

Copper Data Cabling

Category	Class	Frequency	Transmission Speed	Maximum Distance
Cat5e	Class D	100 MHz	1 Gbps	90mts
Cat6	Class E	250 MHz	1 Gbps	90mts
Cat6a	Class EA	500 MHz	10 Gbps	90mts
Cat7	Class F	600 MHz	10 Gbps	90mts
Cat7a	Class Fa	1000 MHz*	10 Gbps	90mts
Cat8**	Class I	2000 MHz	40 Gbps	30mts
Cat8	Class II	2000 MHz	40 Gbps	30mts

*Suitable for application including CATV (862 MHz), **Not backward compatible with Cat7

General Cabling Standards

ISO/IEC IS 11801, ANSI/TIA 568-C.2

ANSI - American National Standards Institute

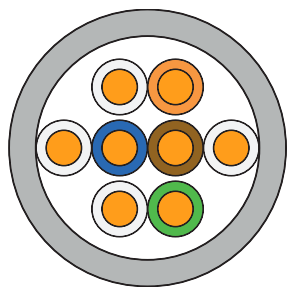
IEC – International Electrotechnical Commission

ISO – International Organization for Standardization

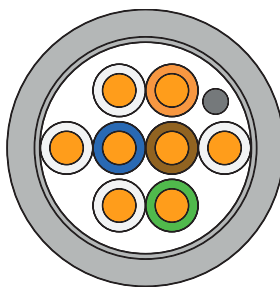
TIA - Telecommunications Industry Association

These standards define the procedure to certify that an installation meets performance criteria in a given category or class. The significance of each category or class is the limit values of which the Pass/Fail and frequency ranges are measured.

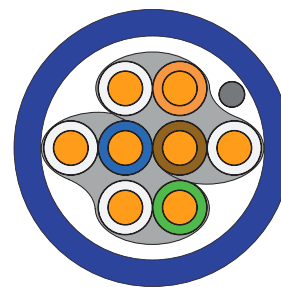
Cable Types



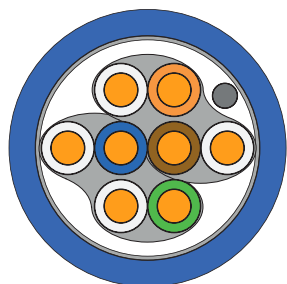
UTP
Unshielded Twisted Pair



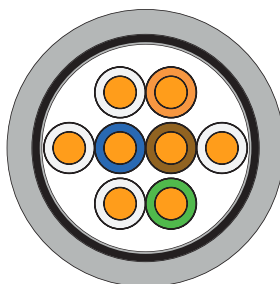
F/UTP
Overall Foiled Pairs



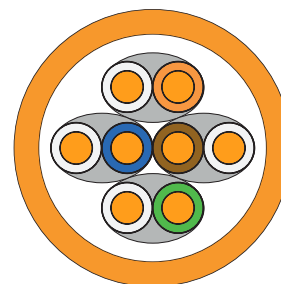
U/FTP
Individual Foiled Pairs



F/FTP
Individual Foil and Overall Foiled Pairs



SF/UTP
Screened and Foiled Overall Pairs



S/FTP
Individual Foil and Overall Screened Pairs

Cable Sheaths

LSZH/LSOH - Low Smoke Zero Halogen (Internal Use)

LSFH - Low Smoke Free of Halogen (Internal Use)

PE - Polyethylene (External Use)

PVC - Polyvinyl Chloride (Internal Use)

Plenum - American Standard Only. (NOT SOLD IN UK)

TIA/EIA-568-B Wiring Configuration

Pin	Pair	Wire	Colour
1	2	1	 white/orange
2	2	2	 orange
3	3	1	 white/green
4	1	2	 blue
5	1	1	 white/blue
6	3	2	 green
7	4	1	 white/brown
8	4	2	 brown

Propagation Delay

Test for the time it takes for the signal to be sent from one end and received by the other end

Delay Skew

Tests for the difference in propagation delay between the fastest and slowest set of wire pairs. An ideal skew is between 25 and 50 nanoseconds over a 100m cable.

Cable Length

Verifies the cable does not exceed the maximum recommended distance.

Insertion Loss

Also referred to as attenuation, refers to the loss of signal strength at the far end of a line compared to the signal that was introduced into the line. The loss is expressed in decibels with a minus sign.

