

Televes®

COAXIAL CABLE AND ACCESSORIES

THE PERFECT COMBINATION FOR
INTERFERENCE PREVENTION



THE COAXIAL CABLE FOR DEMANDING ENVIRONMENTS

The **Digital Dividend** imposes a new situation where all the components of the television installation must comply with the requirements for the rejection of interfering signals caused by the new LTE/4G mobile services.

The new Televes range of coaxial cable, in particular **the Trishield cable, has been carefully developed to meet the most demanding shielding specifications.**

Televes provides a professional range of coaxial cable, in which the low attenuation and **the shielding are of key importance** for ensuring the final quality of the installation.

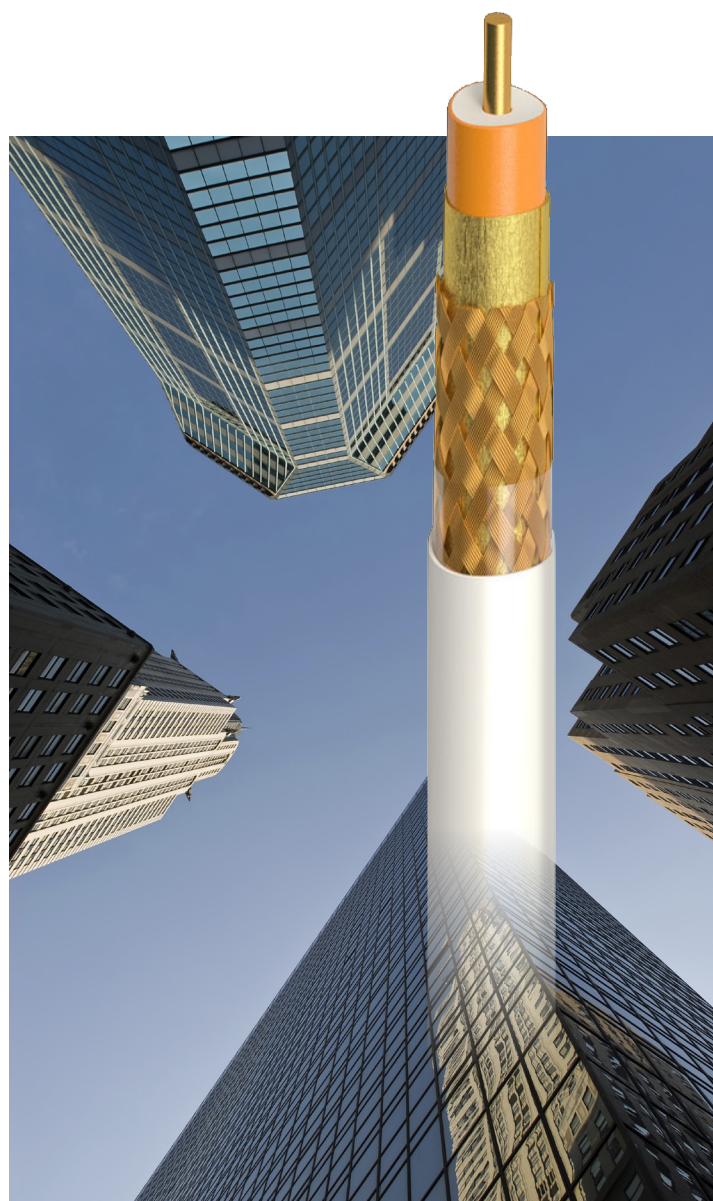
A CABLE THAT IS MARKED TELEVES, NO DOUBT IS A CERTIFIED CABLE

The new Televes facilities are designed for guaranteeing the technical characteristics of the coaxial cable by the close quality control through all the stages of the manufacturing process.

The coaxial cable is configured by several elements, and quality control must be applied to all of them. The technical characteristics are controlled by strict and thorough testing in order to obtain a high performance assembly.

Continuity and attenuation tests are carried out during the generation of the final reels, so each reel sent to the customer has been verified and certified to obtain the highest reliability product providing absolute protection of the TV signal at minimum losses.

The certification of the coaxial cable and optical fiber, is a demonstration of the Televes' commitment to quality, European manufacturing and customer service.



The final result has been recognized in the international market, even in the most demanding German market, where the Televes cable range has gone through the strict approval tests of Dibkom, the German Institute of Telecommunications.

COAXIAL CABLE KEYS

Every detail counts: from the cable length marking on the sheath, to the quality of the internal components.

The combination of different component types generates a complete cable range to fulfill all customer requirements.

There are certain parameters and specifications that mean little to who has to make the decision to purchase a product such as coaxial cable.

If the choice is made without serious criteria, you can jeopardize the entire television installation.

The interpretation of the cable marking can help to make the right choice of the cable type to be installed, not so much for its quality and technical specifications, as to know where and how to use it.

THE MATERIALS for manufacturing a cable, usually make reference to the Inner Conductor and the Braid. One cable 100% copper (both Inner Conductor and Braid are made of copper) like the T100+ and T200+ have better DC performance and excellent response for signal transportation at both low and high frequencies, compared to the Copper-clad steel (CCS) cables.

The key **ELECTRICAL PARAMETERS** for making the right cable choice are:

Screening Efficiency: Represents the quality of the cable shielding and is determined by the combination of the braid and the shielding foils.

