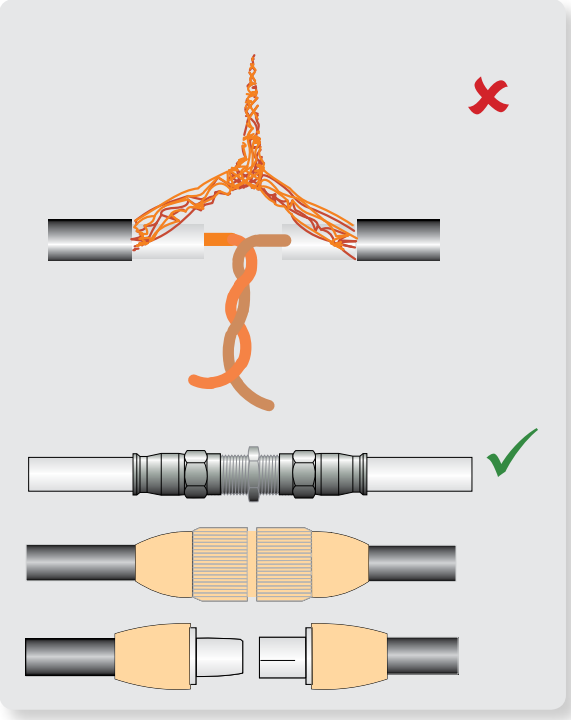
Do not twist or strech coaxial cable in excess

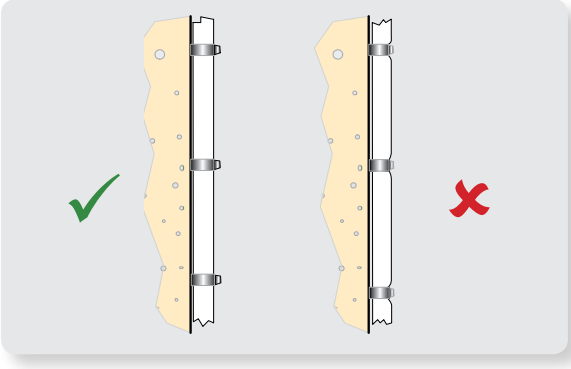




A coaxial cable is not an electrical cable.
Make the joints properly

Use suitable cable clips





Do not step on the coaxial cable.