Return Loss

Measurement of the amount of signal that is reflected back toward the transmitter. The reflection is caused by the variations of impedance in the connectors and cable and is usually attributed to a poorly terminated wire.

Near-End Crosstalk (NEXT)

Near-End Crosstalk is an error condition that describes the occurrence of a signal from one wire pair radiating to and interfering with the signal of another wire pair. It is the difference in amplitude (in dB) between a transmitted signal and the crosstalk received on other cable pairs at the same end of the cabling.

Power Sum NEXT (PSNEXT)

The sum of NEXT values from 3 wire pairs as they affect the other wire pair. The combined effect of NEXT can be very detrimental to the signal.

Cable Tests

Wiremap - Test to ensure all wires are terminated correctly. Ensures there are incorrect terminations, cross pairs etc.

Permanent Link - Test the link between patch panel and module.

Channel - Test the whole channel including patch leads.

The Equal-Level Far-End Crosstalk (ELFEXT)

Measures Far-End Crosstalk (FEXT). FEXT is very similar to NEXT, but happens at the receiver side of the connection. Due to attenuation on the line, the signal causing the crosstalk diminishes as it gets further away from the transmitter. Because of this, FEXT is usually less detrimental to a signal than NEXT, but still important nonetheless.

Power Sum ELFEXT (PSELFEXT)

The sum of FEXT values from 3 wire pairs as they affect the other wire pair, minus the insertion loss of the channel. Recently the designation was changed from PSELFEXT to PSACR-F (far end ACR).

Attenuation-to-Crosstalk ratio (ACR)

The difference between the signal attenuation produced NEXT and is measured in decibels (dB). The ACR indicates how much stronger the attenuated signal is than the crosstalk at the destination (receiving) end of a communications circuit. The ACR figure must be at least several decibels for proper performance. If the ACR is not large enough, errors will be frequent. In many cases, even a small improvement in ACR can cause a dramatic reduction in the bit error rate.

DC Loop Resistance

Measures the total resistance through one wire pair looped at one end of the connection. This will increase with the length of the cable. DC resistance usually has less effect on a signal than insertion loss, but plays a major role if power over ethernet is required.

Construction Product Regulation (CPR) Introduced July 1st 2017.

Construction Products Regulation (CPR) for cable products provides 3rd party proof of a cable's reaction to fire properties.

Cable classification allocated on successful test completion

Manufacturer produces a Declaration of Performance (DoP) document with relevant testing and classification details.

A DoP is required for CE Marking and products cannot be sold without a CE mark

 XXXX	<i>CE marking, consisting of the "CE"-symbol</i> <i>Identification number of the product certification body</i>
AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium 14 (To be given by the manufacturer)	<i>Name and the registered address of the manufacturer, or identifying mark</i> <i>Last two digits of the year in which the marking was first affixed</i> <i>Reference number of the DoP</i>
EN 50575:2014 (To be given by the manufacturer) Supply of electricity in buildings and other civil engineering works with the objective of limiting the generation and spread of fire and smoke Reaction to Fire: B2 _{ca} -s1,d1,a1 Dangerous substances: none	<i>No. of European Standard applied, as referenced in OJEU</i> <i>Unique identification code of the product-type</i> <i>Intended use of the product as laid down in the European Standard applied</i> <i>Class of performance</i>

Example of CE marking information on the product label for products subject to AVCP system 1+¹¹

Whereas a class F_{ca} product is declared as such by the manufacturer, a class D_{ca} product or a class E_{ca} product needs to run through a notified testing laboratory's type testing. A product falling into classes A_{ca}, B1_{ca}, B2_{ca} or C_{ca}, which are critical for fire safety, will be continually surveyed in production in accordance with the conformity procedure 1+ by a notified product certification body.

A successfully completed conformity procedure is a prerequisite for labelling a product with CE marking.

The assignment to the respective class is documented by the CE marking. Hence, the user can be sure that required fire safety criteria are met and that the class can be easily identified.

Reaction to Fire Classes Flame propagation /heat development	Additional Classes			Security requirements in a building
	Smoke production/density	Flaming droplets/particles	Acidity development/ corrosivity	
A _{ca}				Very High
B1 _{ca}				Very High
B2 _{ca}	S1	d1	a1	Very High
C _{ca}	S1	d1	a1	High
D _{ca}	S1	d1	a1	Medium
E _{ca}				Low
F _{ca}				None