UL 1660

STANDARD FOR SAFETY

Liquid-Tight Flexible Nonmetallic Conduit

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UL Standard for Safety for Liquid-Tight Flexible Nonmetallic Conduit, UL 1660

Sixth Edition, Dated January 30, 2019

Summary of Topics

This revision of ANSI/UL 1660 dated July 31, 2026 includes the following changes in requirements:

– Increase of Wet Location Limit for LFNC above 60 °C; 5.10.1, 5.10.4, 6.1.3, and Table 9

– No. 50-2/20 unbleached cotton braid tape; 5.15.4

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

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated May 8, 2026.

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Preface

This is the harmonized CSA Group and ULSE standard for Liquid-Tight Flexible Nonmetallic Conduit. It is the third edition of CSA C22.2 No. 227.2.1 and the sixth edition of UL 1660. This edition of CSA C22.2 No. 227.2.1, supersedes the previous editions published in 1993 and 2014. This edition of UL 1660 supersedes the previous edition published on 2014. This harmonized standard has been jointly revised on July 31, 2026. For this purpose, CSA Group and ULSE are issuing revision pages dated July 31, 2026.

This harmonized standard was prepared by CSA Group and ULSE. The efforts and support of the Technical Harmonization Committee 23A LFNC Working Group, of the Council on the Harmonization of Electrotechnical Standards of the Nations of the Americas (CANENA), are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

While ANCE continues to participate in the technical development of this trinational standard, the ANCE logo has been removed from the title page as standards cannot be formally published in Mexico at this time.

This standard was reviewed by the CSA Subcommittee on ICCM01-Nonmetallic Conduit, Tubing and Fittings under the jurisdiction of the CSA Technical Committee on Wiring Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the Technical Committee. This standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

Level of harmonization

This standard uses the IEC format but is not based on, nor is it considered equivalent to, an IEC standard.

This standard is published as an equivalent standard for CSA Group and ULSE.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

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Reasons for differences from IEC

The THSC determined the safe use of electrical liquid-tight flexible conduit and fittings is dependent on the design and performance of the conduit and cable systems with which they are intended to be installed. Significant investigation is required to assess safety and system compatibility issues that may lead to harmonization of traditional North American electrical conduit and cable fittings with those presently addressed in the known IEC standards. The THSC agreed such future investigation might be facilitated by completion of harmonization of the North American standards for electrical liquid-tight flexible conduit and fittings.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

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Liquid-Tight Flexible Nonmetallic Conduit

1 Scope

1.1 These requirements cover liquid-tight flexible nonmetallic conduit in the 3/8 – 4 (12 – 103) trade sizes of Type LFNC-A (Layered), Type LFNC-B (Integral), and Type LFNC-C (Corrugated) constructions. The conduit is intended for installation in accordance with the National Electrical Code (NEC), the CE Code, Part 1, and the Mexican Electrical Code, NOM-001-SEDE. The values in parentheses are metric trade designators of conduit.

1.2 Conduit covered by this Standard is intended for use in wet, dry, or oily locations at a maximum of 60°C (140°F), unless otherwise marked. (See Section 6.)

1.3 Fittings for liquid-tight flexible nonmetallic conduit are covered in UL 514B, CSA C22.2 No. 18.3, or NMX-J-017-ANCE.

2 Definitions

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

LIQUID-TIGHT FLEXIBLE NONMETALLIC CONDUIT – A conduit that is resistant to the ingress of vapors, machine oils and other liquids, and solids, and can be bent by hand without other assistance, and is intended to flex throughout its life.

TYPE LFNC-A (Layered) – A liquid-tight conduit with a smooth seamless inner core and cover bonded together with one or more reinforcement layers between the core and cover.

TYPE LFNC-B (Integral) – A liquid-tight conduit with a smooth inner surface with integral reinforcement within the conduit wall.

TYPE LFNC-C (Corrugated) – A liquid-tight conduit with corrugated internal and external surfaces without integral reinforcement within the conduit wall.

3 General

3.1 Reference publications

3.1.1 Where reference is made to any Standards, such reference shall be considered to refer to the latest editions and revisions thereto available at the time of printing, unless otherwise specified.

ANCE Standards

NMX-E-208-CNCP
Plastics industry – Determination of characteristics of plastic conduit under external loads using parallel plates – Test method

NMX-E-029-CNCP
Plastics industry – Impact resistance for conduit and fittings – Test method

NMX-J-017-ANCE
Fittings for Cables and Tubing – Specifications and Test Methods

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NMX-J-178-ANCE
Wires and Cables – Ultimate Strength and Elongation of Insulation, Semiconducting Shields and Jackets of Electrical Conductors – Test Method

NMX-J-417-ANCE
Wires and Cables – Convection Laboratory Ovens for Evaluation of Electrical Insulation – Specifications and Test Methods

NMX-J-553-ANCE
Wires and Cables – Weather Resistance of Insulation or Jacket of Electrical Conductors – Test Method

NMX-J-565-3-ANCE
Safety Requirements – Flammability of Plastic Materials for Parts in Devices and Equipment – Test Methods

NOM-001-SEDE
Standard for Electrical Installations

CSA Group Standards

Note: For products intended for use in Canada, general requirements are given in CAN/CSA-C22.2 No. 0.

