

Cable Standards Reference Guide

National Electrical Code (NEC)® Catalog Reference Information

The National Electrical Code is a set of guidelines describing procedures which minimize the hazards of electrical shock, fires, and explosions caused by electrical installation. The text of the NEC is contained in nine chapters, each chapter broken into individual articles.

NEC types are acronyms consisting of a prefix describing cable type (e.g. coax, CATV, fiber optic) and a suffix indicating the type of flame test it has passed and where it can be installed. Articles describing wire and cable products — including required cable markings — are listed in the chart to the right.

Impact of the NEC

Almost everyone involved with wire and cable is affected by the National Electrical Code. In particular, the following groups must incorporate NEC guidelines into their work: OEM engineers, wire and cable product engineers, distributors, installers, and architects.

Although NEC covers wire and cable installed in factories, office buildings, hotels, motels, apartment buildings, residences, and all cables which pass through any floor, wall, ceiling, or which travel in ducts, plenums, and other air handling spaces, each individual municipality, city, county, or state can decide whether or not they wish to adopt the 2002 NEC as law. Local authorities having jurisdiction enforce their own codes. They have the right to accept or refuse any installation in accordance with their own local laws. One of the organizations local inspectors rely on to test wire and cable is Underwriters Laboratories (UL).

Intended Uses of Appliance Wiring Materials (AWM)

In the past, AWM cable was incorrectly used to wire buildings—this was never its intended use.

AWM cable is intended for internal wiring of factory-assembled, listed appliances such as computers, business machines, ranges, washers, dryers, radios, and televisions.

In some cases, AWM cable may be used for external connection. In these situations, the user should be aware that AWM cable temperatures and voltage ratings may differ from NEC ratings.

NEC Article/Type	Description	Installation Type				
		Plenum	Riser	Commercial	Residential	
725	CL2	Class 2 cables	CL2P	CL2R	CL2	CL2X*
	CL3	Class 3 cables	CL3P	CL3R	CL3	CL3X*
	PLTC	A stand-alone class. This is a power limited tray cable — a CL3-type cable which can be used outdoors, is sunlight- and moisture-resistant and must pass the Vertical Tray flame test.	(none)	(none)	PLTC	(none)
760	FPL	Power limited, fire protective signaling circuit cable	FPLP	FPLR	FPL	(none)
770	OFC	Fiber cable also containing metallic conductors	OFCP	OFCR	OFCG, OFC	(none)
	OFN	Fiber cable only containing optical fibers	OFNP	OFNR	OFNG, OFN	(none)
800	CM	Communications	CMP	CMR	CMG, CM	CMX*
	MP	Multi-Purpose Cables	MPP	MPR	MPG, MP	(none)
820	CATV	Community antenna television and radio distribution system	CATVP	CATVR	CATV	CATVX**
830	BM	Network-powered broadband communications cable	BLP	BMR	BM	BLX

*Cable diameter must be less than 0.250" **Cable diameter must be less than 0.375"

C(UL) Certifications

UL/NEC-Approved cables may also be C(UL)/CEC-Approved as communications cables meeting the requirements of the Bi-National Standard CSA C22.2 No. 214/UL 444 and Section 60 of the Canadian Electrical Code, Part I (CEC). The C(UL) cable designation (and its meaning) would be one of the following:

- 1. **CMP** — Cable meeting CSA FT7 or NFPA 262 (UL 910);
- 2. **CMR** — Cable meeting UL 1666;
- 3. **CMG** — Cable meeting CSA FT4;
- 4. **CM** — Cable meeting UL 1685 (UL 1581, Sec. 1160) Vertical-Tray;
- 5. **CMX** — meeting UL 1581, Sec. 1080 (VW-1);
- 6. **CMH** — Cable meeting CSA FT1.

NOTE: The CSA flame tests are defined in CSA C22.2 No. 0.3 as follows:

FT1 Vertical Flame Test — per C.S.A. C22.2 No. 0.3-92 Para 4.11.1

A finished cable shall not propagate a flame or continue to burn for more than one (1) minute after five (5) fifteen (15) second applications of the test flame. There is an interval of fifteen (15) seconds between flame applications. The flame test shall be performed in accordance with Para 4.11.1 of Canadian Standards Association (CSA) Standard C22.2 No. 0.3. In addition, if more than 25% of the indicator flag is burned, the test cable fails.

FT4 Vertical Flame Test — Cables in Cable Trays per C.S.A. C22.2 No. 0.3-92 Para 4.11.4

The FT4 Vertical Flame Test — Cables in Cable Trays is similar to the UL-1685 Vertical Tray Flame Test, but is more severe. The FT4 test has its burner mounted at 20° from the horizontal with the burner ports facing up. The UL-1685 Vertical Tray has its burner at 0° from the horizontal. The FT4 samples must be larger than 13mm (.512") in diameter.

If not, then the cable samples are grouped in units of at least three (3) to obtain a grouped overall diameter of 13mm. The UL-1581 Vertical Tray does not distinguish on cable size. The FT4 has a maximum char height of 1.5 m (59") measured from the lower edge of the burner face. The UL-1685 has a flame height allowable up to approximately 78" measured from the burner.

