

Flammability Ratings for Parallel Pair (Twinax) Copper Cables

The intent of this article is to provide a brief overview of Parallel Pair copper cable ratings and the environments for which they are intended.

JACKET TYPES

In the United States, NFPA-70, the National Electric Code (NEC), specifies the environment where each cable type is to be used. In addition, each cable type has an associated recommended test method. Typically, Siemon's parallel pair cabling is referred to as CL2, Class 2, Power Limited Circuit cable per NEC Article 725.

– CL2P (PLENUM):

Suitable for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics. Plenum is a commonly used term today in the construction and system installation industries because, in most cases, plenum-rated cables may be installed in air handling systems (air plenums) without expensive metallic conduit. Plenum cable can cut installation costs dramatically..

– CL2R (RISER):

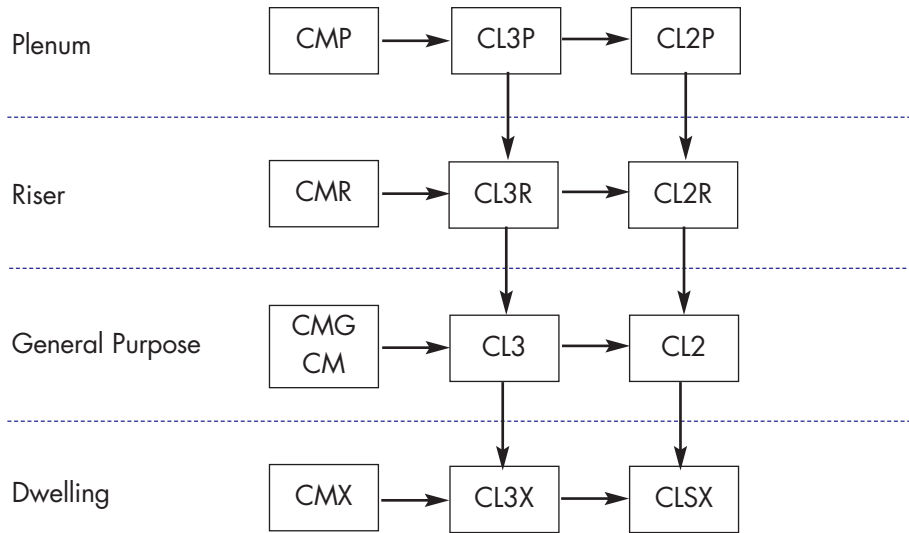
Riser describes cables having a lesser degree of flame retardancy than plenum, but may be used to convey signals vertically in shafts without requirement for metallic conduit. Suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor..

– CL2 (GENERAL PURPOSE):

Suitable for general-purpose communications use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire.

As the flammability and smoke requirements for cables become more stringent from CL2 to CL2P, the NEC also provides a cable substitution hierarchy (see Figure 1 and Table 1) to allow the use of more stringent requirement cables in place of a less stringent cable. For example, a CL2R or CL2P cable could be substituted for a CL2 cable.





Type CLM - Communications wires and cables

Type CL2 and CL3 - Class 2 and Class 3 remote control, signaling and power-limited cables.

A → **B** Cable A shall be permitted to be used in place of cable B

Figure 1

Cable Type	Permitted Substitutions
CL3P	CMP
CL2P	CMP, CL3P
CL3R	CMP, CL3P, CMR
CL2R	CMP, CL3P, CL2P, CMR, CL3R
CL3	CMP, CL3P, CMR, CL3R, CMG, CM
CL2	CMP, CL3P, CL2P, CMR, CL3R, CL2R, CMG, CM, CL3

Table 1

LSZH

In contrast to these jacket types is Low Smoke, Zero Halogen (LSOH or LSZH) cables. This is a European designation that has seen growing acceptance in the United States and Asia. The advantages of this construction are a reduction of smoke, which can impair visibility, and the elimination of exposure by both personnel and active equipment to halogenated (acid) gases.

LSZH cables are typically subjected to a three distinct tests: flame retardency (IEC 60332), halogen content (IEC 60754) and smoke emission (IEC 61034). For flame retardency, there are two different grades: IEC 60332-2-2 (formerly IEC 60332-1) for a single cable and the more stringent IEC 60332-3-24 (formerly IEC 60332-3c) for bundled cables. Requirements for which grade is applicable varies by country and local codes should be consulted.

VARYING PHILOSOPHIES

At the heart of the issue, the purpose of having requirements for jacket ratings is for life safety. This is broken down into two primary considerations: flame spread and smoke generation.

Flame spread parameters are defined to impede the ignition and subsequent spread of flame. Smoke generation, while often less discussed, is equally important as its' corrosive nature, in the form of halogens, can damage sensitive equipment and are also toxic.

Generally, there are two primary historical schools of thought as it relates to jacket ratings. In the United States, jacket ratings consider the inhibition of flame spread as the greatest concern, but subsequently release undesired halogen gases. In the European market, LSZH cables have primarily focused on the reduction of smoke and elimination of halogens, but have a lower resistance to ignition and flame spread.

It is not typically the choice of the end user to decide which philosophy may be better, but rather, because it is a life safety issue, it is national, regional or local codes that dictate the jacketing material that must be used.

HARMONIZATION OF STANDARDS

Unfortunately, the differences between NEC and LSZH ratings do not appear to harmonize any time soon. Additionally, as the testing methods for each are entirely different, there is no direct correlation between NEC and LSZH ratings. This often precludes the use of one cable in markets that specify the other.

SUMMARY

The cable rating to use on a project is, first and foremost, dictated by the local building authorities, followed by regional and national requirements. Always check on your local codes before committing to the design. These are hard requirements and are not open to interpretation. As in any case, the most important rule is to be well educated on the subject so that you can address any concerns that may arise.

ANNEX A - TWINAX FLAME RATING OVERVIEW

Rating	Reference	Definition
CL2P	NEC 2007 Article 725.154 (A)	Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CL2P or CL3P. Listed wires and cables installed in compliance with 300.22 shall be permitted. Listed plenum signaling raceways shall be permitted to be installed in other spaces used for environmental air as described in 300.22(C). Only Type CL2P or CL3P cable shall be permitted to be installed in these raceways.
CL2R	NEC 2007 Article 725.154 (B)	(1) Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CL2R or CL3R. Floor penetrations requiring Type CL2R or CL3R shall contain only cables suitable for riser or plenum use. Listed riser signaling raceways and listed plenum signaling raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type CL2R, CL3R, CL2P, or CL3P cables shall be permitted to be installed in these raceways. (2) Other cables as covered in Table 725.154(G) and other listed wiring methods as covered in Chapter 3 shall be installed in metal raceways, or located in a fireproof shaft having firestops at each floor.
CL2	NEC 2007 Article 725.154 (B)	(3) Type CL2, CL3, CL2X, and CL3X cables shall be permitted in one- and two-family dwellings. Listed general-purpose signaling raceways shall be permitted for use with Type CL2, CL3, CL2X, and CL3X cables.

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