C22.1
CE Code, Part I

C22.2-No. 0
General Requirements – Canadian Electrical Code, Part II

CAN/CSA-C22.2 No. 0.17
Evaluation of Properties of Polymeric Materials

C22.2 No.18.3
Conduit, Tubing, and Cable Fittings

C22.2 No. 211.0
General Requirements and Methods of Testing for Nonmetallic Conduit

UL Standards

UL 94
Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

UL 514B
Conduit, Tubing, and Cable Fittings

ANSI/NFPA Standards

ANSI/NFPA 70
National Electrical Code (NEC)

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ASTM Standards

ASTM D412
Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers – Tension

ASTM D2122
Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

ASTM D2412
Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

ASTM D2444
Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)

ASTM D5025
Standard Specification for Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials

ASTM D5207
Standard Practice for Confirmation of 20-mm (50-W) and 125-mm (500-W) Test Flames for Small-Scale Burning Tests on Plastic Materials

ASTM D5423
Standard Specification for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation

ASTM G155
Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials

3.2 Units of measurement

3.2.1 The values given in SI (metric) units shall be normative. Any other values given shall be for information purposes only.

4 Construction

4.1 General

4.1.1 Conduit shall be essentially circular in cross-section. The inside surface of conduit shall not have indentations (normal convolutions or corrugations shall not be considered indentations), projections, roughness, or other features that could damage or impede wires and cables being pulled into the conduit. The length of finished conduit is not specified. Spliced lengths of Type LFNC-B conduit shall be provided with a marking on the package. See 6.2.1(g).

4.2 Materials

4.2.1 Conduit shall be made entirely of nonmetallic materials. Each material used in conduit shall be compatible with all of the other materials used in the conduit and with any conductors or cable intended to be pulled into the conduit.

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4.3 Dimensions

4.3.1 Type LFNC-A conduit

4.3.1.1 The inside and outside diameters of finished Type LFNC-A conduit shall comply with Table 1.

4.3.1.2 Compliance of Type LFNC-A conduit with the minimum and maximum inside diameters shall be determined by means of the go and no-go limit gauges specified in Figure 1 and Table 1.

4.3.1.3 The average thickness and the minimum thickness at any point of the separate jacket of Type LFNC-A conduit shall not be less than indicated in Table 2. The thicknesses of Type LFNC-A conduit are not specified.

4.3.1.4 The average thickness of the separate jacket shall be determined from measurements on a specimen of the jacket that is at least 13 mm (1/2 in) wide, at least 125 mm (5 in) long, and prepared from the finished Type LFNC-A conduit by cutting the conduit through one wall longitudinally, followed by peeling or cutting and buffing the separate lining away and then removing the fibrous reinforcement. The longitudinal cut shall be clean and straight. The jacket shall be split, skived, or buffed to remove the irregularities left on its inside surface by the reinforcement. The specimen selected shall include the thinnest portion of the jacket as determined visually. Five readings shall be taken at different points along the length of the specimen. The average of these measurements shall be taken as the average thickness. The smallest of these measurements shall be taken as the minimum thickness at any point.

4.3.1.5 Compliance of Type LFNC-A conduit with the minimum and maximum outside diameters in Table 1 shall be determined when measured in accordance with ASTM D2122.

4.3.2 Type LFNC-B conduit

4.3.2.1 The inside and outside diameters of finished Type LFNC-B conduit shall comply with Table 3.

4.3.2.2 Compliance of Type LFNC-B conduit with the minimum and maximum inside diameters shall be determined by means of the go and no-go limit gauges specified in Figure 1 and Table 3.

4.3.2.3 The minimum thickness at any point of the flexible lining or jacket of Type LFNC-B conduit shall not be less than indicated in Table 4 when measured on the finished conduit between the convolutions formed by the rigid reinforcement. The flexible jacket or lining shall be reinforced, but this thickness is not specified. The smallest of at least three measurements made around the circumference of the conduit shall be taken as the minimum thickness at any point.

4.3.2.4 Compliance of Type LFNC-B conduit with the minimum and maximum outside diameters in Table 3 shall be determined when measured in accordance with ASTM D2122.

4.3.3 Type LFNC-C conduit

4.3.3.1 The minimum inside diameter of finished Type LFNC-C conduit shall comply with Table 5. Other dimensions are not specified.

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