

Outdoor Residential Cat5e Cable Purchasing Guide

Review, Analysis and Recommendation

Choose the ideal Cat5e design for outdoor residential installations

Which Cat5e cable design is ideal for outdoor residential installations?

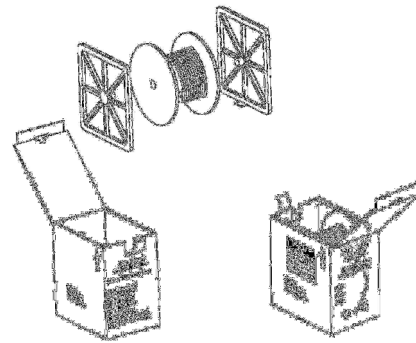
There are many options when evaluating Cat5e cables. You can find shielded, double shielded, double jacketed, PVC jacketed, PE jacketed, braided shielded, aluminum shielded, UV rated, unshielded and any combination of the group just mentioned. With each cable, there is also the type of box and unspooling method that needs to be considered.

Choosing the wrong cable can either cost you too much money on the purchase or cause you to roll trucks on every installation you made over a 2-3 year period. In either case, a bad choice can cost you tens of thousands of dollars.

Unspooling Method



No Spool



Spool in a Box

Bulk Cat5e cable is typically sold in 1,000' increments. The 1,000' of cable is almost always placed in a corrugated box. Spool only designs and bigger increments can be found but they are becoming less common. With a box design, cable can be either put on a spool or simply wound up and placed in the box.

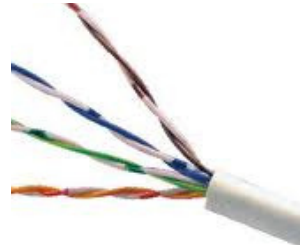
The wound up design is known for knotting and kinking up during the unspooling process. This happens because the cable is wound on a spool, then removed from the spool and just placed into a box. There is no securing device to keep the spool of cable neatly wound up. The box of cable is then shipped on a boat across the Pacific Ocean and around the United States until it reaches your door.

The chance that the cable on the inside of the box can stay in the neat spool design without having some securing device is low. A spool in a box design can be a little heavier but it almost always means a neat, smooth unspool. Plus, the spool can be removed from the box and used if the box is ever damaged which cannot be done if the cable is only placed into the box.

Shielding



Shielded



Unshielded

Is shielding necessary on residential installations? This is the main question you should be trying to answer when comparing shielded cable to unshielded cable. The type of shield you use should not be a factor until you determine that a shield is necessary.

Shielded cable is primarily used to block out external static and non-static electric fields (Electromagnetic Interference, or EMI). EMI affects the cable's ability to transmit data. EMI can come from high voltage wires, generators, motors, different types of lighting and many other mechanical devices. Cable shields are usually made from braided strands or a metal foil (typically aluminum). Braided strands can make cable more durable (primarily to prevent rodents from chewing the copper) but typically either type of shield will be fine. With all other items equal, shielded cable is typically more expensive than unshielded cable.

You will most likely never see EMI from mechanical objects or medium to high voltage wires on residential installations. The only place that a shield may benefit you on a residential installation is to increase grounding efficiency but in most cases grounding will not save your radios. If a lightning strike is close, your radios will most likely be fried with or without proper grounding. Grounding is mainly used to save equipment in the customer's house which can be done with a simple surge protector. We recommend that a surge protector is used independent of your type of cable. So, the use of a surge protector is much more important than grounding with a shielded cable.

That being said, shielded cable should be used on tower installations. This is especially true when there is the chance for other operators to install on the tower in the future. If another broadcaster puts power cable next to your Cat5e cable, they may cause EMI problems.

In most cases, it is not worth your money to install shielded cable at customer houses. If you a shielded cable is necessary, you **MUST** make sure the cable is certified for outdoor use by the Underwriter Laboratories, Inc. Using a shielded indoor cable is almost useless on outdoor

installations. You would be better off saving money and going with an unshielded indoor cable instead of using a shielded indoor cable.

UV Rating



Damaged Non-UV Cable



Undamaged UV Cable

Troubleshooting a cable UV problem is extremely difficult and time consuming. Once a cable problem has been diagnosed, a truck role and re-installation is almost always necessary. This work can cost up to \$250.00 per house. Typically, a cable issue is not diagnosed for 2-3 years. The bad cable could have been used on every installation over that period. Therefore, the total cost of a bad cable could reach astronomical levels.

