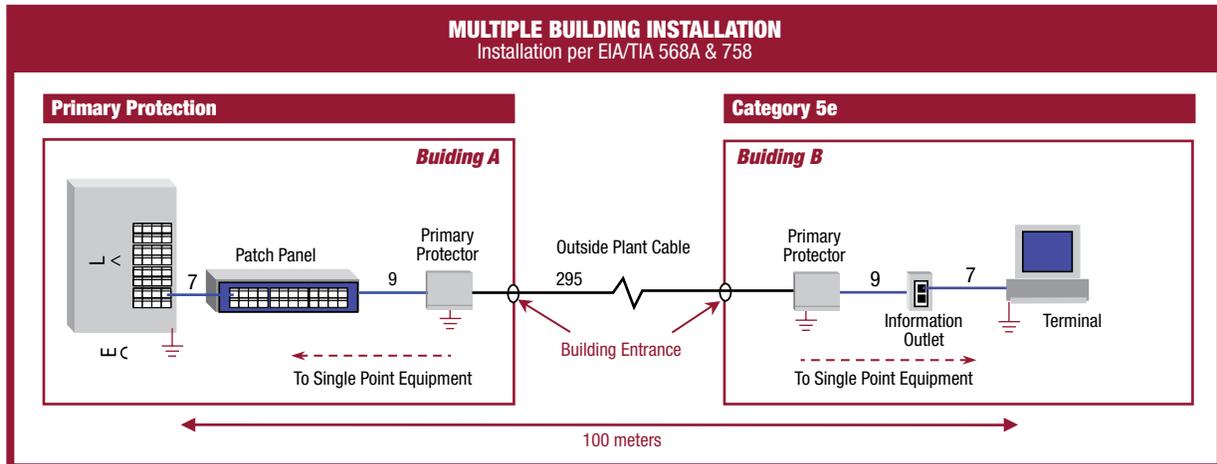


# CATEGORY 5 / 5E / 6

## THE TRUTH ABOUT CATEGORY 5 / 5E / 6 STANDARDS

Warning: Many manufacturers will try to pass on their version of a Category 5/5e/6 protection product when they are not meeting the proper standards or the application's needs. In a campus environment, the NEC requires that you protect any conductive path entering or leaving a building (Article 800). This protector must be agency listed (i.e. UL 497). Often times, this protector will be advertised as Category 5/5e/6, but there are three key features that are needed for a campus environment – primary (UL 497), solid-state, and certified Category 5/5e/6. Many manufacturers will provide a Category 5/5e/6 product, but not for the application you are looking for.

Proper Location for Campus Applications (short or temporary runs where fiber is not needed):



## UL LISTINGS

The greatest misconception is most likely the UL standard for different applications. People believe that just because something has a UL mark on it, it must be safe to use the product. Different UL Listings mean different things for good reasons – safety. The highest UL Listing for surge protection products is UL 497. This can easily be confused with UL 497A and UL 497B. Although the Listings look similar, the testing procedures for each are extremely different. Here is a quick look at the differences:

- UL 497 – Primary Protection: The Primary Protector is used at Building Entrances and is capable of withstanding the highest level of over-voltage surges- lightning. These devices are required by NEC Article 800 to protect buildings and humans.
- UL 497A – Secondary Protection: The Secondary Protector is located between the building entrance / Primary protector and the equipment intended to be protected. These protectors are intended to protect buildings, humans and sensitive electronic equipment. The TIA/EIA 568 standard does not allow fuses and PTC's to enable secondary protection due to the 100 ohm impedance mismatching.
- UL 497B – Isolated Loop Protection: Isolated Loop Protectors are designed to handle over-voltage events which are introduced within a building. The protected "loop" must not be exposed to the outside world. These protectors are not designed to protect against lightning type surges but are for low voltage protection instead.

