

UL 2 Hour Fire-Rated Cable Code Requirements

UL 1424 Listed FPLR-CI-LS for Power-Limited Fire Alarm Cables: 300V / 105°C

1 Scope

1.1 These requirements cover 60 – 250°C (140 – 482°F) single- and multiple-conductor cables for use as fixed wiring within buildings (some are also marked for direct burial) principally for power-limited fire-alarm circuits as described in Article 760 and other applicable parts of the National Electrical Code (NEC). Cables covered by these requirements are:

- a) Type FPLP (plenum cable),
- b) Type FPLR (riser cable), and
- c) Type FPL (cable for other than plenum and riser uses in general and in trays).

1.2 The cables covered in these requirements are rated for 300 volts but are not so marked. See 44.1(h).

1.3 A cable that contains one or more electromagnetic shields may be surface marked or have a marker tape to indicate that it is "shielded". A cable that contains one or more optical-fiber members has "-OF" supplementing the type letters and is marked in accordance with 45.1(d). A cable may consist of or contain one or more coaxial members.

1.4 The overall jacket on a cable that has "sun res" or "sunlight resistant" in a surface marking or on a marker tape complies with a 720-h sunlight-resistance test.

1.5 A cable that has "dir bur", "direct burial", or "for direct burial" in a surface marking or on a marker tape complies with a 1000-lbf crushing test. Direct-burial cable with wire armor, a metal braid, interlocked metal armor, or a smooth or corrugated metal sheath has a jacket over the metal covering.

1.6 Smoke and fire considerations are as follows for the cables covered in these requirements:

- a) **TYPE FPLP CABLE** – Cable that is intended for installation in accordance with section 760-154(A) of the National Electrical Code (ANSI/NFPA 70) in a duct, plenum, or other space used to transport environmental air without the cable being enclosed in a raceway in that space is to be tested for smoke and flame characteristics in accordance with the National Fire Protection Association Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, ANSI/NFPA 262. A cable that complies exhibits a maximum flame-propagation distance that is not greater than 5 ft, 0 inch or 152 cm, a peak optical density of smoke produced of 0.50 or less (32 percent light transmission), and an average optical density of smoke produced of 0.15 or less.
- b) **TYPE FPLR CABLE** – Cable that is intended for use in vertical runs in a shaft, or for installations in which the cable penetrates more than one floor, as specified in section 760-154(B) of the National Electrical Code ANSI/NFPA 70. This cable is to be tested for flame-propagation characteristics in accordance with the Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts, UL 1666. A cable that complies has a flame-propagation height less than 12 ft, 0 inch or 366 cm and temperatures are 850.0°F (454.4°C) or less at a height of 12 ft, 0 inch or 366 cm.
- c) **TYPE FPL CABLE** – Type FPL cable complies with a 70,000 Btu/h (20.5 kW) vertical-tray flame test. The cable manufacturer chooses one of the following tests:
 - 1) **THE UL TEST REFERENCED IN 23.2.1** – This paragraph applies the test method described as the UL Flame Exposure (smoke measurements are not applicable) in the Standard Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables, UL 1685, to cable that is surface marked or designated by a marker tape as "FPL". A cable of a given construction shall not exhibit char that reaches the upper end of any specimen (a maximum of 8 ft, 0 inch or 244 cm).
 - 2) **THE FT4/IEEE 1202 TEST REFERENCED IN 23.3.1** – This paragraph applies the test method described as the FT4/IEEE 1202 Type of Flame Exposure (smoke measurements are not applicable) in the Standard Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables, UL 1685. This test differs from the UL tests in loading (more cables are used, with small cables bundled, and the spacing between cables or bundles is limited), burner angle, and failure criterion. For compliance, this test damages less than 150 cm (59 inches) of cable. A cable that complies either is not marked or it bears the designation "FT4/IEEE 1202" or "FT4" legible on or through the outer surface or on a marker tape [see marking in 44.1(i).d].

UL 13 Listed CL3R-CI-LS for Power-Limited Circuit Cables; 300V / 105°C

1 Scope

1.1 These requirements cover 60 – 250°C (140 – 482°F) single- and multiple-conductor power-limited circuit cables for use as fixed wiring within buildings (some are also marked for direct burial) principally for Class 3 and Class 2 circuits as described in

Article 725 and other applicable parts of the National Electrical Code (NEC). Cables covered by these requirements are:

- a) Types CL3P and CL2P (plenum cables),
- b) Types CL3R and CL2R (riser cables),
- c) Types CL3 and CL2 (commercial cables for other than plenum, riser, or tray uses),
- d) Types CL3X and CL2X (cables for limited use), and
- e) Type PLTC (cable for non-plenum and non-riser Class 3 and Class 2 circuits in general and in trays).

1.2 Cables for Class 3 circuits are rated for 300 volts but are not so marked. Cables for Class 2 circuits do not have a voltage rating. See 47.1(h).