Characteristic Impedance:

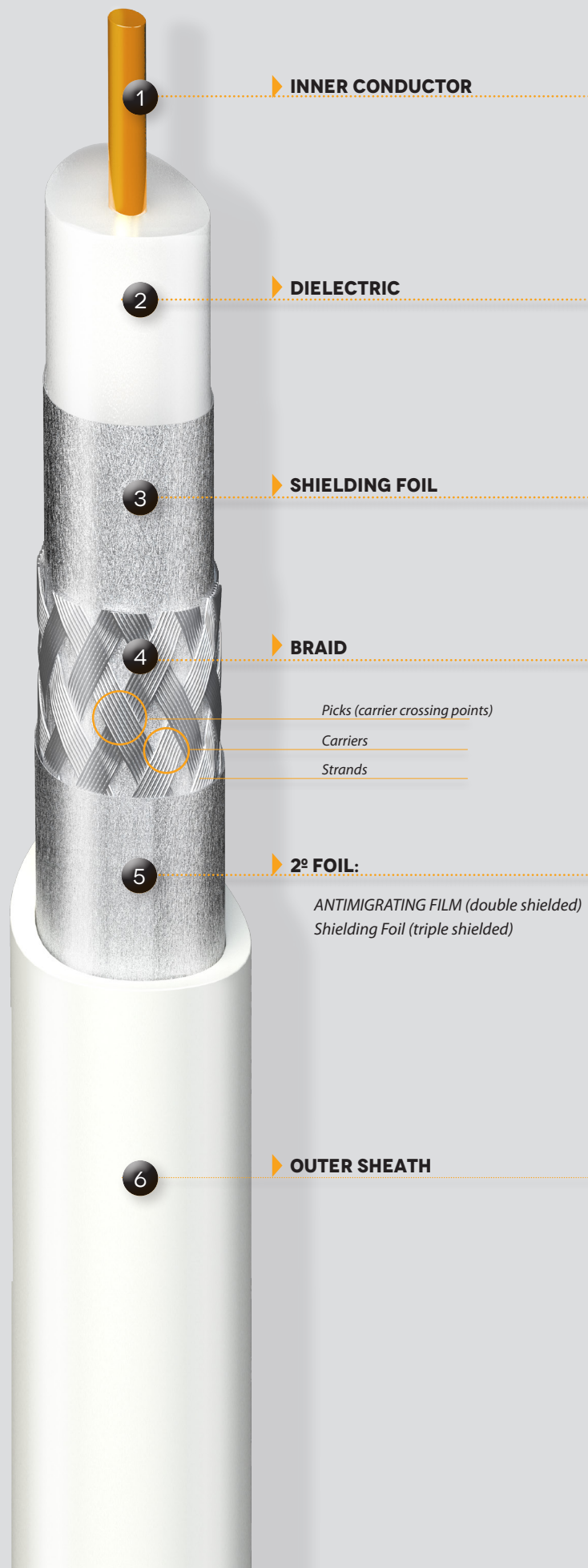
For guaranteeing line matching and minimum losses, the impedance must remain stable (75 ohm) along the cable. This requires a structural homogeneity in the cable that only can be achieved by the most rigorous manufacturing process.

Structural Return Loss (SRL): consists in the return loss of the cable caused by variations of its own impedance, they are due to the materials imperfections, and/or dimensional variations in the cable construction.

Loop Resistance: defined as the resistance of both the inner and outer (Braid and films) conductors.

Frequency Attenuation: consists in the power loss (dB/m) at a given frequency, and depends on the cable geometry and materials.

COAXIAL CABLE PARTS



1

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 behaviour but worst electrical resistance and attenuations.

The 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, for example when the cable is used to power devices like DiSEqC switches where the voltage controls their capacity to select horizontal or vertical polarization; amplifiers being DC remote-powered through the coaxial cable, multi-switches, etc.

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

- Copper (Cu)
- Copper-clad steel (CCS)

2

DIELECTRIC

Televes cables feature expanded dielectric, made of polyethylene being expanded by injection of gas within it. This type of dielectric provides, **lower attenuation, more flexibility, higher moisture resistance and uniform construction** reflected on the impedance stability.

Coaxial cable life tests, during 21 days at 40°C 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%.

3

SHIELDING FOIL

Several types are available:

- Copper + Polyester
- Aluminium + Polyester
- Aluminium + Polyester + Aluminium
- Aluminium + Polypropylene

Polyester film ensures the right flexibility of the assembly when it is being bent. Moreover, connectorization becomes easier on cables in which this foil is stuck onto the dielectric.

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.

4

OUTER CONDUCTOR (BRAID)

The 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. Aluminium (Al)

5

2ND FOIL: ANTIMIGRATING/ SHIELDING

■ **ANTIMIGRATING foil**
(double shielding cables):

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

■ **ADDITIONAL SHIELDING foil**
(triple shielding cables, TSH):

The second metal film provides extra screening efficiency.

6

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 (Polyvinyl Chloride) 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.

