

**Product:**  
Cabling

**Family:**  
Copper Solutions

# Tech Tip 16

## Differences between a Telecommunications Cable and a Conventional Power Cable

### IMPORTANT NOTE:

*This is an important document for both, attendant and purchasing managers. Sometimes the customs authorities want to classify our data cables as common power cables, which have different tariff codes and sometimes with many higher tariffs. This document has been used several times to defend the cables before courts and customs authorities.*

LanPro Cable is a cable telecommunications for use strictly. Below are some considerations.

### Data cables, CAT 5e, CAT 6 and CAT 6A LanPro.

The LanPro's communications cable is NOT designed as power cables that using almost the entire section with copper to maximize current flow, (which is the target of a power supply cable), but is occupied its internal area by plastic elements that separate the pairs and give geometric uniformity along the cable to fulfill the characteristics specified in table 1 of ISO specifications for cable (for example) Category 6 and thus able to transmit at frequencies on the order of 250 MHz.

#### 1.1. Defining Data Communications Cable Twisted Pair.

LanPro's Cable CAT 6 consists of 4 twisted pairs and is based on the technology used for telecommunications cables.

The twisted pair cable is a connection method used in telecommunications in which two insulated electrical

conductors are twisted to cancel interference from external sources and crosstalk from adjacent wires. It was invented by Alexander Graham Bell in the late 19th century.

The multi-pair cable is that formed by a large number of copper pairs, usually multiple of 25. There are standard multi-pair cables with capacity of 25, 50, 125, 250 and up to 3600 pairs on a single physical cable.

The pair cables are used for the physical connection of telephone equipment, data networks, such as LANs. In these data networks is using twisted pair (UTP), where conductors "twisted" each other and screened, that is covered with a screen or mesh of conductive material. These enhancements allow data transmission at high capacity and minimize interference to / from other systems (Crosstalk).

#### 1.2. Definition of Cable Category 6.

Cable Category 6, or CAT 6 (ANSI / TIA / EIA-568-B.2-1) is a standard's cables for Gigabit Ethernet and other network protocols that is backward compatible with standard Category 5 / 5e and Category 3. Category 6 has features and specifications for crosstalk (or crosstalk) and noise. The standard cable is usable for 10BASE-T, 100BASE-TX and 1000BASE-TX (Gigabit Ethernet). Frequencies reach up to 250 MHz in each pair and a speed of 1 Gbps.

The cable contains four pairs of twisted copper wire, like previous standards copper cables. Although Category 6 is sometimes made with 23 AWG wire, this is not a requirement; ANSI / TIA-568-B.2-1 specifications clarifies that the cable can be made between 22 and 24 AWG, while the cable fulfill all testing standards indicated.

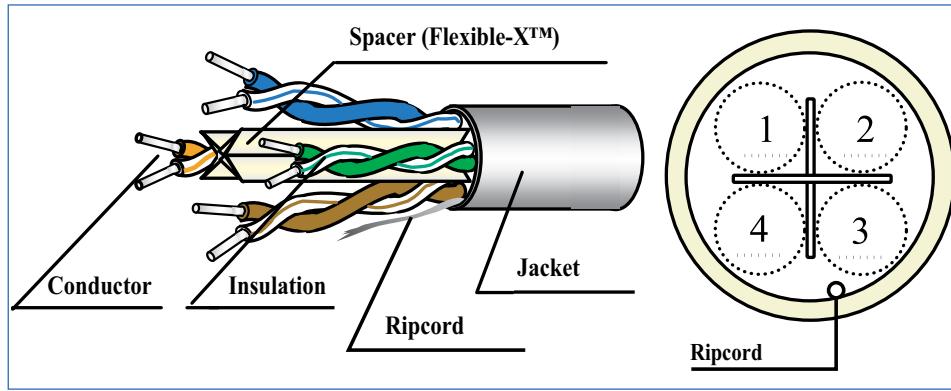
If components of the various cable standards are mixed each other, the signal performance will be limited to the category that all parties comply. As all cables defined by TIA / EIA-568-B, the maximum of a CAT 6 horizontal cable is 90 meters (295 feet). A

complete channel (horizontal over each end cable) is allowed to reach 100 meters in length.

The CAT 6 UTP cables commercials for LAN networks are electrically built to exceed the recommendation of the task group of the IEEE, which is working since before 1997.

