

## Extruded insulating tubing



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***Extruded insulating tubing***



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ICS 29.040.20

Standard for Safety for Extruded Insulating Tubing

Seventh Edition, Dated May 5, 2021

***Summary of Topics***

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The requirements are substantially in accordance with Proposal(s) on this subject dated September 20, 2020 and October 16, 2020.

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Underwriters Laboratories Inc.  
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## Extruded Insulating Tubing

May 5, 2021



ANSI/UL 224-2021



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## Preface

This is the harmonized CSA Group and UL standard for Extruded Insulating Tubing. It is the fourth edition of CSA C22.2 No. 198.1 and the seventh edition of UL 224. This edition of CSA C22.2 No. 198.1 supersedes the previous edition(s) published on March 6, 2006. This edition of UL 224 supersedes the previous edition published on March 6, 2006.

This harmonized standard was prepared by the CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the Technical Harmonization Committee 15C, Electrical Tubing and Sleeving Products, 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 on Insulation Systems, 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 to be considered equivalent to, an IEC standard.

This standard is published as an equivalent standard for CSA 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 Technical Harmonization Subcommittee identified the following standard as being within the scope of this standard: IEC 60684, Flexible Insulating Sleeving. IEC 60684 and CSA C22.2 No. 198.1/UL 224 are similar but not identical. Both standards cover multiple, but not identical, products and similar methods. The THC agreed to address the issues involved in the harmonization of these standards during the next revision of CSA C22.2 No. 198.1/UL 224.

### 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.

# Extruded Insulating Tubing

## 1 Scope

1.1 This Standard specifies the requirements for insulating tubing that is usually round in cross-section and that consists entirely of extruded compounds whose characteristic constituents are thermosetting, elastomeric, or thermoplastic polymers (see [Table 1](#) for materials and ratings). These requirements also cover heat-shrinkable and crosslinked tubing.

1.2 Tubing is intended for use only in air – in dry and damp locations – as part of the internal wiring of electrical devices and appliances in accordance with the Canadian Electrical Code, Part 1 (CE Code, Part 1) and ANSI/NFPA 70, National Electrical Code (NEC). It may be used for insulating one or more inadequately insulated conductors, bus bars, motor leads, transformer leads, terminal lugs, or small assemblies of electronic components. Tubing is not intended for use in contact with sharp edges, corners, or projections, or where subject to tension, compression, or repeated flexing. Tubing is not intended for use where it is feasible to employ a standard insulated conductor (appliance-wiring material) intended specifically for the purpose.

1.3 These requirements do not apply to fabric tubing, chemically dilated tubing, polymeric tubing extruded with reinforcement, or tubing intended only for mechanical protection.

1.4 The acceptability of tubing in any particular device or appliance depends upon its acceptability for continued use under the conditions that prevail in actual service. Accordingly, for a particular application, it will in some cases be necessary to employ tubing having features other than or in addition to those specified in these requirements. For example, tubing may be required to have a heavier wall thickness or a flat rather than a round cross-section; it may be required to have inherent resistance to the effects of immersion in water, oil, solvents, or other liquids (or their vapors); it may be required to be used in an environment conducive to the development of fungi and similar organisms.

## 2 Reference Publications and Definitions

### 2.1 Reference publications

For undated references to standards, such reference shall be considered to refer to the latest edition and all revisions 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.

### CSA Group

C22.1 No. 1:21  
*Canadian Electrical Code, Part I*

CAN/CSA C22.2 No. 0.17-00 (R2018)  
*Evaluation of Properties of Polymeric Materials*

C22.2 No. 2556:21  
*Wire and cable test methods*