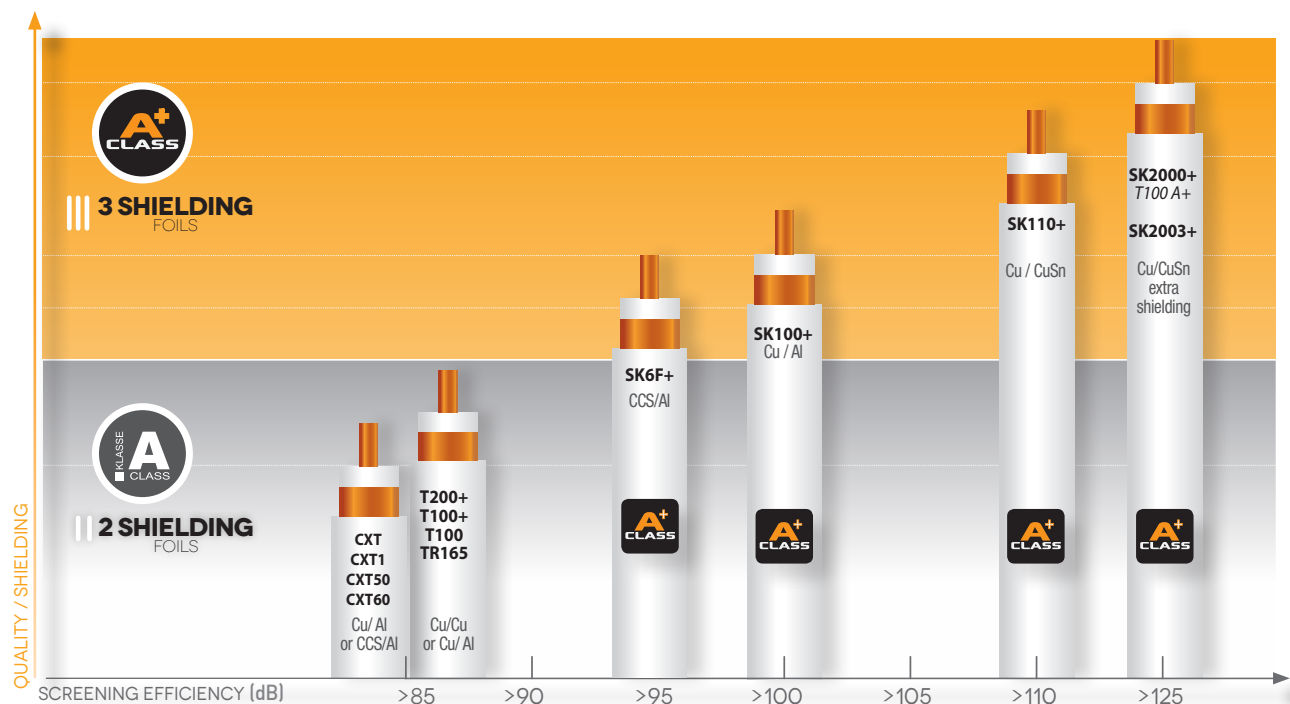
LSFH (Low Smoke Free Halogen) strongly recommended for especial installations like hospitals, schools, airports, tunnels, shopping centers, hotels, theatres, transport stations; or buildings that receive/house high valued patrimonial objects: libraries, art galleries, museums; or control systems, industrial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

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

COAXIAL CABLE SHIELDING TYPE

NO MATTER WHAT YOUR SCREENING REQUIREMENTS ARE, TELEVES HAS THE SOLUTION:
YOUR CHOICE JUST DEPENDS ON THE INSTALLATION CONDITIONS.

The screening efficiency of the cable is determined by the braid and shielding foils, this elements guarantee the required conductivity as well. According to the screening efficiency, the cables are classified in Classes. The A+ class cables are manufactured with triple shielding (TRISHIELD) to provide the greater immunity against interferences. These cables provide the highest screening efficiency against LTE/4G interferences.



REFERENCES QUICK GUIDE

CONVENTIONAL COAXIAL CABLES

 3 SHIELDING FOILS	SK2000+ T100A+	SK110+	SK100+	SK6F+
	Cu / CuSn	Cu / CuSn	Cu / Al	CCS / Al
	4138xx 4140xx (SK2003+)	4137xx	4136xx	4148xx

 2 SHIELDING FOILS	T200+	T100+	T100	CXT	CXT-1	CXT-50	CXT-60
	Cu / Cu	Cu / Cu	Cu / Al	Cu / Al	CCS / Al	CCS / Al	CCS / Al
	213002	2141xx	2126xx	2128xx	2127xx	210102	210202
		2155xx	2125xx				
		2151xx					

CLASS SPECIFICATIONS

Class	Frequency	Screening efficiency
A+	5 - 30 MHz	TI < 2,5 mΩ/m
	5 - 1000 MHz	SA > 95 dB
	1000 - 2000 MHz	SA > 85 dB
	2000 - 3000 MHz	SA > 75 dB

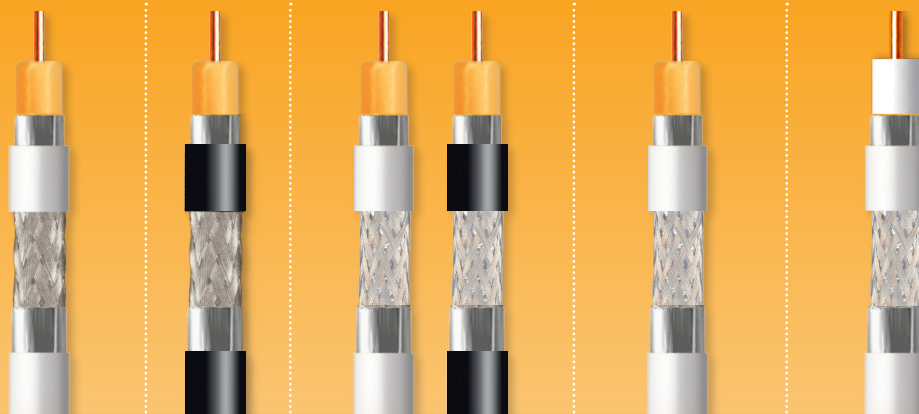
Class	Frequency	Screening efficiency
A	5 - 30 MHz	TI < 5 mΩ/m
	5 - 1000 MHz	SA > 85 dB
	1000 - 2000 MHz	SA > 75 dB
	2000 - 3000 MHz	SA > 65 dB