1.3 A cable that contains one or more electromagnetic shields may be surface marked or have a marker tape to indicate that it is "shielded". A cable that contains one or more optical-fiber members has "-OF" supplementing the type letters and is marked in accordance with 48.1(d). A cable may consist of or contain one or more coaxial members.

1.4 The overall jacket on a cable that has "sun res" or "sunlight resistant" in a surface marking or on a marker tape complies with a 720-h sunlight-resistance test. The overall jacket on all Type PLTC cable is required to comply with this 720-h test, so Type PLTC cable may be marked "sun res" or "sunlight resistant" but is not required to be so marked.

1.5 A cable that has "dir bur", "direct burial", or "for direct burial" in a surface marking or on a marker tape complies with a 1000-lbf crushing test. Direct-burial cable with wire armor, a metal braid, interlocked metal armor, or a smooth or corrugated metal sheath has a jacket over the metal covering.

1.6 Smoke and fire considerations are as follows for the cables covered in these requirements:

a) TYPE CL3P and CL2P CABLES – Cables that are intended for installation in accordance with section 725.82 (A) of the National Electrical Code, ANSI/NFPA 70, in a duct, plenum, or other space used to transport environmental air without the cables being enclosed in a raceway in that space are to be tested for smoke and flame characteristics in accordance with the National Fire Protection Association Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, ANSI/NFPA 262. A cable that complies exhibits a maximum flame-propagation distance that is not greater than 5 ft, 0 in or 152 cm, a peak optical density of smoke produced of 0.50 or less (32 percent light transmission), and an average optical density of smoke produced of 0.15 or less.

b) TYPE CL3R and CL2R CABLES – Cables that are intended for use in vertical runs in a shaft, or for installations in which the cables penetrate more than one floor, as specified in Section 725.82 (B) of the National Electrical Code, ANSI/NFPA 70, are to be tested for flame-propagation characteristics in accordance with the Standard for Test for Flame-Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts, UL 1666. A cable that complies has a flame-propagation height less than 12 ft, 0 in or 366 cm and temperatures are 850.0°F (454.4°C) or less at a height of 12 ft, 0 in or 366 cm.

c) TYPE CL3 and CL2 CABLES – Type CL3 and CL2 general-use cables comply with a 70,000 Btu/h (20.5 kW) vertical-tray flame test. The cable manufacturer chooses one of the following tests:

1) THE UL TEST REFERENCED IN 28.2.1 – This paragraph applies the test method described as the UL Flame Exposure (smoke measurements are not applicable) in the Standard for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables, UL 1685, to cable that is surface marked or designated by a marker tape as "CL3" or "CL2". For compliance, this test damages less than 8 feet (244 cm) of cable.

2) THE FT4/IEEE 1202 TEST REFERENCED IN 28.3.1 – This paragraph applies the test method described as the FT4/IEEE 1202 Type of Flame Exposure (smoke measurements are not applicable) in the Standard for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables, UL 1685. This test differs from the UL test in loading (more cables are used, with small cables bundled, and the spacing between cables is limited), burner angle, and failure criterion. For compliance, this test damages less than 150 cm (59 in) of cable. A cable that complies either is not marked or it bears the designation "FT4/IEEE 1202" or "FT4" legible on or through the outer surface or on a marker tape [see marking in 47.1(i)].

d) TYPE CL3X and CL2X CABLES – Type CL3X and CL2X cables comply with the VW-1 vertical-specimen flame test. The cable is not marked "VW-1".

e) TYPE PLTC CABLE – Type PLTC tray cable complies with a 70,000 Btu/h (20.5 kW) vertical-tray flame test. The cable manufacturer chooses the test in (c)(1) or (c)(2). This test is applied to cable that is surface marked or designated by a marker tape as "PLTC".

1.7 The overall jacket on Type PLTC cable is a "gas/vapor-tight continuous sheath" in the sense discussed in sections 501.15 (D) and 501.15 (E) of the National Electrical Code, ANSI/NFPA 70. Cables that are surface marked "-ER" are for use as exposed runs between a cable tray and utilization equipment where the cables are continuously supported and protected against physical damage using mechanical protection such as struts, angles, or channel.

1.8 With certain exceptions, as noted in 1.9, Type CL3X and CL2X cables are required by the NEC to be used with protection such as raceway. The Type CL3 and CL2 and other cables covered in these requirements that are not required by the NEC to be used in raceway are capable of use without the physical protection of raceway but may be pulled into conduit or installed in other raceway.

1.9 Type CL3X and CL2X cables are limited by the NEC to use in unconcealed spaces in which the exposed length of cable does not exceed 10 ft or 3.05 m, and in raceway. These NEC limitations do not apply to Type CL3X and CL2X cables that are smaller in diameter than 0.25 in or 6.35 mm and are used in a one-, two-, or multi-family dwelling.

