# UL 1696

## STANDARD FOR SAFETY

Mechanical Protection Tubing (MPT) and Fittings

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UL Standard for Safety for Mechanical Protection Tubing (MPT) and Fittings, UL 1696

Fourth Edition, Dated April 11, 2025

***Summary of Topics***

***This revision of ANSI/UL 1696 dated April 20, 2026 includes a correction to Figure 9. The revised Figure 9 from ballot dated October 4, 2024, was inadvertently not included in the new Fourth Edition dated April 11, 2025. Also included in this publish is an update to remove the ANCE logo from the title page and ANCE references from the Preface.***

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 revised requirements are substantially in accordance with Proposal(s) on this subject dated October 4, 2024 and January 17, 2025.

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Sixth Edition

ULSE Inc.
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# Standard for Mechanical Protection Tubing (MPT) and Fittings

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Approved American National Standard

ANSI/UL 1696-2025

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This ANSI/UL Standard for Safety consists of the Fourth Edition including revisions through April 20, 2026. The most recent designation of ANSI/UL 1696 as an American National Standard (ANSI) occurred on April 11, 2025. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

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**CONTENTS**

**Preface ..... 5**

1 Scope ..... 7
2 Referenced Publications ..... 7
3 Definitions ..... 9
4 General Requirements ..... 10
5 Construction ..... 10
5.1 General ..... 10
5.2 Nonmetallic MPT ..... 10
5.3 Composite MPT ..... 11
5.4 Dimensions ..... 11
5.5 Internal surface ..... 11
5.6 Fittings ..... 11
5.7 Clamps ..... 11
6 Tests ..... 11
6.1 Test specimens ..... 11
6.2 Pre-conditioning and test conditions ..... 12
6.3 Identification of materials ..... 12
6.4 Vertical flame ..... 12
6.5 Tension ..... 16
6.6 Flexibility ..... 17
6.7 Cold impact ..... 17
6.8 Weather resistance ..... 17
6.9 Flame test in cable trays – FT4 (optional) ..... 18
6.10 Pull-out ..... 18
6.11 Heat aging ..... 18
6.12 Liquid tightness ..... 19
6.13 Electrical resistance test ..... 20
6.14 Protective coating for ferrous metal MPT fittings, clamps and components ..... 20
7 Marking ..... 20
7.1 General ..... 20
7.2 MPT ..... 20
7.3 Fittings and clamps ..... 21
TABLES ..... 21
FIGURES ..... 23

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# Preface

This is the harmonized CSA Group and ULSE standard for Mechanical Protection Tubing (MPT) and Fittings. It is sixth edition of CSA C22.2 No. 227.3, and the fourth edition of UL 1696. This edition of CSA C22.2 No. 227.3 supersedes the previous edition of CSA C22.2 No. 227.3 published on March 31, 2021. This edition of UL 1696 supersedes the third edition of UL 1696 published on March 31, 2021. This harmonized standard has been jointly revised on April 20, 2026. For this purpose, CSA Group and ULSE are issuing revision pages dated April 20, 2026.

This harmonized standard was prepared by CSA Group and ULSE. The efforts and support of the conduit manufacturing industry and the Technical Harmonization Committee 23A, NMPT Working Group, of the Council on the Harmonization of Electrotechnical Standards for 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 Integrated Committee on 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 CSA 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.

### Reasons for Differences from IEC

The Technical Harmonization Committee determined the safe use of nonmetallic mechanical protection tubing and fittings is dependent on the design and performance of the raceway 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 nonmetallic tubing and

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fittings with those presently addressed in the known IEC standards. The THC agreed such future investigation might be facilitated by completion of harmonization of the North American standards for mechanical protection tubing 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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# Mechanical Protection Tubing (MPT) and Fittings

## 1 Scope

1.1 This Standard applies to nonmetallic or composite mechanical protection tubing (MPT), and nonmetallic, composite or metal fittings, and clamps used for the support, routing and mechanical protection of conductors, wires, and cables. The MPT, fittings, and clamps are intended to be used to interconnect separate component assemblies or consoles of electrical devices, such as robotics, medical or X-ray equipment. The mechanical protection afforded the internal wiring contained within the tubing is considered equivalent to the protection provided by a type SJT flexible cord. Mechanical protection tubing (MPT) may be submitted without fittings, clamps, etc.