Class	Frequency	Screening efficiency
B	5 - 30 MHz	TI < 15 mΩ/m
	5 - 1000 MHz	SA > 75 dB
	1000 - 2000 MHz	SA > 65 dB
	2000 - 3000 MHz	SA > 55 dB

According the CENELEC European Standard:
EN 50117-2-4: Indoor Cable 5...3000MHz / EN 50117-2-5: Outdoor Cable 5...3000MHz

SA: Shielding Attenuation
TI: Transfer Impedance

CABLE RANGE CLASS A+



REFERENCES		4138	413802	413801	414002	414003	413705	413704	413706	413707	413601	413602	413603	414801	414802	414803	
Televés Model		SK2000+ T100A+				SK2003+		SK110+				SK100+			SK6F+		
Inner conductor	Ø mm	1.02						1.02				1.02			1.02		
	Material	Cu						Cu				Cu			CCS		
	Res. Ohm/Km	<22						<22				<22			<110		
Dielectric	Ø mm	4.6						4.6				4.6			4.6		
	Material	PEE						PEE				PEE			PEE		
Shielding Foil	Material	B						B				B			B		
Braid	Material	CuSn (98% Cu)						CuSn (98% Cu)				Al			Al		
	Dimensions (N _c xN _s xØ)	24x7x0.10						16x6x0.10				16x6x0.12			16x6x0.12		
	Res. Ohm/Km	<11						<15				<22			<30		
	% Coverage	82						55				60			60		
2ª shielding foil		Yes						Yes				Yes			Yes		
Petrol Jelly		No						No				No			No		
Outer sheath	Ø mm	6.7						6.7				6.7			6.8		
	Color	Ⓢ	Ⓢ	Ⓢ	Ⓑ	Ⓑ	Ⓢ	Ⓢ		Ⓢ	Ⓑ	Ⓢ	Ⓢ		Ⓢ		
	Material	PVC			LSFH UV Resistant		PVC				PVC			PVC			
Min. bending radius	mm	33.5						33.5				33.5			34		
Shielding at 1GHz	dB	>95						>95				>95			>95		
Capacitance	pF/m	54						54				53			53		
Impedance	Ohm	75						75				75			75		
Loop resistance	Ohm/m	<0.032						<0.037				<0.044			<0.013		
Velocity ratio min.	%	84						84				82			82		
Packaging	m/reel	100	250	500	100	250	100	250	500	250	100	250	500	100	250	500	
	Type	🟡	🟡	🟤	🟡	🟡	🟡	🟡	🟤	🟤	🟡	🟡	🟤	🟡	🟡	🟤	
Environmental use		Indoor			Outdoor		Indoor				Indoor			Indoor			
Attenuation max. [dB/m]																	
Frequency [MHz]	200	0.09						0.09				0.09			0.10		
	500	0.14						0.14				0.14			0.15		
	800	0.18						0.18				0.18			0.19		
	1000	0.21						0.21				0.21			0.22		
	1350	0.25						0.25				0.25			0.26		
	1750	0.28						0.28				0.28			0.29		
	2050	0.31						0.31				0.31			0.31		
	2300	0.32						0.32				0.32			0.33		

Sheath Environment

PVC Indoor
PE Outdoor
LSFH Special

Overlapped foil materials

A Aluminium + Polyester + Aluminium
B Aluminium+ Polyester
C Copper + Polyester
D Aluminium + Polypropylene

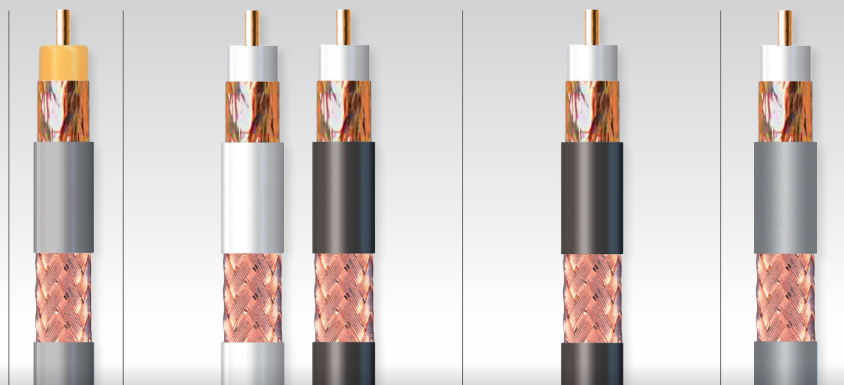
Other abbreviations















PE Polyethylene
PEE Foam Polyethylene
PVC Polyvinyl Chloride
LSFH Low Smoke Free Halogen
LSZH LSFH

