UL 2024

STANDARD FOR SAFETY

Cable Routing Assemblies and Communications Raceways

UL Standard for Safety for Cable Routing Assemblies and Communications Raceways, UL 2024

Fifth Edition, Dated March 25, 2014

SUMMARY OF TOPICS

This revision of ANSI/UL 2024 dated November 17, 2021 was issued to incorporate the following changes:

– Revision of Definitions to Correlate with the Definitions in the 2020 NEC; 2.2, 2.3 and 2.4

– Specific Gravity of Materials; 10.1

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated June 25, 2021.

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Standard for Cable Routing Assemblies and Communications Raceways

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Fifth Edition

March 25, 2014

This ANSI/UL Standard for Safety consists of the Fifth Edition including revisions through November 17, 2021.

The most recent designation of ANSI/UL 2024 as an American National Standard (ANSI) occurred on November 17, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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CONTENTS

INTRODUCTION

CONSTRUCTION

PERFORMANCE

MARKINGS

APPENDIX A – GUIDE TO MOUNTING METHODS

INTRODUCTION

1 Scope

1.1 These requirements cover cable routing assemblies and fittings and communications raceways and fittings in accordance with the NFPA 70, National Electrical Code, NFPA 76, Standard for the Fire Protection of Telecommunications Facilities, and NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems:

a) Plenum – Evaluated for installation in other spaces used for environmental air in accordance with the National Electrical Code, ceiling cavity plenums and raised floor plenums in accordance with NFPA 76 and NFPA 90A as well as riser and general purpose applications.

b) Riser – Evaluated for installation in risers in accordance with the National Electrical Code and NFPA 76 as well as general purpose applications.

c) General Use – Evaluated for general purpose applications only in accordance with the National Electrical Code and NFPA 76

2 Glossary

2.1 For the purpose of this Standard the following definitions apply.

2.2 CABLE ROUTING ASSEMBLY – A single channel or connected multiple channels, as well as associated fittings, forming a structural system that is used to support and route communications wires and cables, optical fiber cables, data cables associated with information technology and communications equipment, Class 2, Class 3 and Type PLTC cables and power-limited fire alarm cables in plenum, riser, and general-purpose applications.

2.3 COMMUNICATIONS RACEWAY (Raceway, Communications) – An enclosed channel of nonmetallic materials designed expressly for holding communications wires and cables; optical fiber cables; data cable associated with information technology and communications equipment; Class 2, Class 3, and Type PLTC cables; and power-limited fire alarm cables, in plenum, riser and general-purpose applications.

2.4 RACEWAY – An enclosed channel designed expressly for holding wires, cables, or busbars, with additional functions as permitted in the National Electrical Code.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 References

4.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

CONSTRUCTION

5 General

5.1 The interior surfaces of signaling optical fiber raceways and communications raceways and cable routing assemblies shall be free from burrs and sharp edges that can damage cables. Compliance is to be determined by visual examination of the interior surfaces.

5.2 The distinguishing feature between raceways and cable routing assemblies is that raceways are enclosed and cable routing assemblies may or may not include enclosed sections. See 6.1.

6 Raceway System

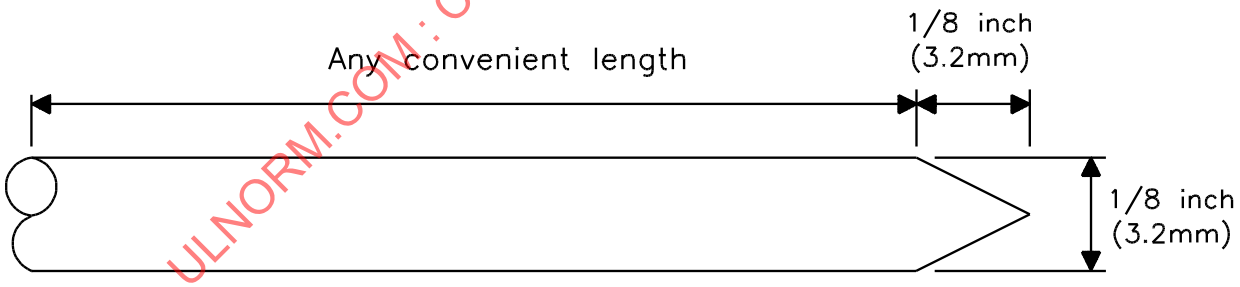
6.1 A raceway system shall enclose the cables installed therein and, when installed as intended, shall comply with the following:

a) There shall not be any openings that permit the probe illustrated in Figure 6.1 to be inserted for a distance greater than 1/8 inch (3.2 mm), and

b) The total area of openings shall not exceed 15 percent of the area of the surface in which the openings are located.