FT6 Horizontal Flame & Smoke Test — per C.S.A. C22.2 No. 0.3-92 Appendix B

Belden® products passing the FT6 Horizontal Flame and Smoke Test are designated FT6 in the column where the trade number appears. This test is for cables which must pass a Horizontal Flame and Smoke Test in accordance with ANSI/NFPA Standard 262-1985 (UL-910). The maximum flame spread shall be 1.50 meters (4.92 ft.). The smoke density shall be 0.5 at peak optical density and 0.15 at maximum average optical density.

Cable Substitution Chart

Per 2005 NEC®

FIRE-RESISTANCE LEVEL

Test Requirements

NEC ARTICLES

800

725

760

820

770

830

PLENUM

4 (Highest)

NFPA 262
(UL-910
Steiner Tunnel)

RISER

3

UL-1666
(Vertical Shaft)

GENERAL PURPOSE

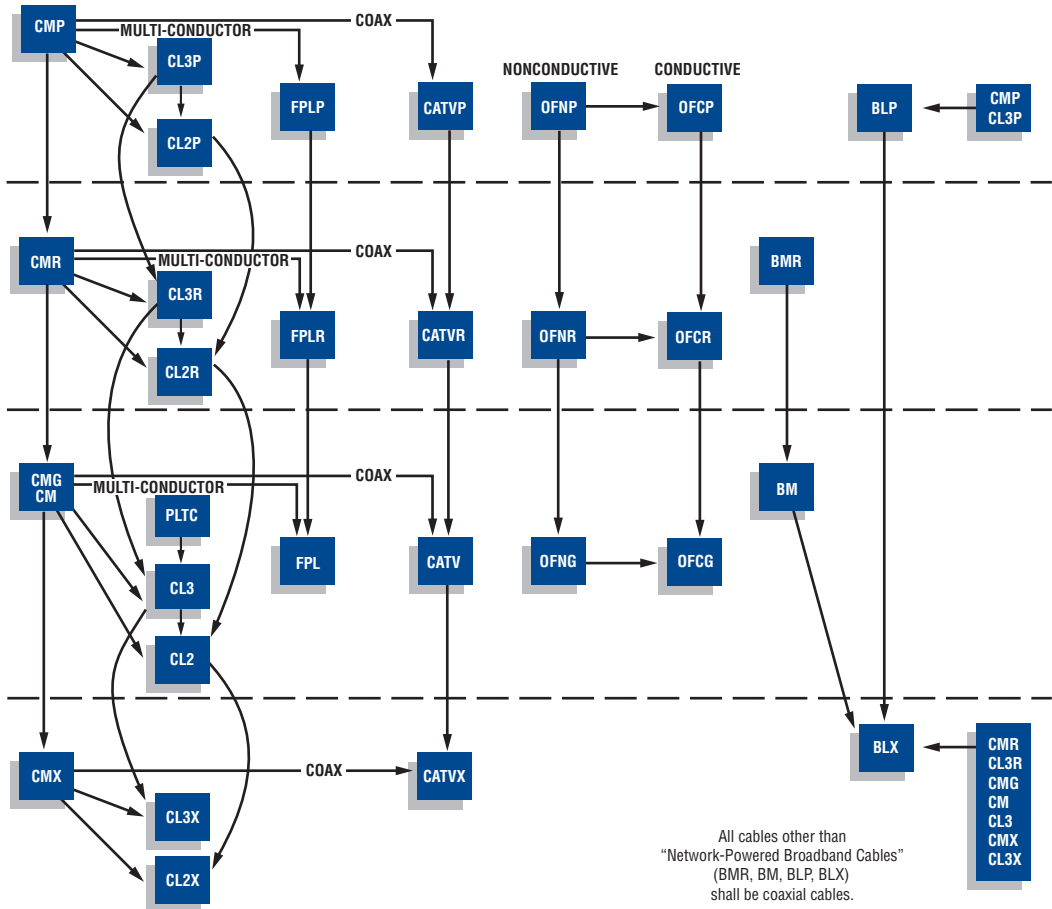
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UL-1685
Vertical Tray
or CSA FT4
(UL 1581)

RESIDENTIAL

1 (Lowest)

VW-1
(Vertical Flame)



→ Cables indicated can be substituted.

NEC Type	Definition
CMP, CMR, CMG, CM, CMX	Communications Cables
CL3P, CL3R, CL3, CL3X, CL2P, CL2R, CL2, CL2X	Class 2 and Class 3 Remote-Control, Signaling and Power Limited Cables
FPLP, FPLR, FPL	Power Limited Fire Alarm Cables
CATVP, CATVR, CATV, CATVX	Community Antenna Television and Radio Distribution Cables
OFNP, OFNR, OFNG, OFN	Nonconductive Optical Fiber Cables
OFCP, OFCR, OFCG, OFC	Conductive Optical Fiber Cables
PLTC	Power Limited Tray Cables
BMR, BM, BLP, BLX	Network-powered Broadband Communications Cable