Al Aluminium
Cu Copper
CCS Copper Clad Steel
CCA Copper Clad Aluminium
CuSn Tinned Copper
TCCAM Tinned Copper Clad Aluminium Magnesium

Packaging Type: ○ Plastic reel ● Cardboard reel ● Wooden drum ○ Plastified coil

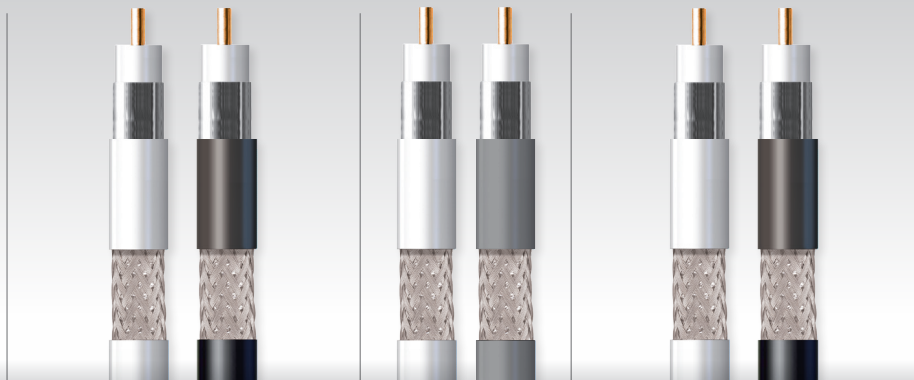
CABLE RANGE CLASS A



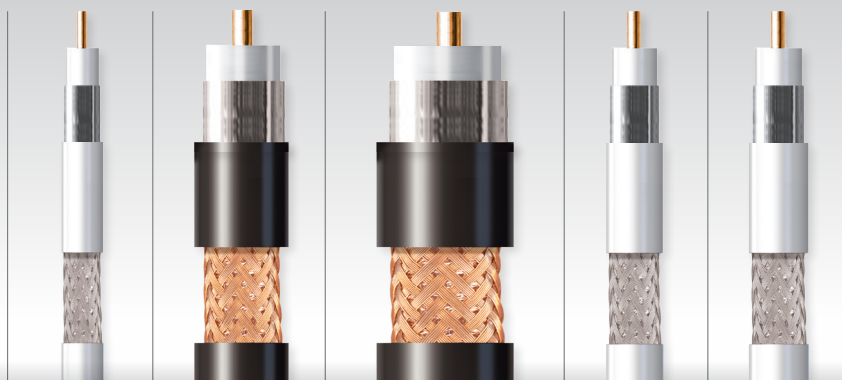
REFERENCES		213002	214102	214104	214108	215501	215502	215101
Televes Model		T-200+	T-100+			T-100+		T-100+
Inner conductor	Ø mm	1.20	1.13			1.13		1.13
	Material	Cu	Cu			Cu		Cu
	Res. Ohm/Km	<16	<20			<20		<20
Dielectric	Ø mm	5.0	4.8			4.8		4.8
	Material	PEE	PEE			PEE		PEE
Shielding Foil	Material	C	C			C		C
Braid	Material	Cu	Cu			Cu		Cu
	Dimensions (N _c xN _s xØ)	16x8x0.11	16x8x0.11			16x8x0.11		16x8x0.11
	Res. Ohm/Km	<12	<12			<12		<12
	% Coverage	73	73			73		73
Antimigrating film		Yes	Yes			Yes		Yes
Petrol Jelly		No	No			No		No
Outer sheath	Ø mm	6.9	6.6			6.6		6.6
	Color							
	Material	LSFH	PVC			PE		LSFH
Min. bending radius	mm	34.5	33			33		33
Shielding at 1GHz	dB	>85	>85			>85		>85
Capacitance	pF/m	55	55			55		55
Impedance	Ohm	75	75			75		75
Loop resistance	Ohm/m	<0.028	<0.032			<0.032		<0.032
Velocity ratio min.	%	82	82			82		82
Packaging	m/reel	250	100	250	250	100	250	100
	Type							
Environmental use		Indoor	Indoor			Outdoor		Indoor
Attenuation max. (dB/m)								
Frequency (MHz)	200	0.07	0.08			0.08		0.08
	500	0.12	0.13			0.13		0.13
	800	0.15	0.16			0.16		0.16
	1000	0.17	0.19			0.19		0.19
	1350	0.20	0.22			0.22		0.22
	1750	0.23	0.25			0.25		0.25
	2050	0.25	0.28			0.28		0.28
	2300	0.27	0.30			0.30		0.30