1.10 These requirements do not cover cables that contain conductors for electric-light, power, or Class 1 circuits. These requirements do not cover optical-fiber cables that do not contain any electrical conductors. These requirements do not cover communication cables (see the Standard for Communications Cables, UL 444) or cables for power-limited fire-alarm circuits (see the Standard for Cables for Power-Limited Fire-Alarm Circuits, UL 1424). These requirements do not cover vault-lacing cable, which is for use in concrete as part of a theft-alarm system.

1.11 These requirements do not cover the optical or other performance of any optical-fiber member or group of such members.

UL 444 Listed CMR-CI-LS for Communication Cable; 300V / 105°C

1 Scope

1.1 This standard applies to 60 – 250°C single- or multiple-conductor jacketed or unjacketed, integral or nonintegral cables and single or multiple coaxial cables for telephone and other communication circuits such as voice, data, and audio for on-premise customer systems. These cables may contain one or more optical fiber members. For the purpose of this standard, a coaxial cable or coaxial member conductor is a single conductor with a shield. For the purpose of this standard, a single- or multiple-conductor unjacketed cable is a cross-connect wire.

1.2 This standard applies to communications cables that are intended primarily for installation in accordance with Section 60 of the Canadian Electrical Code Part I, and Article 800 of the National Electrical Code (NEC), ANSI/NFPA 70. They are rated for 300 V applications, but are not so marked. Note: See Annex a for a complete list of wire types covered by this Standard and the specific electrical codes for which they are intended.

1.3 This standard does not apply to communications cords.

1.4 In Canada, the Type "-CI" circuit integrity markings are not recognized by the Canadian Electrical Code, Part I. In the US, Type CMH is not recognized in the NEC.

1.5 If a value for measurement is followed by a value in other units in parenthesis, the second value may be only approximate. The first stated value is the requirement.

Riser Rated per UL1666

1 Scope

1.1 This is a fire test for determining values of flame propagation height for electrical and optical-fiber cables that are for installation vertically in shafts or in vertical runs that penetrate one or more floors.

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1.2 The purpose of this test is to determine whether the flame propagation characteristics of these "riser" cables are in accordance with the National Electrical Code.

1.3 This test does not investigate the toxicity or corrosivity of the products of combustion or decomposition.

1.4 This test does not cover the construction requirements for any cable or the electrical, optical, and other performance requirements for any cable.

Certified to ANSI/ UL 2196 (Tests for Fire Resistive Cables) per UL FHJR.R27557

1 Scope

1.1 The intent of this Standard is to evaluate the integrity of power, control, instrumentation, and data cables for their ability to maintain circuit integrity when subjected to standard fire test exposure and associated hose stream test.

1.2 The power, control, instrumentation, and data cables covered by this Standard are intended to comply with the following requirements:

In Canada:

Canadian Electrical Code and the National Building Code of Canada

In the United States:

National Electrical Code, and/or the National Fire Alarm and Signaling Code, and/or the Standard for Fixed Guideway Transit and Passenger Rail Systems, and/or the Standard for Road Tunnels, Bridges, and Other Limited Access Highways.

1.3 Power, control, and instrumentation cables are subjected to the fire exposure in accordance with CAN/ULC-S101, Standard Methods of Fire Endurance Tests of Building Construction and Materials, and ANSI/UL 263, Standard for Fire Tests of Building Construction and Materials. During the fire test, cables are continuously energized at their maximum rated voltage or maximum utilization voltage (power cables); or at their maximum utilization voltage (control and instrumentation cables) and evaluated for circuit integrity. Insulation resistance measurements are also taken to quantify leakage current. Following the fire test, the assembly shall be subjected to a hose stream test.

1.4 Data cables are subjected to the fire exposure in accordance with CAN/ULC-S101, Standard Methods of Fire Endurance Tests of Building Construction and Materials, and ANSI/UL 263, Standard for Fire Tests of Building Construction and Materials. During the fire tests, the data cables are evaluated for their ability to maintain error free data transfer and retrieval at the specified protocol and data rates. Following the fire test, the assembly shall be subjected to a hose stream test.

1.5 The fire exposure and hose stream tests are not intended to be representative of all fire conditions and impact conditions, respectively. It is likely that conditions will vary with changes in the amount, nature, distribution of fire loading, ventilation, compartment size and configuration, and heat conducting and dissipating characteristics of the compartment in which the cables are installed. These requirements provide a relative measure of fire performance of comparable assemblies under these specified fire exposure conditions. It is possible that any variation from the construction or operating condition tested, such as size, method of assembly and materials, will substantially change the performance characteristics of the cables.

1.6 The standardized fire and hose stream exposures for comparing the performance of cables represents one factor in determining the acceptability of cables for use in specific applications.

1.7 The construction and operation of the furnace and the general test conditions are intended to be in accordance with the requirements in CAN/ULC S101, Standard Methods of Fire Endurance Tests of Building Construction and Materials, and ANSI/UL 263, Standard for Fire Tests of Building Construction and Materials.

Authorities Having Jurisdiction (AHJ) should always be consulted before installation.