Figure 6.1

Accessibility Probe



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7 Raceway and Fitting Covers

7.1 A two-piece raceway or fitting shall have provisions for securing the cover to the base. A raceway cover shall be securely held in place by continuous grooves, flanges, or similar construction at intervals not exceeding 4 feet (1.2 m).

8 Fittings

8.1 Signaling raceway, optical fiber raceway and communications raceway fittings are investigated in combination with a specific raceway system. They are not intended to be interchangeable with other conduit or raceway systems as the raceways may differ in their inside and outside diameters.

8.2 Cable routing assembly fittings shall be evaluated in combination with a specific cable routing assembly system. They are not intended to be interchangeable with other conduit or cable routing assembly systems since the dimensions of the cable routing assemblies may differ.

PERFORMANCE

9 General

9.1 Communications raceways and fittings, and cable routing assemblies and fittings are to be subjected to the tests summarized in Table 9.1.

Exception: Cable routing assembly fittings and communications raceway fittings molded of the same material that has previously been subjected to the appropriate flame test in a length of cable routing assembly or communications raceway need not be subjected to a flame test.

Table 9.1
Test programs for cable routing assemblies and communications raceways

Construction	Test	Section
Rigid Cable Routing Assemblies and Communications Raceways	Identification of Materials	10
Rigid Cable Routing Assemblies	Plenum, Riser or General Use Flame	11A, 12, 13
Rigid Communications Raceways	Plenum, Riser or General Use Flame	11 or 11A, 12, 13
Pliable Communications Raceways[a]	Identification of Materials	10
	Plenum, Riser or General Use Flame	11 or 11A, 12, 13
	Heat Shock	14
	Cold Bend	15
Pliable Cable Routing Assemblies	Identification of Materials	10
	Plenum, Riser or General Use Flame	11A, 12, 13
Raceway and Cable Routing Assembly Fittings	Identification of Materials	10
	Plenum, Riser or General Use Flame	11A, 12, 13

[a] A pliable raceway or cable routing assembly is a raceway or cable routing assembly that is intended to be bent by hand without the use of a tool.

10 Identification of Materials

10.1 The infrared spectrum of the materials used in the cable routing assemblies, communications raceways, and fittings shall be determined in accordance with the methods described in the Standard for Polymeric Materials – Short Term Property Evaluations, UL 746A.

11 Test for Flame Propagation and Smoke Density Values of Communications Raceways (Plenum)

11.1 General

11.1.1 This is a fire test for determining values of flame-propagation distance and optical smoke density for communications raceways that are to be installed in other spaces used to transport environmental air, ceiling cavity plenums and raised floor plenums. The test shall be conducted in accordance with NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

11.1.2 To be acceptable, each of the following is to be exhibited:

a) The maximum flame-propagation distance shall not be greater than 5.0 ft, 0 inches (152 cm) beyond the initial 4.5 ft (137 cm) test flame.

b) The peak optical density of the smoke produced shall be 0.50 or less (32 percent light transmission).

c) The average optical density of the smoke produced shall be 0.15 or less.

11.1.3 *Deleted*

11.2 Apparatus

11.2.1 Test chamber

11.2.1.1 *Deleted*

11.2.2 Smoke measurement

11.2.2.1 *Deleted*

11.2.3 Temperature measurement

11.2.3.1 *Deleted*

11.3 Test specimens

11.3.1 Communications raceway specimens in 24 ft (7.32 m) lengths are to be installed in a single layer across the bottom of the cable tray. The specimens are to be laid into the tray in parallel, straight rows without any space between adjacent specimens other than that needed for fasteners described in 11.3.3. The number of specimens is to be sufficient to fill the tray as determined by dividing 11.25 inches (286 mm) by the communications raceway outer diameter using a diameter tape or equivalent, with the result of the division rounded off to the nearest higher whole number of specimens that fit considering the presence of fasteners. If a nonmetallic pull tape is provided, it is to remain in place within the specimens during the test.