2 SHIELDING
FOILS



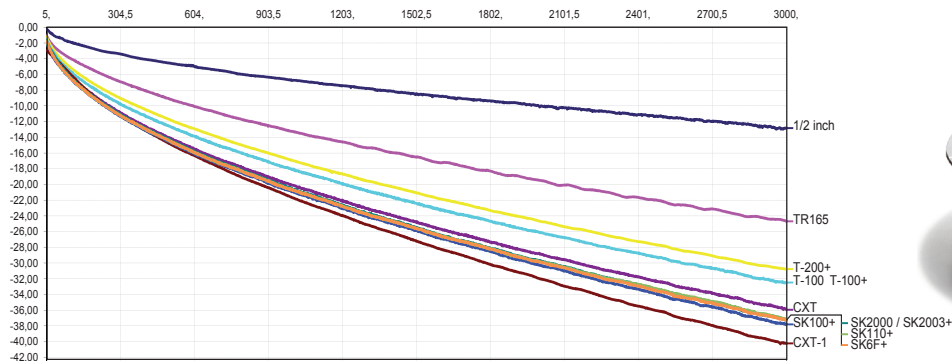
REFERENCES		2126	212601	212602	212501	212502	2128	212801	212811	2127	212703	212704	212701	212702
Televes Model		T-100					CXT			CXT-1				
Inner conductor	Ø mm	1.13					1.00			1.00				
	Material	Cu					Cu			CCS				
	Res. Ohm/Km	<20					<23			<120				
Dielectric	Ø mm	4.7					4.5			4.7				
	Material	PEE					PEE			PEE				
Shielding Foil	Material	A					B			B				
Braid	Material	Al					Al			Al				
	Dimensions (N _c xN _s xØ)	16x8x0.12					16x8x0.12			16x8x0.12				
	Res. Ohm/Km	<27					<31			<30				
	% Coverage	77					79			77				
Antimigrating film		No					No			No				
Petrol Jelly		No					No			No				
Outer sheath	Ø mm	6.6					6.5			6.7				
	Color	Ⓢ	Ⓢ	ⓑ	ⓑ	ⓑ	Ⓢ	Ⓢ	ⓖ	Ⓢ	Ⓢ	Ⓢ	ⓑ	ⓑ
	Material	PVC			PE		PVC		LSFH	PVC				
Min. bending radius	mm	33					32.5			33				
Shielding at 1GHz	dB	>85					>85			>85				
Capacitance	pF/m	52					54			54				
Impedance	Ohm	75					75			75				
Loop resistance	Ohm/m	<0.050					<0.015			<0.150				
Velocity ratio min.	%	85					82			82				
Packaging	m/reel	100	250	250	100	250	100	250	250	100	250	500	100	250
	Type	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿	⦿
Environmental use		Indoor			Outdoor		Indoor			Indoor				
Attenuation max. (dB/m)														
Frequency (MHz)	200	0.08					0.09			0.09				
	500	0.13					0.14			0.15				
	800	0.16					0.19			0.20				
	1000	0.19					0.21			0.23				
	1350	0.22					0.25			0.27				
	1750	0.25					0.29			0.32				
	2050	0.28					0.32			0.35				
	2300	0.30					0.35			0.38				



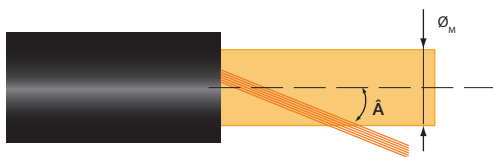
REFERENCES		210601	214901	2140	210102	210202
Televes Model		CXT-5	TR-165	1/2"	CXT-50	CXT-60
Inner conductor	Ø mm	0.80	1.63	2.70	0.80	1.00
	Material	Cu	Cu	Cu	CCS	CCS
	Res. Ohm/Km	<37	<9	<3.2	<140	<95
Dielectric	Ø mm	3.4	7.2	11.5	3.8	4.7
	Material	PEE	PEE	PEE	PEE	PEE
Shielding Foil	Material	A	D	C	A	A
Braid	Material	TCCAM	Cu	Cu	Al	Al
	Dimensions (N _c xN _s xØ)	16x6x0.12	16x8x0.15	24x6x0.12	16x7x0.12	16x8x0.12
	Res. Ohm/Km	<28	<7.2	<7	<32	<30
	% Coverage	74	70	53	75	77
Antimigrating film		No	No	No	No	No
Petrol Jelly		No	Si	Si	No	No
Outer sheath	Ø mm	5.0	10.1	15	6.0	6.9
	Color	Ⓢ	Ⓟ	Ⓟ	Ⓢ	Ⓢ
	Material	PVC	PE	PE	PVC	PVC
Min. bending radius	mm	25	50	75	30	34.5
Shielding at 1GHz	dB	>85	>85	>85	>85	>85
Capacitance	pF/m	53	53	55	54	54
Impedance	Ohm	75	75	75	75	75
Loop resistance	Ohm/m	<0.065	<0.016	<0.010	<0.172	<0.125
Velocity ratio min.	%	82	84	82	82	82
Packaging	m/reel	150	250	500	250	250
	Type	⦿	●	●	●	●
Environmental use		Indoor (µcable)	Outdoor (buried)	Outdoor (buried)	Indoor	
Attenuation max. (dB/m)						
Frequency (MHz)	200	0.11	0.05	0.11	0.11	0.09
	500	0.17	0.09	0.18	0.18	0.15
	800	0.23	0.12	0.23	0.23	0.19
	1000	0.25	0.13	0.26	0.26	0.21
	1350	0.30	0.15	0.30	0.30	0.25
	1750	0.34	0.18	0.35	0.35	0.29
	2050	0.37	0.19	0.38	0.38	0.32
	2300	0.39	0.21	0.40	0.40	0.34

ADDITIONAL INFORMATION

ATTENUATION CURVES FOR DIFFERENT TYPES OF COAXIAL CABLES



BRAID COVERAGE CALCULATION



$$\% \text{ coverage} = (2 \cdot F \cdot F^2) \cdot 100$$

where:

$$F = N_S \cdot N_p \cdot \varnothing_S / \sin \hat{A} \text{ and}$$

$$\hat{A} = \tan^{-1} 2 \cdot \pi \cdot (\varnothing_B + 2 \cdot \varnothing_S) \cdot (N_p / N_C)$$

