



UL 248-1

STANDARD FOR SAFETY

Low-Voltage Fuses – Part 1: General Requirements

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UL Standard for Safety for Low-Voltage Fuses – Part 1: General Requirements, UL 248-1

Fourth Edition, Dated October 24, 2022

Summary of Topics

This new edition of ANSI/UL 248-1 dated October 24, 2022 is issued to incorporate editorial maintenance updates to the style, format, numbering, re-organization of content and to update references.

The requirements are substantially in accordance with Proposal(s) on this subject dated November 19, 2021.

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This ANSI/UL Standard for Safety consists of the Fourth Edition. The most recent designation of ANSI/UL 248-1 as an American National Standard (ANSI) occurred on October 24, 2022. 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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Preface

This is the harmonized ANCE, CSA Group, and UL standard for Low-Voltage Fuses – Part 1: General Requirements. It is the third edition of NMX-J-009/248/1-ANCE, the fourth edition of CSA C22.2 No. 248.1, and the fourth edition of UL 248-1. This edition of NMX-J-009-248/1-ANCE cancels the previous edition published in 2017. This edition of CSA C22.2 No. 248.1 supersedes the previous editions published in 1994, 2000, and 2011. This edition of UL 248-1 supersedes the previous edition published in 2017.

This harmonized standard was prepared by the Association of Standardization and Certification, (ANCE), CSA Group and Underwriters Laboratories Inc. (UL).

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

The present Mexican Standard was developed by the CT 32 from the Comité de Normalización de la Asociación de Normalización y Certificación, A.C., CONANCE, with the collaboration of the fuse manufacturers and users.

This standard was reviewed by the CSA Subcommittee on Fuses and Fuseholders, under the jurisdiction of the CSA Technical Committee on Industrial 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 the 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 is published as an identical standard for ANCE, CSA Group and UL.

An identical standard is a standard that is exactly the same in technical content except for national differences resulting from conflicts in codes and governmental regulations. Presentation is word for word except for editorial changes.

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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Low-Voltage Fuses – Part 1: General Requirements

1 Scope

1.1 This Standard applies to low-voltage fuses rated 1000 V or less, AC and/or DC, with interrupting ratings up to 300 kA (200 kA for Mexico). These fuses are intended to be used in accordance with the Canadian Electrical Code, Part I, CSA C22.1, NOM – 001, Mexican Electrical Code, and the National Electrical Code, NFPA 70.

1.2 This Standard and its subsequent Parts establish the characteristics, construction, operating conditions, markings, and test conditions for each of the fuse classes so that initial investigation and follow-up verification can be performed in an orderly manner. The titles of the Clauses in this Part 1 correspond to the similarly titled Clauses in subsequent Parts.

2 Referenced Publications

2.1 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.

2.2 When a reference is made to a code or standard, the product shall comply with the code or standard of the country in which the product is intended to be used.

2.3 The following publications are referenced in this Standard:

United States	Canada	Mexico
NFPA 70, National Electrical Code	CSA C22.1, Canadian Electrical Code, Part I	NOM – 001, Mexican Electrical Code
	CSA C22.2 No. 0, General Requirements – Canadian Electrical Code, Part II	

3 Units of Measurement

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

4 Definitions

4.1 Fuse

4.1.1 BODY – The part of the fuse which encloses the fuse elements and supports the contacts. Also referred to as cartridge, tube, or case.

4.1.2 CONTACTS – The external metallic parts of the fuse used to complete the circuit. Also referred to as ferrules, caps, blades, or terminals.

4.1.3 ELEMENT – The fusible portion of the fuse which acts, during an overcurrent condition, to clear the circuit; also referred to as a link.

4.1.4 FILLER – Material used to fill a section or sections of a fuse.

4.1.5 FUSE – A protective device which opens a circuit during specified overcurrent conditions by means of a current responsive element.

4.1.6 RENEWAL ELEMENT – The part of a renewable fuse that is replaced after interruption to restore the fuse to operating condition.

4.2 General terms

4.2.1 AMBIENT AIR TEMPERATURE – The temperature of the air surrounding the fuse. Measurement of the ambient air temperature is conducted according to [11.1.3](#).

4.2.2 BODY SIZE – The specified set of dimensions of fuses within a fuse class or system. Each individual size covers a given range of rated currents for which the specified dimensions of the fuse remain unchanged.