1.2 The MPT, fittings, and clamps covered by this Standard are not intended for use as a wiring method in accordance with NFPA 70, National Electrical Code (NEC), CSA C22.1, Canadian Electrical Code (CE Code), Part I and NOM-001-SEDE Standard for Electrical Installations.

1.3 This Standard does not include standard trade sizes. The MPT, fittings, and clamps from different manufacturers are not interchangeable unless the combination of MPT, fittings, and clamps are determined to be in accordance with this Standard.

1.4 This Standard does not apply to tubing with slit or split wall constructions, electrical nonmetallic tubing, liquid-tight flexible non-metallic conduit, flexible metal conduit, liquid-tight flexible metal conduit, jacketed or unjacketed metallic conduit, or EMI/RFI shielding conduits.

This Standard does not apply to fittings for use with cable or conduit, liquid-tight flexible nonmetal conduit, electrical nonmetallic tubing, flexible metal conduit, liquid-tight flexible metal conduit, jacketed or unjacketed metallic conduit, or EMI/RFI shielding conduits and strain-relief of a fitting.

NOTE 1: Insulating bushings to provide strain-relief for flexible cord and single conductors are covered in the Standard for Insulating Bushings, UL 635, or the Standard for Conduit, Tubing, and Cable Fittings, CSA C22.2 No. 18.3 / UL 514B / NMX-J-017-ANCE.

NOTE 2: Flexible aluminum and steel conduit is covered in the Standard for Flexible Metal Conduit, UL 1 or Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit, CSA C22.2 No. 56.

NOTE 3: Liquid-tight flexible metal conduits are covered in the Standard for Liquid-Tight Flexible Metal Conduit, UL 360, or Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit, CSA C22.2 No. 56.

NOTE 4: Fittings for use with cable and conduit are covered in the Standard for Conduit, Tubing, and Cable Fittings, CSA C22.2 No. 18.3 / UL 514B / NMX-J-017-ANCE.

NOTE 5: Liquid-tight flexible nonmetallic conduit is covered in the Standard for Liquid-Tight Flexible Nonmetallic Conduit, CSA C22.2 No. 227.2.1 / UL 1660 / NMX-J-764-ANCE.

NOTE 6: Electrical Nonmetallic Tubing is covered in the Standard for Electrical Nonmetallic Tubing, UL 1653 / CSA C22.2 No. 227.1 / NMX-J-851-ANCE.

## 2 Referenced Publications

2.1 For undated references to Standards, 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. For dated references to Standards, such reference shall be considered to refer to the dated edition and all revisions published to that edition up to the time the Standard was approved.

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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 Calibration of 20 and 125 mm 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 for Nonmetallic Materials*

CSA C22.1, *Canadian Electrical Code (CE Code), Part I*

CSA C22.2 No. 0, *General requirements – Canadian Electrical Code, Part II*

CSA C22.2 No. 0.17:22, *Evaluation of Properties of Polymeric Materials*

CSA C22.2 No. 18.3-12 (R2022), *Conduit, Tubing, and Cable Fittings*

CSA C22.2 No. 94.2-20, *Enclosures For Electrical Equipment, Environmental Considerations*

CSA C22.2 No. 211.0-03 (R2022), *General Requirements and Methods of Testing for Nonmetallic Conduit*

CSA C22.2 No. 227.1:19 (R2023), *Electrical Nonmetallic Tubing*

*National Building Code of Canada, 2010*

NOM-001-SEDE, *Standard for Electrical Installations*

NMX-J-017-ANCE, *Conduit, Tubing and cable Fittings – Specifications and Test Methods*

NMX-J-235-2-ANCE, *Enclosures For Electrical Equipment, Environmental Considerations*.

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

NMX-J-851-ANCE, *Electrical Nonmetallic Tubing*

UL 50E, *Enclosures For Electrical Equipment, Environmental Considerations*

UL 514B, *Conduit, Tubing, and Cable Fittings*

UL 746A, *Polymeric Materials – Short Term Property Evaluations*

UL 746B, *Polymeric Materials – Long Term Property Evaluations*

UL 1653, *Electrical Nonmetallic Tubing*

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## 3 Definitions

3.1 The following definitions apply in this Standard:

3.2 CLAMP – An external device used to secure, but not support, MPT.

3.3 COMPOSITE FITTING – A fitting constructed of both metal, other than screws and the like, and nonmetallic materials. For example, a nonmetallic body with a metal thread.