Exception: A nonmetallic pull tape that has previously been evaluated to NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, need not be included in the test specimen.

11.3.2 The communications raceway specimens are to be placed on a galvanized wire cloth supported by the tray. The wire cloth is to be fabricated from 0.047 inch (1.19 mm) diameter wire and have 3/64 inch

(1.2 mm) openings. Individual lengths of specimen are to be fastened to the screen with fasteners as described in 11.3.3.

11.3.3 Bare copper tie wires not larger than 18 AWG (nominal wire cross section of 1620 cmil or 0.823 mm^2) may be used to fasten specimens to the wire cloth and rungs of the tray wherever a tie is necessary to keep a specimen in contact with the rung, straight and parallel with all of the other specimens and to minimize movement during the test. A tie is not to be used in any manner that alters the ability of the specimen to transmit gases and/or vapor longitudinally through the core of the specimen.

11.3.4 Properties applicable to identification of the communications raceway specimens are to be determined and recorded.

11.4 Calibration of test equipment

11.4.1 *Deleted*

11.5 Test procedure

11.5.1 *Deleted*

11.6 Report

11.6.1 The report is to include all of the following for each test:

a) A detailed description of the specimens tested.

b) The number of lengths used as specimens for the test.

c) The value of maximum flame propagation.

d) The values of the peak optical density and average optical density.

e) The graph of the optical density of the smoke generated during the test versus time for the duration of the test. Optical density may be obtained by computer-assisted computation of the logarithm to the base 10 of the light-transmission data.

f) Observations of the condition of the test specimens after completion of the test.

11A Test for Flame Propagation and Smoke Density Values of Cable Routing Assemblies and Communications Raceways (Plenum)

11A.1 General

11A.1.1 This is a fire test for determining values of flame spread index and smoke developed index for cable routing assemblies and communications raceways that are to be installed in other spaces used to transport environmental air, ceiling cavity plenums and raised floor plenums. The test shall be conducted in accordance with the Standard for Test for Surface Burning Characteristics of Building Materials, UL 723.

Exception: While the test specified in Section 11A is the only test method to determine whether or not a cable routing assembly may be plenum rated, it is to be considered as an alternate test to NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, when qualifying communications raceways for a plenum rating.

11A.1.2 To be acceptable, each of the following is to be exhibited:

a) The flame spread index shall not be greater than 25.

b) The smoke developed index shall not be greater than 50.

11A.2 Report

11A.2.1 The report is to include all of the following for each test:

a) A detailed description of the specimens tested.

b) The number of lengths used as specimens for the test.

c) The flame spread index.

d) The smoke developed index.

e) Observations of the condition of the test specimens after completion of the test.

12 Test for Flame Propagation of Cable Routing Assemblies and Communications Raceways (Riser)

12.1 General

12.1.1 This is a fire test for determining values of flame-propagation height for cable routing assemblies and communications raceways that are to be installed vertically in shafts. The test shall be conducted in accordance with Standard for Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts, UL 1666.

12.1.2 To be acceptable, each of the following is to be exhibited:

a) The flame-propagation height shall not equal or exceed 12 ft, 0 inches (3.66 m).

b) The temperature of any thermocouple at the 12 ft, 0 inches (3.66 m) height shall not exceed 850.0°F (454.4°C).

c) The difference between the flame propagation heights obtained with the two sets of cable routing assembly or communications raceway specimens shall not be greater than 15 percent.

Exception: If the difference between the flame propagation heights of the two sets of cable routing assembly or communications raceway specimens exceeds 15 percent, a third set of cable routing assembly or communications raceway specimens is to be tested. The flame propagation height obtained with the third set of raceway specimens shall not equal or exceed 12 ft, 0 inches (3.66 m), and the temperature of any thermocouple shall not exceed 850.0°F (454.4°C).

