



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

Fourth Edition, Dated February 16, 2004

Summary of Topics

Reaffirmation and Continuance of the Fourth Edition of the Standard for Liquid-Tight Flexible Nonmetallic Conduit, UL 1660, as an American National Standard.

As noted in the Commitment for Amendments statement located on the back side of the title page, UL and CSA Group are committed to updating this harmonized standard jointly. However, the revised pages dated April 19, 2013 will not be jointly issued by UL and CSA Group as these revision pages only address the ANSI reaffirmation of UL 1660, UL effective date information, and CSA Group's name and logo. No substantive changes are involved.

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 February 15, 2013.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the preface. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

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First Edition



Underwriters Laboratories, Inc.
UL 1660
Fourth Edition

Liquid-Tight Flexible Nonmetallic Conduit

February 16, 2004

(Title Page Reprinted: April 19, 2013)



ANSI/UL 1660-2008 (R2013)

Approved
by
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Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as “CSA Group”) and Underwriters Laboratories Inc. (UL). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or UL at any time. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and UL. CSA Group and UL will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

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This Standard is subject to periodic review, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquires@csagroup.org and include “Proposal for change” in the subject line: Standard designation (number); relevant clause, table, and/or figure number; wording of the proposed change; and rationale for the change.

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This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through April 19, 2013. The most recent designation of ANSI/UL 1660 as an American National Standard (ANSI) occurred on April 19, 2013. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

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 <http://csds.ul.com>.

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Preface

This is the common CSA Group and UL standard for *Liquid-Tight Flexible Nonmetallic Conduit*. It is the first edition of CSA C22.2 No. 227.2.1 and the fourth edition of UL 1660. The requirements of CSA Standard C22.2 No. 227.2, published in 1993, are superseded by this standard, for products covered in this standard, as indicated in the Scope of this standard. This edition of UL 1660 supersedes the previous edition(s) published on February 4, 2000. This common standard has been jointly revised on April 18, 2008.

This common standard was prepared by the CSA Group and Underwriters Laboratories Inc. (UL). 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.

This Standard was reviewed by the CSA Subcommittee C22.2 No. 227, 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 will be submitted to the Standards Council of Canada (SCC) for approval as a National Standard of Canada.

This standard has been approved by the American National Standards Institute (ANSI) as an American National Standard.

A UL standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

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 to be considered equivalent to, an IEC standard. This standard is published as an equivalent standard for CSA Group and UL.

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.

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

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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.

CSA Group effective date

The effective date for CSA Group will be announced through CSA Informs or a CSA Group certification notice.

UL effective date

As of April 19, 2013, all products Listed or Recognized by UL must comply with the requirements in this standard.

A UL effective date is one established by Underwriters Laboratories Inc. and is not part of the ANSI approved standard.

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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) and the Canadian Electrical Code (CEC), Part 1. 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 Clause 6.)

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

2 Definitions

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

LIQUID-TIGHT FLEXIBLE NONMETALLIC CONDUIT – A conduit that is liquid-tight, can be bent by hand without other assistance, and is intended to flex throughout its life.

TYPE LFNC-A (Layered) – A 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 conduit with a smooth inner surface with integral reinforcement within the conduit wall.

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

3 General

3.1 Components

3.1.1 Except as indicated in Clause 3.1.2, a component of a product covered by this Standard shall comply with the requirements for that component. A component shall comply with both the Underwriters Laboratories Inc. and Canadian Standards Association standards for the component.

3.1.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

3.1.3 A component shall be used in accordance with its rating established for the intended conditions of use.

3.1.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

3.2 Reference publications

3.2.1 Where reference is made to other publications, such reference shall be considered to refer to the latest edition and all amendments published to that edition up to the time when this Standard was approved.

CSA Standards

C22.1-02,
Canadian Electrical Code (CEC), Part I

CAN/CSA-C22.2 No. 0.17-00,
Evaluation of Properties of Polymeric Materials

C22.2 No.18.3-04,
Conduit, Tubing, and Cable Fittings

C22.2 No. 211.0-03,
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 70-2002,
National Electrical Code (NEC)

ASTM Standards

ASTM D 412-98a,
Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers – Tension

ASTM D 2412-96a,
Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

ASTM D 2444-99,
Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)