## TECHNOLOGY

After looking at the UL Listings, the next important aspect to consider is the technology differences between protectors. Today's telecom surge protectors consist mainly of either gas-tube or solid-state over voltage devices. When a product is UL Listed for Primary either of these two devices can be used, but there are differences. Keep in mind that UL Listings are meant for safety and not to protect the equipment the protector is connected to. With that being said, here are the main differences between the two technologies:

- Gas-Tube: Gas tube protectors take 4,000 to 5,000 nanoseconds to divert a surge to ground. This equates to 4,000 to 5,000 feet down the conductive path. In a LAN application, the channel can only be 100m in length. So the 5,000 feet would allow the surge to bounce back and forth through the channel 16 times. Secondly, gas tube protectors can clamp only as low as 90V. Typical LAN circuits will clamp at 16V, leaving a large window for surges to damage the equipment involved. Therefore, gas-tube protectors should never be used for protecting your network equipment.
- Solid-state: Solid-state protectors take 2 to 5 nanoseconds to divert a surge to ground. This equates to 2 to 5 feet down the conductive path – essentially clamping as fast as a surge can travel. These protectors have greater voltage control and can clamp at low voltages such as in LAN applications. This protection technology is needed with today's sensitive electronic equipment and should be used in nearly all applications.

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## SPECIFICATIONS

The last aspect that needs to be considered is the way in which products can be marketed in order to pass for your application. Many manufacturers test their product in-house and do not use third party testing. By doing this, you are taking their word that it passes for Category 5/5e/6 – and often they don't even meet what they claim. The other way of going around the standards is using the patch cord standards. Here are some of the ways in which a vendor can try to get around the standards you are looking for:

- Category 5/5e/6: Many manufacturers will advertise that they meet Category 5/5e/6, but unfortunately, this is not always true. In order to ensure the proper performance, ask for third party certification/verification (e.g. UL, Anixter, Nordex). This is the safest and easiest way to ensure that you meet the performance you are looking for.
- Protector: The protector should meet requirements for Category 5e Connecting Hardware shown in the table below. The main tests include Near End Cross Talk (NEXT), Return Loss (RL), and Insertion Loss (or Attenuation).

FREQUENCY (MHz)	INSERTION Loss (dB)	NEXT (dB)	RETURN Loss (dB)
1.0	0.1	65.0	30.0
4.0	0.1	65.0	30.0
8.0	0.1	64.9	30.0
10.0	0.1	63.0	30.0
20.0	0.2	57.0	30.0
25.0	0.2	57.0	30.0
31.25	0.2	53.1	30.0
62.5	0.3	47.1	24.1
100.0	0.4	43.0	20.0

- Patch Cord: If a protector is classified as a protected patch cord, beware. Patch cords meet different performance standards shown below. The attenuation per 100 meters is +20% of the horizontal UTP cable attenuation due to the stranded conductors. Many manufacturers will classify their protector under protected patch cords in order to meet the Category 5e performance.

FREQUENCY (MHz)	2 m CORD NEXT (dB)	5 m CORD NEXT (dB)	10 m CORD NEXT (dB)	RETURN Loss (dB)
1.0	65.0	65.0	65.0	19.8
4.0	62.3	61.5	60.4	21.6
8.0	56.4	55.6	54.7	22.5
10.0	54.5	53.7	52.8	22.8
16.0	50.4	49.8	48.9	23.4
20.0	48.6	47.9	47.1	23.7
25.0	46.7	46.0	45.3	24.0
31.25	44.8	44.2	43.6	23.0
62.5	39.0	38.5	38.1	20.0
100.0	35.1	34.8	34.6	18.0

There are many ways to get past the standards for Cat5/5e and these are only a few examples that have been used by other manufacturers. When specifying or buying Cat5/5e products, have the manufacturer or installer verify the performance (as applicable to your installation) so that you can be assured you are getting a true Cat5/5e/6 product. ITW Linx offers Cat5/5e/6 UL Listed primary protection devices which exceed standards for Cat5e/6.