

UL 248-14

ISBN 0-7629-0564-6

Low-Voltage Fuses – Part 14: Supplemental Fuses

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UL Standard for Safety for Low-Voltage Fuses – Part 14: Supplemental Fuses, UL 248-14

Second Edition, Dated August 1, 2000

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New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing, Recognition, and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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This Standard consists of pages dated as shown in the following checklist:

Page	Date
1-14	August 1, 2000

**National Association of
Standardization and
Certification of the Electrical
Sector**

NMX-J-009/248/14-2000-ANCE
First Edition



CSA International
CSA C22.2 No. 248.14-00
Second Edition



**Underwriters Laboratories
Inc.**

UL 248-14
Second Edition



LOW-VOLTAGE FUSES – PART 14: SUPPLEMENTAL FUSES

August 1, 2000

Commitment for Amendments

This Standard is issued jointly by the National Association of Standardization and Certification of the Electrical Sector (ANCE), CSA International, and Underwriters Laboratories Incorporated (UL). Amendments to this Standard will be made only after processing according to the Standards writing procedures by ANCE, CSA, and UL.

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. 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.

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ISBN 1-55324-252-1

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ISBN 0-7629-0564-6

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CONTENTS

Preface4
Foreword (ANCE)5
Foreword (CSA)6
Foreword (UL)8
1 General9
1.1 Scope .....	.9
4 Classification .....	.9
5 Characteristics .....	.9
5.2 Voltage rating .....	.9
5.3 Current rating .....	.9
5.5 Interrupting rating .....	.9
5.6 Peak let-through current and clearing I^2t characteristics .....	.10
6 Marking .....	.10
6.1 Marking of fuses .....	.10
7 Construction .....	.11
7.1 Fuse dimensions .....	.11
8 Tests .....	.11
8.1 General .....	.11
8.2 Verification of temperature rise and current-carrying capacity .....	.12
8.3 Verification of overload operation .....	.13
8.4 Verification of operation at rated voltage .....	.13

Preface

This is the common UL, CSA, and ANCE Standard for *Low-Voltage Fuses – Part 14: Supplemental Fuses*. This is the second edition of UL 248-14, the second edition of CSA C22.2 No. 248.14-00 (superseding the first edition, published in 1994), and the first edition of NMX-J-009/248/14-2000-ANCE.

This Standard was prepared by a Technical Harmonization Committee comprised of members from Underwriters Laboratories, CSA International, the National Association of Standardization and Certification of the Electrical Sector, the end product manufacturers, and material suppliers. The efforts and support of the members of the Technical Harmonization Committee are gratefully acknowledged.

This Standard was reviewed by the CSA Subcommittee on Fuses and approved by the Technical Committee on Industrial Products under the jurisdiction of the CSA Strategic Resource Group.

This Standard will be submitted to the American National Standards Institute (ANSI) for publication as an American National Standard.

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 purpose.

Level of Harmonization

This trinational standard is published as an Identical Standard. An identical standard is a standard that is the same in technical content except for conflicts in Codes and Governmental Regulations. Presentation is word for word except for editorial changes.

Interpretations

The interpretation by the SDO (Standards Development Organization) of an identical standard shall be based on the literal text to determine compliance with the standard in accordance with the procedural rules of the SDO. If more than one interpretation of the literal text has been identified, a revision shall be proposed as soon as possible to each of the SDOs to more accurately reflect the intent.

UL Effective Date

This edition of the standard is now in effect.

CSA Effective Date

The effective date for CSA will be announced through either a *CSA Informs* or *CSA Certification Notice*.

ANCE Effective Date

The effective date for ANCE will be announced through the *Diario Oficial de la Federation (Official Gazette)* and is indicated on the cover page.

Foreword (ANCE)

The Present Mexican Standard was developed by the Low Voltage Fuses Subcommittee from the Comité de Normalización de la Asociación Nacional de Normalización y Certificación del Sector Eléctrico, A.C., CONANCE, with the collaboration of the fuse manufacturers and users.

ANCE is a National Organization for Standardization (ONN) registered by the DGN (Dirección General de Normas) in the electrical sector and household appliances which develops Mexican Standards (NMX) and collaborates in the development of the Mexican Official Standards (NOM), voluntary and mandatory standards, respectively.

The conformity assessment in accordance with ANCE Mexican Standards is responsibility of ANCE Certification Products Division.

The ANCE Certification Products Division is accredited by the EMA (Entidad Mexicana de Acreditación) in order to certificate a variety of products. The certification is carry out following the corresponding procedures established and developed by the Technical Committee of Certification in connection with the test reports performed in test labs accredited by the EMA.

The conformity assessment activities developed by ANCE cover quality systems, test lab and verification products.

Foreword (CSA)

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CSA Certification for a number of products is provided in the interest of maintaining agreed-upon standards of quality, performance, interchangeability and/or safety, as appropriate. Where applicable, certification may form the basis for acceptance by inspection authorities responsible for enforcement of regulations. Where feasible, programs will be developed for additional products for which certification is desired by producers, consumers or other interests.