NOTE: The presence of screws, nuts, washers and unexposed metallic sleeves for screws should not be the sole means to change the classification of a fitting from "nonmetallic" to "composite." These components generally are not likely to become energized in the event of a conductor fault so they are not subject to the test in 6.13 and a protective coating is not measured in accordance with 6.14.2.

3.4 COMPOSITE MPT – A tubing constructed of nonmetallic material with a rigid metallic reinforcement.

NOTE: Metal tubing with a polymeric jacket is not to be considered a composite MPT.

3.5 CONNECTOR – A fitting intended to terminate, secure, and support MPT to an enclosure, equipment or similar device.

3.6 CONVOLUTION – Intricate folds (i.e. corrugation) in the wall of the tubing that provide performance and flexibility characteristics dependent on the width and height dimensions for each fold.

3.7 COUPLING – A fitting intended to securely connect two lengths of MPT.

3.8 COUPLING, REDUCER – A fitting intended to join two different sizes of MPT.

3.9 ELBOW – A MPT Fitting design to change the direction of a system.

3.10 FITTING – A device, such as a coupling, connector, or elbow, that provides a means for securing MPT to an enclosure, splicing between lengths of MPT, or securing MPT to equipment that maintains the support and protection of the MPT.

3.11 GASKETS AND SEALS – A deformable material clamped or located between two surfaces to prevent the passage of gases, vapors, or liquids consisting of "O" rings, seats, shaft seals, flexible cellular material, sealing materials, facings and special forms.

3.12 GLOWING COMBUSTION – Combustion of a material in the solid phase without flame but with emission of light from the combustion zone.

3.13 LIQUID-TIGHT – A combination of MPT and fitting intended for use in wet locations and industrial environments that contain machine oils and coolants.

3.14 LOCKNUT – A component of a Connector intended to inhibit turning and to provide a secure joint.

3.15 MECHANICAL PROTECTION TUBING (MPT) – An enclosed channel of nonmetallic or composite construction that is intended to be repeatedly flexed throughout its life.

3.16 METAL FITTING – A fitting constructed completely of metal materials.

3.17 NONMETALLIC FITTING – A fitting constructed completely of nonmetallic materials.

NOTE: See note in 3.3.

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3.18 NONMETALLIC MPT – A tubing constructed completely of nonmetallic materials.

3.19 ROOM TEMPERATURE – 23 ±5 °C (73 ±9 °F) and a relative humidity of 50 ±10 %.

3.20 SEALING RING – A seal placed around a thread, and fitting used in conjunction with a locknut to provide a seal at a knockout in a box or enclosure.

3.21 WORKING TEMPERATURE – The temperature to which the MPT is subjected during its intended use.

## 4 General Requirements

4.1 MPT covered by this Standard is intended for use as a system with particular fittings or clamps in compliance with 5.6 and 5.7. When intended for use with clamps, MPT may be evaluated without identified particular fittings.

4.2 MPT and associated fittings are permitted to be designated for use in dry locations only or for dry and wet locations.

4.3 MPT and associated fittings intended for use in wet locations, including outdoors, are considered liquid-tight and shall comply with all applicable requirements including the tests in 6.8 and 6.12 and shall comply with the requirements for dry locations. See Markings in 7.

4.4 MPT and associated fittings intended only for use in dry locations need not be subjected to the tests in 6.8 and 6.12. See Marking in 7.

4.5 MPT, fittings, or clamps with metal components that will be exposed after installation and become energized in case of a conductor fault shall comply with the electrical resistance test in 6.13.

4.6 Working temperature of the MPT is 50 °C (122 °F) maximum and minus 18 °C (0 °F) minimum. Temperature ratings greater than 50 °C (122 °F) can be obtained according to the test in 6.11.

4.7 Where specific assembly techniques are required for fittings, instructions for proper assembly shall be provided with the fitting when shipped from the factory.

4.8 For products intended for use in Canada, general requirements are given in CSA C22.2 No. 0.

## 5 Construction

### 5.1 General

5.1.1 MPT shall be essentially circular in cross-section. The inside surface of MPT shall not have indentations (normal convolutions shall not be considered indentations), projections, roughness, or other features that could damage or impede wires and cables being pulled into the MPT. MPT may be supplied as a continuous or cut length.

### 5.2 Nonmetallic MPT

5.2.1 Nonmetallic MPT shall be:

a) A layered construction that consists of a jacket or lining, or both, that is integral to the nonmetallic flexible material, with or without a rigid nonmetallic reinforcement (core) embedded in the wall;

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