N_C : No. of carriers

N_S : No. of strands per carriers

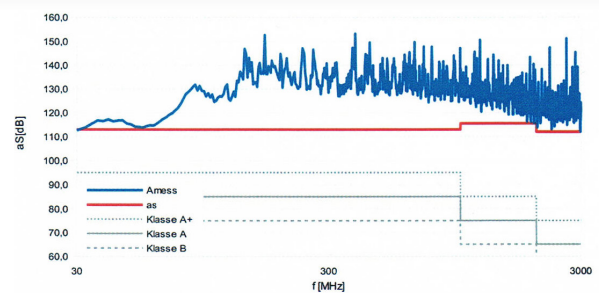
N_p : No. of picks

\varnothing_S : Strand diameter in inches

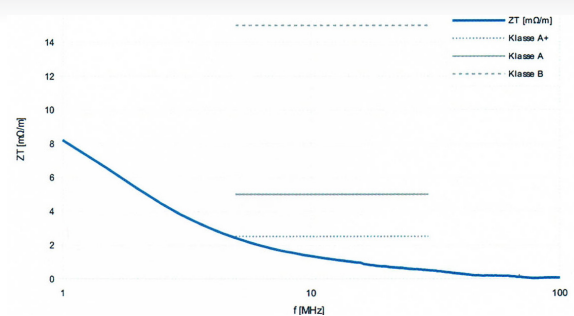
\varnothing_B : Diameter of structure beneath braid

\hat{A} : angle between cable axis and carrier

SCREENING



TRANSFER IMPEDANCE ZT



SK2000+ cable analysis carried out by Dibkom, German Institute of Telecommunications

FRENCH SYSTEM FOR CABLE MARKING



Meaning		
xx		100m attenuation at 800MHz
1	V	Outer sheath PVC
	P	Outer sheath PE
2	Rt	Copper Foil and Braid
	At	Aluminium Foil and Braid
3	M	Solid polyethylene dielectric
	C	Polyethylene dielectric
4	.A	Copper-clad steel Inner conductor
	-	Copper Inner conductor

CONNECTORS AND ACCESSORIES

THE COAXIAL NETWORK PROTECTION AGAINST INTERFERING LTE/4G SIGNALS

PRO EASYF CONNECTORS

The new "PRO EasyF" guarantees an exceptional A+ screening class. It eases the connection of the cable by using one single clamping screw which provides a better grip in comparison to the typical compression connectors. Manufactured in zinc-plated Zamak-5 material, the "PRO EasyF" has an increased life-span proven by the many field installations.

The coaxial cable installation performance depends on the quality of the connector and the mounting.

Using a high screening cable requires a high quality connector.

The **EasyF** connector provides exceptional screening for your coaxial network.

Now making Safe connections is simple thanks to the quick fitting system of the EasyF Connector

No extra tools are required to outperform screening obtained with compression connectors.



"PROEASY F"

REF.	Connector Type
------	----------------

413210	IEC Ø 9,5mm Male
--------	------------------

413310	IEC Ø 9,5mm Female
--------	--------------------

413410	Quick F
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STRENGTHS

SIMPLICITY AND QUICK FITTING:

- ✓ Single securing screw
- ✓ Easy visual check of the connection
- ✓ Not threaded
- ✓ No loose parts

SAFE CONNECTION:

- ✓ Saves time and reduces the cost of the installation
- ✓ Assures the reliability of the connection and doesn't require any future revision.
- ✓ If something fails, connectors are not the cause.

ELECTRICALLY PERFECT:

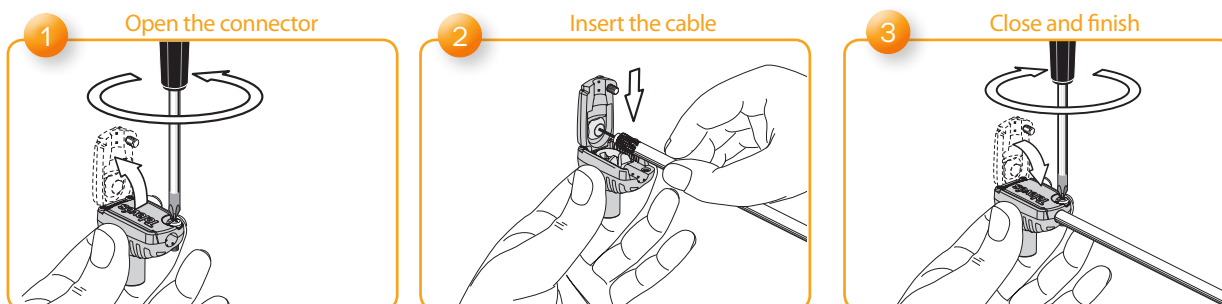
- ✓ Automatic manufacturing
- ✓ Total protection that minimizes interfering signals on the DTT reception
- ✓ Perfectly adapted to the distribution network components
- ✓ The ideal connector for the Digital Dividend due to its performance and quality