In performing its functions in accordance with its objectives, CSA does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of the Association represent its professional judgement given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed.

Products in substantial accord with this Standard but which exhibit a minor difference or a new feature may be deemed to meet the Standard providing the feature or difference is found acceptable utilizing appropriate CSA Certification and Testing Division Operating Procedures. Products which comply with this Standard shall not be certified if they are found to have additional features which are inconsistent with the intent of this Standard. Products shall not be certifiable if they are discovered to contravene applicable laws or regulations.

Testing techniques, test procedures and instrumentation frequently must be prescribed by the CSA Certification and Testing Division in addition to the technical requirements contained in Standards of CSA. In addition to markings specified in the Standard, the CSA Certification and Testing Division may require special cautions, markings and instructions that are not specified by the Standard.

Some tests required by CSA Standards may be inherently hazardous. The Association neither assumes nor accepts any responsibility for any injury or damage that may occur during or as the result of tests, wherever performed, whether performed in whole or in part by the manufacturer or the Association, and whether or not any equipment, facility or personnel for or in connection with the test is furnished by the manufacturer or the Association.

Manufacturers should note that, in the event of the failure of the CSA Certification and Testing Division to resolve an issue arising from the interpretation of requirements, there is an appeal procedure: the complainant should submit the matter, in writing, to the Secretary of the Canadian Standards Association.

If this Standard is to be used in obtaining CSA Certification please remember, when making application for certification, to request all current Amendments, Bulletins, Notices and Technical Information Letters that may be applicable and for which there may be a nominal charge. For such information or for further information concerning CSA Certification please address your inquiry to Applications and Customer Service, CSA International, 178 Rexdale Boulevard, Toronto, Ontario M9W 1R3.

No Text on This Page

Foreword (UL)

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction which conflict with specific requirements of the Standard cannot be judged to comply with the Standard. A product employing materials or having forms of construction not addressed by this Standard may be examined and tested according to the intent of the requirements and, if found to meet the intent of this Standard, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

Low-Voltage Fuses – Part 14: Supplemental Fuses

1 General

NOTE –

This Part is intended to be read together with the Standard for Low-Voltage Fuses – Part 1: General Requirements, hereafter referred to as Part 1. The numbering of the Clauses in this Part corresponds to like numbered Clauses in Part 1. The requirements of Part 1 apply unless modified by this Part. For Clauses not shown below, refer to the Standard for Low-Voltage Fuses – Part 1: General Requirements, NMX-J-009/248/14-2000-ANCE ♦ CSA C22.2 No. 248.1 ♦ UL 248-1.

1.1 Scope

This Part applies to supplemental fuses rated 60 A or less intended only for supplementary overcurrent protection where branch circuit or equivalent applications are not involved. DC ratings are optional.

4 Classification

Supplemental fuses are constructed so they cannot be installed in fuseholders intended for fuses covered in the other Parts of the Low-Voltage Fuse Standard series. Time-delay ratings are optional.

5 Characteristics

5.2 Voltage rating

The DC voltage rating may be different from the AC rating.

5.3 Current rating

60 A or less

5.5 Interrupting rating

For AC – 10,000 A unless otherwise specified below.

The DC interrupting rating may be different from the AC rating.

- a) Microfuse: 50 A minimum interrupting rating
- b) A fuse rated 250 V ac may have a dual interrupting rating. This rating shall be 10,000 A at 125 V ac and a lower interrupting rating at 250 V ac as specified in Table A.

Table A – Interrupting ratings for dual interrupting rated fuses at 250 V ac

Current rating I_n , A	Minimum interrupting rating, A
0 – 1	35
1.1 – 3.5	100
3.6 – 10	200
10.1 – 15	750
15.1 – 30	1500

- c) Fuses rated less than 125 V ac may have an interrupting rating less than 10,000 A.
- d) Fuses with interrupting ratings greater than 10,000 A shall be rated 50,000 A or 100,000 A, AC.

5.6 Peak let-through current and clearing I^2t characteristics

Not specified.

6 Marking

6.1 Marking of fuses

All required markings shall appear on the smallest package.

The term "Supplemental Fuse" is the appropriate fuse classification, but it does not have to be marked. Neither a fuse nor its package shall bear a marking which states or implies that the fuse is current-limiting.

Except for microfuses, the minimum marking on the fuse shall be:

- a) the manufacturer's name, trademark, or both;
- b) current rating; and
- c) voltage rating.

For microfuses, the smallest package shall be marked with the required information, except the fuse shall be marked to indicate its current rating. Indication of current rating units, e.g. A, is not mandatory on the fuse. Color coding of microfuses is an acceptable type of marking and, when used, the applicable color code scheme shall be marked on the smallest package.

The designation "D" may be used as a substitute for "Time Delay" (for qualifying fuses only).

7 Construction

7.1 Fuse dimensions

The dimensions of a supplemental fuse are not specified, except envelope dimensions are given for the microfuse in Part 1, Clause 2.2.7.2.

8 Tests

8.1 General

8.1.1 Types of tests

Required test samples are shown in Table 1.