4.2.3 BRANCH CIRCUIT FUSE – A fuse which is suitable for protection of distribution systems, wiring, or equipment. Examples of branch circuit fuses are Classes R, J, L, T, and CC. A supplemental fuse, intended to protect equipment only, is not a branch circuit fuse.

4.2.4 CURRENT-LIMITING FUSE – A fuse that, within a specified overcurrent range, limits the clearing time at rated voltage to an interval equal to or less than the first major or symmetrical current loop duration; and limits the peak current to a value less than the available peak current.

4.2.5 HOMOGENEOUS SERIES OF FUSES – A series of fuse current ratings, within a given body size and of similar construction, such that one of the ratings of the series may be taken as representative of the series itself.

4.2.6 LOW MELTING POINT FUSE – A fuse that will open in an ambient air temperature of 200 °C when carrying 10 % of rated current.

4.2.7 MICROFUSE – A supplemental fuse, the body of which has no principal dimension exceeding 10 mm (0.4 in), excluding the leads or terminals.

NOTE: Principal dimensions are length, width, height, and diameter.

4.2.8 NON-INTERCHANGEABILITY – A condition which prevents the inadvertent interchange of fuses because of physical characteristics (slot, groove, pin, overall dimensions, and the like).

4.2.9 PLUG FUSE – A screw-in type fuse for use in an Edison Base, Type C tamper-proof, or Type S tamper-proof fuseholder.

4.2.10 RENEWABLE FUSE – A fuse which can be restored for service, after interruption, by the replacement of the renewal elements.

4.2.11 SUPPLEMENTAL FUSE – A fuse intended only for supplementary overcurrent protection where branch-circuit protection is not required.

4.2.12 TIME-DELAY FUSE – A fuse capable of carrying a specified overcurrent for a specified minimum time. Time-delay characteristics are verified by the overload and operation tests in the relevant subsequent Parts for certain fuse classes.

4.3 Characteristic quantities

4.3.1 **ARCING TIME** – The time from the instant the fuse element or link has melted and arcing is initiated, until final circuit interruption by the fuse.

4.3.2 **CLEARING TIME** – The time from the beginning of an overcurrent to final circuit interruption by the fuse. The clearing time is equal to the sum of the melting time and the arcing time.

4.3.3 **CONVENTIONAL FUSING CURRENT (I_f)** – The lowest specified current which causes a fuse to open within a specified (conventional) time.

4.3.4 **CONVENTIONAL NON-FUSING CURRENT (I_{nf})** – A specified current which a fuse is capable of carrying under specified conditions without opening.

4.3.5 **CONVENTIONAL TIME** – A specified time within which a fuse must open (or carry current) during a conventional current test.

4.3.6 **CURRENT-LIMITING RANGE** – The range of prospective currents from the threshold current to the interrupting current rating of a fuse.

4.3.7 **CURRENT RATING (I_n)** – The nominal rms AC or DC ampere rating, based on specified conditions, which is assigned to a fuse.

4.3.8 **I^2t (ampere-squared seconds)** – A measure of heat energy developed during fuse interruption from the initiation of an overcurrent until the fuse clears the circuit. " I^2 " stands for the square of the effective (rms) let-through current and " t " stands for the time of current flow in seconds. The term I^2t also applies during the melting or arcing portions of the clearing time and is referred to as melting or arcing I^2t respectively. Clearing I^2t is the sum of melting I^2t and arcing I^2t .

4.3.9 **INTERRUPTING RATING** – The highest prospective rms symmetrical alternating current or direct current which a fuse will interrupt under specified conditions verified by operation at rated voltage tests.

4.3.10 **MAXIMUM ENERGY** – A specified test condition which causes a fuse to experience maximum arc energy during interruption within the first 1/2 cycle.

4.3.11 **MELTING TIME** – The time from the initiation of a specified overcurrent to the instant when arcing of the element begins.

4.3.12 **PEAK ARC VOLTAGE** – The maximum instantaneous voltage across the fuse during the arcing time.

4.3.13 **PEAK LET-THROUGH CURRENT (I_p)** – The maximum instantaneous current through a fuse during interruption in its current-limiting range.

4.3.14 **PROSPECTIVE CURRENT** – The current that would flow in a circuit if a fuse therein were replaced by a shorting bar of negligible impedance. The prospective current is also referred to as the available current and is the quantity to which the interrupting rating, I^2t , and peak let-through current are normally referred.

4.3.15 **RECOVERY VOLTAGE** – The power frequency rms or DC voltage impressed upon the fuse after the circuit has been interrupted and after high frequency transients have subsided.