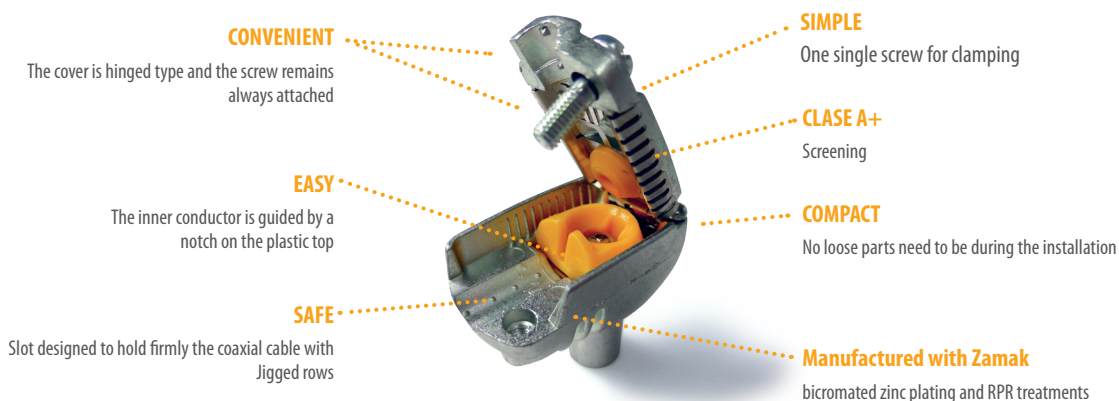
CONNECTORS AND ACCESSORIES

PRO EASYF CONNECTORS

EASYF MOUNTING SYSTEM



THE PROFESSIONAL CONNECTOR



COAXIAL EXTENSIONS WITH PRO EASYF CONNECTORS

Mobile phones and other user terminals using the LTE/4G band are susceptible of affecting the DTT receivers. The elements close to the receptor or the TV which are lacking an effective shielding against LTE could become the entry point for interfering signals.

The critical point is the coaxial extension connecting the TV outlet to the TV or the receiver. Typically this coaxial extensions are manufactured in Asia without assuring good shielding properties.







The Televes Coaxial Extensions are manufactured with high screening cable T200+, LSFH sheath and Class A+ connectors delivering absolute protection for TVs and DTT receivers against interferences.

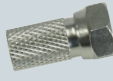












REF. Coaxial Cable Lead

431001	IEC Male - Female Ø 9,5mm	1,5m grey
431002	IEC Male - Female Ø 9,5mm	2,5m grey

CABLE-CONNECTOR COMPATIBILITY TABLE

Shielded connectors												
Type	Ref. and Picture		Cable type									
			SK (TSH)	T200	T100	CXT	CXT1	CXT5	CXT-50	CXT-60	TR165	1/2"
IEC	413210 (male)											
	413310 (female)		✓	✓	✓	✓	✓	✓	✓	✓		
Quick F	413410											
IEC	4130 (male)											
	4131 (female)			✓	✓	✓	✓	✓	✓	✓		
Quick F	4176											

Other Connectors												
Type	Ref. and Picture		Cable type									
			SK (TSH)	T200	T100	CXT	CXT1	CXT5	CXT-50	CXT-60	TR165	1/2"
F threaded	4171 417101		✓		✓	✓	✓					
	4127 3808							✓				
	9349										✓	
F compression	3802		✓									
	410801			✓								
	4104				✓	✓	✓			✓		
	4105							✓	✓			
	410701		✓		✓	✓	✓			✓		
	4106										✓	
F	4120											✓
5/8"	4122										✓	

ACCESSORIES

CABLE STRIPPERS



Ref.2145

Professional cable stripper from Ø 4,3 to 7 mm.
Ideal for crimping and compression connectors



Ref. 2162

Cable stripper up to Ø 7.5 mm

CONNECTOR COMPRESSION TOOL



Ref. 2163

Compression tool for "F" connectors



Ref. 216310

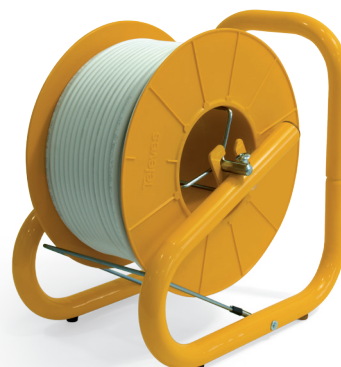
Insertion tool for "F" connectors

CABLE/FIBER DISPENSER

Accessory for easing the cable handling during the installation
and preserving the mechanical characteristics of the cable

- ✓ Lightweight and resistant material
- ✓ Easy transportation
- ✓ Compatible with plastic reel of 100m and 250m
- ✓ Compatible with Optical Fiber (2 fiber cable)

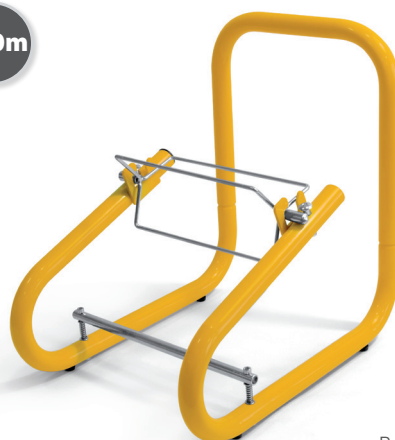
100m



Ref.212001

(Plastic drum not included)

250m



Ref.212011

Televes®

COAXIAL CABLE AND ACCESSORIES

THE PERFECT COMBINATION FOR
INTERFERENCE PREVENTION