The UTP cable CAT 6 LanPro (for example) has the following morphology, **see Figure 1.**

Packaging example of this shown in **Figure 2.**



**Figure 1**



**Figure 2**

In Category 6, the wired to work in networks up 250 MHz, proposal values that must be fulfill are shown in table No.1:

**Table 1. Specifications of current channel ISO CAT 6**

frequency (MHz)	PS Attenuation (dB)	pr-pr NEXT (dB)	PS NEXT (dB)	pr-pr ELFEXT (dB)	PS ELFEXT (dB)	Return Loss (dB)	Delay phase (ns)	Delay Torc. (ns)
1	2,2	72,7	70,3	63,2	60,2	19,0	580,0	50,0
4	4,2	63,0	60,5	51,2	48,2	19,0	563,0	50,0
10	6,5	56,6	54,0	43,2	40,2	19,0	556,8	50,0
16	8,3	53,2	50,6	39,1	36,1	19,0	554,5	50,0
20	9,3	51,6	49,0	37,2	34,2	19,0	553,6	50,0
31,25	11,7	48,4	45,7	33,3	30,3	17,1	552,1	50,0
62,5	16,9	43,4	40,6	27,3	24,3	14,1	550,3	50,0
100	21,7	39,9	37,1	23,2	20,2	12,0	549,4	50,0
125	24,5	38,3	35,4	21,3	18,3	11,0	549,0	50,0
155,52	27,6	36,7	33,8	19,4	16,4	10,1	548,7	50,0
175	29,5	35,8	32,9	18,4	15,4	9,6	548,6	50,0
200	31,7	34,8	31,9	18,4	15,4	9,0	548,4	50,0
250	36,0	33,1	30,2	17,2	14,2	8,0	548,2	50,0

All the loss figures, are in decibels (dB) figures Sources: IEEE (Category 6 Cable TaskForce)

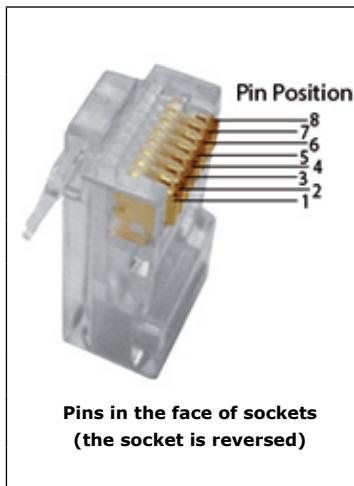


Table 2. Colors Code of conductors and two kind of connection T568A and T568B					
Pin	T568A Par	T568B Par	Cable	T568A Color	T568B Color
1	3	2	tip	White/Green line	White/Orange line
2	3	2	ring	Green	Orange
3	2	3	tip	White/Orange line	White/Green line
4	1	1	ring	Blue	Blue
5	1	1	tip	White/Blue line	White/Blue line
6	2	3	ring	Orange	Green
7	4	4	tip	White/Brown line	White/Brown line
8	4	4	ring	Brown	Brown

### 1.3. Summaries

#### 1.3.1

A communication cable Category 6 has a architecture conformed by 4 pairs AWG 24 or AWG 23 made structurally to minimize the mutual inductance between 4 pairs and adjacent cables and achieve capacity data transmission architecture for which it was designed that is in the order of 250 MHz per pair, reaching 1 GHz the sum of the capacities of 4 pairs so it is called Gigabit Ethernet. UTP cable LanPro Category 6 is an example of this architecture.

#### 1.3.2

The characteristic impedance as transmission line is about 100 Ohm and the maximum voltage of the data signal is in the order of 1 Vrms when the standard or the IEEE IEEE802.11af 802.11at is not used to feed data to the end equipment cable.

#### 1.3.3

Only when is used both standard IEEE802.11 or IEEE802.11af the voltage of the internal operation signal reach 57 Volt DC maximum. Because of this, it sets a maximum voltage of 48 Vrms operation which is well below the 80 Vrms to be considered a power cable low voltage is fixed.

However, the cable of LanPro is over designed to be named as a 300 cable type 60 300 Vrms of communications as required certification by UL® to LanPro as communications cable: DUZX7.E329019 Canada and the DUZX.E329019 of USES. Among its evidence is UL 444 testing communications cables from 60 to 250 ° C, and compliance with US NEC Article 800.

#### 1.3.4

The communications cable is not designed as power cables using almost the entire section with copper to maximize current flow, (which is the target of a power cable power) but is occupied internal area by elements plastic separating couples and give geometric uniformity along the cable to meet the characteristics specified in table 1 of ISO specifications for Cable Category 6 (for example) so you can transmit at frequencies on the order of 250 MHz.

#### 1.3.5

Jackets network cables can be of different technologies for different applications. The jackets are not related to the implementation of the cable. LanPro not sell or provide power cables of any kind. Only we manufacture telecommunications cables. Some of the jackets we handle as follows:

**Covers or CMX CM or CMR:** Typical designs for indoor cables, typically gray or blue color.

**Pe covers (polyethylene)** to withstand water, gasoline, pollution, friction, mechanical abuse, sun, etc., usually black.

**Cases LSZH (low smoke / zero-halogen):** Cases used to emit negligible amounts of smoke and pollutants dangerous when they grab flame. Used for example in medical clinics in Ecuador, and so requested by the customer.

There are hundreds of jackets (covers) used in telecommunication cables and depend on the application and the type of cable required.