12.1.3 *Deleted*

12.2 Apparatus

12.2.1 Fire test chamber

12.2.1.1 *Deleted*

12.2.2 Burner apparatus

12.2.2.1 *Deleted*

12.2.3 Temperature and flow measurement

12.2.3.1 *Deleted*

12.3 Test specimens

12.3.1 Two sets of specimens of each cable routing assembly or communications raceway construction are to be tested. Each set is to consist of multiple 17-1/2 ft (5.33 m) specimen lengths of the raceway or cable routing assembly. If a nonmetallic pull tape is provided, it is to remain in place within the specimens during the conditioning and test.

Exception No. 1: A third set of specimens may be tested as noted in 12.1.2.

Exception No. 2: A nonmetallic pull tape that has previously been evaluated to NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, need not be included in the test specimen.

12.3.2 The raceway and cable routing assembly and communications raceway specimens are to be conditioned for 48 hours in air that is at a temperature of 23.0 ±3.0°C (73.4 ±5.4°F) and a relative humidity of 50 ±5 percent.

12.3.3 The cable routing assembly or communications raceway lengths are to be installed through both slots against the long sides of the slots that are closest to the ignition flame. The cable routing assembly or communications raceway lengths are to be in a single layer that fills the center 12 inches (305 mm) of the long side. The number (N) of cable routing assembly or communications raceway lengths (rounded to the next lower whole number) to be used in a given test is to be determined by means of the following formula, in which, for round raceways, D is the outside diameter of the raceway in inches (or in millimeters divided by 25.4), and, for non-round raceways, D is the smallest dimension of the raceway diameter:

$$N = \frac{12}{D}$$

12.4 Test procedure

12.4.1 *Deleted*

12.5 Report

12.5.1 The report is to include, but need not be limited to, the following items for each test:

a) A detailed description (construction) of the test raceway or cable routing assembly.

b) The number of cable routing assembly or communications raceway lengths that constitute the set of test specimens.

c) A graph (test curve) of flame height in feet and inches (or meters and centimeters) on the vertical axis versus time of exposure in minutes on the horizontal axis. The maximum flame height observed rounded to the nearest 6 inches (15 cm) is the flame propagation height for the set of cable routing assembly or communications raceway specimens tested.

d) Temperature (in degrees F) of the nine thermocouples throughout the test.

e) The maximum continuous damage height on the cable routing assembly or communications raceway specimens and the kinds of cable routing assembly or communications raceway damage.

13 Vertical-Tray Flame Test for Cable Routing Assemblies and Communications Raceways (General Use)

13.1 General

13.1.1 This is a flame test for determining the suitability of cable routing assemblies and communications raceways for use in general purpose installations. The test apparatus shall be conducted in accordance with the requirements in the Standard for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables, UL 1685.

13.1.2 To be acceptable, damage shall not reach the upper end of any specimen after being subjected to 20 minutes of flame.

13.1.3 *Deleted*

13.2 Apparatus

13.2.1 *Deleted*

13.3 Test specimens

13.3.1 Two sets of specimens of each cable routing assembly or communications raceway construction are to be tested. Each set is to consist of multiple 96 inches (2438 mm) specimen lengths fastened in a single layer in the tray by means of steel wire at their upper and lower ends and at two other equally spaced points along their lengths, with each specimen vertical. As many specimens (nominally six) are to be installed in the tray as will fit spaced 1/2 cable routing assembly or communications raceway diameter apart filling the center 6 inches (150 mm) of the tray width. If a nonmetallic pull tape is provided, it is to remain in place within the specimens during the test.

Exception: A nonmetallic pull tape that has previously been evaluated to NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, need not be included in the test specimen.

13.4 Test procedure

13.4.1 *Deleted*

13.5 Report

13.5.1 The report is to include, but need not be limited to, the following items for each test:

a) The time in seconds that the specimens continue to flame following removal of the burner flame.

b) The total length of damage to each specimen.

13.5.2 The maximum height of damage to the cable routing assembly or communications raceway is to be determined by measuring the blistering, char, and other damage upward from the bottom of the vertical tray but ignoring soot that can be removed with a cloth after the specimens and tray have cooled to room temperature.

13.6 Communications raceway fittings

13.6.1 A communications raceway fitting is to be subjected to the test described in 13.1 – 13.5 as modified below.