Table 1 – Number of supplemental fuses to be tested

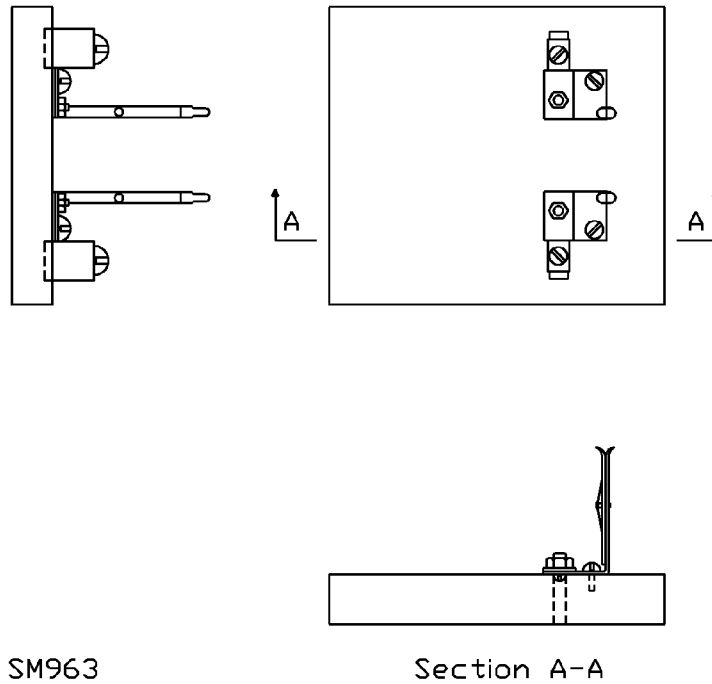
Test description	Samples	Notes
Verification of temperature rise and current-carrying capacity	3	–
Part 1, Table 4		
Test 1 – 1.35 I_N	3	a
Test 3 – 2.0 I_N	3	a
Test 4 – 2.0 I_N , time-delay fuses only	2	–
Part 1, Table 5		
Test 4a – 100 kA	1	d
Test 4b – 50 kA	1	d
Test 4c – ≤ 10 kA	5	c, d
Test 5b – 2 I_N	2	b, d
<p>^a Samples may be taken from verification of temperature rise and current-carrying capacity test.</p> <p>^b Required only for fuses which use a filler. May be combined with Part 1, Table 4, Test 3 – 2.0 I_N.</p> <p>^c Dual rated fuses in accordance with Clause 5.5(b) require two sets of samples. Tests shall be performed at 125 and 250 V ac.</p> <p>^d For DC tests, another set of samples of the same quantity shall be used.</p>		

8.2 Verification of temperature rise and current-carrying capacity

8.2.1.1 For microfuses, the wire specified in Part 1 may be of a smaller gauge if agreeable to all parties.

For all fuses with leads, the test fixture (see Figure A) shall be so arranged that each end of the fuse has a 12.7 mm (0.5 in) minimum length of lead in the test circuit.

Figure A – Example of test fixture for fuses with leads



8.2.3 Test method

1.0 I_n – Temperature rise and current-carrying capacity, I_{nf} .

For microfuses, a thermocouple shall be secured to the body. For other fuses, thermocouples shall be secured to the body and one contact.

8.2.4 Acceptability of test results

In addition to the requirements in Part 1: The maximum temperature rise on body or contact shall not exceed 75°C.

8.3 Verification of overload operation

Part 1, Table 4

Test 1 – 1.35 I_n . This test does not apply to microfuses.

Test 3 – 2.0 I_n . Maximum opening times are as follows:

30 A – 2 min

60 A – 4 min

Microfuses – 1 min

Test 4 – 2.0 I_n for time-delay fuses only.

For 0 – 3 A, the opening time is 5 s minimum.

8.4 Verification of operation at rated voltage

8.4.1 Arrangement of the fuse

For test circuits having a capacity of 10,000 A or less, the fuseholder shall be connected to the test terminals with two 0.9 m (36 in) leads of the following sizes:

Fuses rated 0 – 15 A	No. 14 AWG (2.2 mm ²)
16 – 30 A	No. 10 AWG (5.4 mm ²)
31– 60 A	No. 6 AWG (13.4 mm ²)

For test circuits having a capacity greater than 10,000 A, any wiring or bus connection used to connect the fuseholder to the test terminals shall be included in the test circuit calibration.

8.4.2 Test circuit characteristics

8.4.2.1 For AC circuits

The power factor for supplemental fuses shall be 0.70 – 0.80 unless otherwise specified as follows:

Microfuses: 0.95 – 1.0;

Fuses rated < 125 V ac: 0.85 – 1.0; or

Fuses with interrupting ratings > 10,000 A: 0.20 or less.

Lower power factors may be used if agreeable to all parties.

8.4.2.2 For DC tests

The manufacturers ratings shall be verified. For number of samples see Table 1.

8.4.4 Acceptability of test results

Fuses shall be readily removable from the fuseholder. A pinhole not exceeding 1.6 mm (0.063 in) is permitted in the flat portion of each end cap.