

Copper Wire & Cable NEC Fire Resistance Ratings

Article 800 of the National Electrical Code (NEC), also known as NFPA 70, covers requirements for low-voltage communications cables. The NEC requires that cables used in premises, both commercial and residential, be “listed for the purpose” by a Nationally Recognized Test Laboratory (NRTL, pronounced “nurtle”). Other countries have similar requirements. UL (Underwriters Laboratories Inc.) is the most recognized listing agency in the US. UL 444 is the overall specification used to identify the requirements for listed communications cables.

Many of the fire resistance test procedures called out in UL 444 are written by UL. However, other laboratories, such as ITS (Intertek Testing Services) and CSA (Canadian Standards Association), can also provide listing compliance to the NEC.

Five levels of fire resistance are specified. These are outlined below, from most stringent to least. The ratings are hierarchical, i.e., from a fire resistance standpoint, a higher rating can be substituted for any lower rating, but not vice versa.

NEC Designation	Common Term	Test	Comments
CMP	Communications Plenum	NFPA 262	Cable must have resistance to flame spread and reduced smoke generating properties. These cables are approved for placement in air handling ducts and chambers (plenums) without the use of fireproof conduit. The purpose of the rating is to lessen the transmission of fire and visible smoke to unaffected parts of the building. Toxic or corrosive elements of the smoke are not measured.
CMR	Communications Riser	UL 1666	Cable must not transmit flame from one floor to another when placed vertically in a building shaft (riser).
CMG	Communications General use	CSA C22.2 No. 0.3-M (Vertical Tray)	Cable may not transmit flame for more than 4 ft, 11 in. It shall not penetrate floors or ceilings, i.e., may only be used within a single floor. This designation was added as a part of the harmonization efforts between US and Canadian standards.
CM	Communications General Purpose	UL 1581 (Vertical Tray)	Cable may not transmit flame for more than 4 ft, 11 in. It shall not penetrate floors or ceilings, i.e., may only be used within a single floor.
CMX	Communications Limited Purpose	UL 1581 VW-1 (Vertical Wire)	Cable meets the least stringent flame spread requirements of all ratings. For residential use, but can only be installed in one and two-family (duplex) housing units. Often rated with optional UL requirements for outdoor use ¹ .

¹ These “outdoor” requirements are limited to some cold temperature properties and UV resistance. They do not qualify a cable to be substituted for an Outside Plant cable. For example, they have no protection against the intrusion of water, which can destroy a cable’s transmission properties and physically degrade a cable as well. The purpose of the “outdoor” rating is to ensure the cable can withstand outdoor exposure in the short run between the Network Interface Unit and the point of entry into the interior of the home.

TECH TIP

In response to growing demand for data applications, premises cable performance has evolved such that several categories of transmission performance for Unshielded Twisted Pair (UTP) cables have been developed. These categories are detailed below.

Although some categories are no longer common, all are provided for historical purposes. The categories are hierarchical, i.e., a higher category can be substituted for any lower category, but not vice versa.

Category	Maximum Bandwidth	Common Applications	Specifications	Comments
6A	500 MHz	10 GB Ethernet	ANSI/TIA-568-B.2-10	Designed for reduced alien crosstalk
6	250 MHz	1000 Mbps Gigabit Ethernet	TIA/EIA-568-B.2-1-2002	Doubles the bandwidth of CAT 5e and vastly improves signal-to-noise margins.
5e	100 MHz	1000 Mbps Gigabit Ethernet	TIA/EIA-568-B.2-2001 ANSI/ICEA S-90-661	Characterized by tightly twisted pairs to reduce crosstalk loss.
5	100 MHz	1000 Mbps Gigabit Ethernet 100 Mbps Fast Ethernet 100 Mbps TPDDI 622 Mbps ATM	TIA/EIA-568-B.2-2001 ANSI/ICEA S-90-661	No longer recognized as an appropriate medium for commercial networking installations (replaced by CAT 5e or higher).
4	20 MHz	10 Mbps Ethernet 16 Mbps Token Ring (IEEE 802.5)	TIA/EIA-568-A (CAT 4)	No longer used.
3	16 MHz	100 Mbps Fast Ethernet (IEEE 802.3) Analog Voice Telecom Closet Wiring	TIA/EIA-568-B (Category 3) ANSI/ICEA S-90-661	Minimum allowed by the FCC for horizontal cable in commercial and residential voice and data applications. Market trend is to abandon CAT 3 in favor of installing CAT 5e or higher for both data and voice.