UV Rated Cat5e cable has a chemical compound added to the PVC or PE jacket to protect the cable from disintegrating in sunlight. Without the UV chemical compound, the PVC or PE jacket can crack or completely expose the inner copper wires in as little as a couple years and make the cable almost useless. To be truly UV Rated, a cable must go through rigorous CMX certification under the Underwriters Laboratories, Inc Standard 444 7.12 Weatherometer Test.

Also, many people are told that direct burial cable is all you need for outdoor installations. In fact, direct burial cable has nothing to do with UV protection. Direct burial simply means the cable is designed to be buried in the ground and withstand the kind of heat and moisture the cable will be exposed to in that environment.

Using a UL Certified CMX rated cable is the single most important factor you should choose when looking at cable for residential installations.

Listed by Underwriters Laboratories, Inc.

The Underwriters Laboratories, Inc. (“UL”) is a global independent safety science company offering expertise across five key strategic businesses: Product Safety, Environment, Life & Health, University and Verification Services. The UL officially certifies communication cable in the United States. If a cable is marked as “CMX” rated, the cable can officially be advertised as outdoor rated cable. If the cable does not have a UL CMX rating (or similar certification from a third party testing lab), there is no guarantee that the cable can be used as outdoor cable.

List of UL Communications Cable Markings:

Communications cable is identified by marking on the surface of the jacket or on a marker tape under the jacket. This marking includes one of the following Type designations:

CM — Indicates cable intended for general use within buildings in accordance with Section 800.154(E)(1) of the NEC. This cable does not spread flame to the top of the tray in the Vertical-Tray Flame Test in [UL 1685](#), "Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables."

CMG — Indicates cable for general use within buildings in accordance with Section 800.154(E)(1) of the NEC. The damage height of this cable does not exceed 4 ft 11 in. when tested in accordance with the CSA FT4 Vertical-Tray Flame Test in [UL 1685](#).

CMP — Indicates cable intended for use within buildings in ducts or plenums or other spaces used for environmental air in accordance with Section 800.154(A) of the NEC. This cable exhibits a maximum peak optical density of 0.5, a maximum average optical density of 0.15, and a maximum flame spread distance of 5 ft, when tested per ANSI/NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

CMR — Indicates cable intended for use within buildings in vertical shafts in accordance with Section 800.154(B) of the NEC. The flame propagation height of this cable is less than 12 ft when tested per [ANSI/UL 1666](#), "Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts."

CMUC — Indicates cable for undercarpet use in accordance with Section 800.154(E)(6) of the NEC. This cable complies with the VW-1 Flame Test requirements in [ANSI/UL 1581](#), "Reference Standard for Electrical Wires, Cables, and Flexible Cords."

CMX — Indicates cable intended for use within buildings (1) where the wire or cable is enclosed in raceway or noncombustible tubing, or (2) in nonconcealed spaces where the exposed length of wire or cable does not exceed 10 ft, or (3) in one- or two-family or multifamily dwellings when the cable diameter is less than 0.25 in., in accordance with Section 800.154(E) of the NEC. **Type CMX cable may be marked "Outdoor" to indicate its suitability for installation outdoors on dwellings.** This cable complies with the VW-1 Flame Test requirements in [ANSI/UL 1581](#).

Cable that contains one or more optical fiber members has the suffix "-OF" added to the above.

Cable that complies with the Limited Smoke Requirements specified in [UL 1685](#) is surface marked with the suffix "LS."

Cable marked "Shielded" contains one or more electromagnetic shields.

Cable that complies with the requirements for "Limited Combustible" specified in ANSI/NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems," is surface marked "Limited Combustible."

Listed cable that is additionally marked "Verified (UL) Category 2, 3, 4, 5, 5E, 6 or 6A [including latest draft number if applicable]" or "Verified (UL) Category 3, 4, 5, 5E, 6 or 6A [including latest draft number if applicable] Patch Cable" for stranded conductor cable, has been investigated in accordance with the UL Data Transmission Performance Category Marking Program and is manufactured under an acceptable quality assurance system.

Listed cable that is additionally marked "Verified (UL) Category 6 or 7 NEMA WC66" has been investigated in accordance with NEMA WC66-1999, "Performance Standard for Category 6 and 7 100 Ohm Shielded and Unshielded Twisted Pair Cable." Additionally, this cable has been manufactured under an acceptable quality assurance system.

THE PERFECT DESIGN

The most effective cable for outdoor residential installations is a single jacket, unshielded, spool in a box, UV Rated (or CMX Rated) cable that has been certified with a UL number. A double jacket or shield design may be preferred from time to time, but it is not necessary for the typical residential installation. Whatever cable you decide to use make sure that it is suitable for outdoor installations (UV/CMX RATED) by the Underwriters Laboratories.