



UL 467

STANDARD FOR SAFETY

Grounding and Bonding Equipment

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UL Standard for Safety for Grounding and Bonding Equipment, UL 467

Tenth Edition, Dated March 22, 2013

Summary of Topics

This trinational Standard for Grounding and Bonding Equipment, UL 467, covers grounding and bonding equipment and harmonizes ANCE, CSA Group, and UL requirements.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated January 6, 2012 and October 26, 2012.

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The following table lists the future effective dates with the corresponding reference.

Future Effective Date	Reference
March 22, 2016	Annex C and D



Association of Standardization and Certification
NMX-J-590-ANCE
First Edition



CSA Group
CSA C22.2 No. 41-13
Sixth Edition



Underwriters Laboratories Inc.
UL 467
Tenth Edition

Grounding and Bonding Equipment

March 22, 2013



ANSI/UL 467-2013

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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 Tenth edition. The most recent designation of ANSI/UL 467 as an American National Standard (ANSI) occurred on March 22, 2013. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or effective date information.

The Department of Defense (DoD) has adopted UL 467 on June 12, 1987. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

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 harmonized ANCE, CSA Group, and UL standard for grounding and bonding equipment. It is the first edition of NMX-J-590-ANCE, the sixth edition of CSA C22.2 No. 41, and the tenth edition of UL 467. This edition of CSA C22.2 No. 41 supersedes the previous edition published in 2007. This edition of UL 467 supersedes the previous edition published in 2007.

This harmonized standard was prepared by the Association of Standardization and Certification (ANCE), the CSA Group, and Underwriters Laboratories Inc. (UL). The efforts and support of the Technical Harmonization Committee for Connectors, 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 Integrated Committee on Electrical Connectors, 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 approved by the American National Standards Institute (ANSI) as an American National 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 ANCE, 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 Technical Harmonization Committee identified one IEC standard, IEC 60364-5-54, that addresses grounding and bonding equipment included in the scope of this Standard, Electrical installations of buildings – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements, protective conductors and protective bonding conductors. This standard addresses the earthing arrangements, protective conductors, and protective bonding conductors in order to satisfy the safety requirements of the electrical installation. It has the status of a basic safety publication in accordance with IEC Guide 104.

The IEC standards for grounding and bonding equipment are recognized as being generally system specific. The THC determined that the safe use of grounding and bonding equipment is dependent on the design and performance of the grounding and bonding equipment in relation to the North American electrical codes with which they are intended to be installed.

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.

ANCE effective date

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

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 March 22, 2013, all products Listed or Recognized by UL must comply with the requirements in this standard except for annexes in the following list, which are effective March 22, 2016.

Annex C and Annex D

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

1 Scope

1.1 This Standard applies to grounding and bonding equipment for use in accordance with the *Canadian Electrical Code, Part I*, CSA C22.1, in Canada, the *National Electrical Code*, NFPA 70, in the United States, or the *Standard for Electrical Installations*, NOM-001-SEDE, in Mexico.

1.2 This Standard applies to the following grounding and bonding equipment:

- a) ground clamps, bonding devices, grounding bushings, water-meter shunts, grounding electrodes, and the like used in a grounding system;
- b) equipment for making electrical connections between
 - i) the grounding conductors used in electrical power systems, non-current-carrying metal parts of electrical equipment, armored grounding wires, metal raceways, and the like; and
 - ii) grounding electrodes;
- c) equipment for making electrical connections between
 - i) the grounding conductors used in telecommunications systems such as telephone, radio, CATV, network power broadband, and the like; and
 - ii) grounding electrodes;
- d) hospital grounding jacks and mating grounding cord assemblies (for Mexico and the United States, see Annex A);
- e) bonding devices for making electrical connections between
 - i) the hex head of a brass fitting used in a piping system in accordance with 250.104 of NFPA 70; and
 - ii) the grounding electrodes; and
- f) intersystem bonding terminations for connecting intersystem bonding and grounding conductors for other systems in accordance with NFPA 70.

Notes:

- 1) In Canada, "hospital grounding jacks" are not defined in CSA C22.1, *Canadian Electrical Code, Part I*.
- 2) In Canada, "mating ground cord assemblies" are covered in CSA C22.2 No. 21 and CSA C22.2 No. 42.

2 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.

ANCE (Association of Standardization and Certification)

NOM-001-SEDE
Standard for Electrical Installations

NMX-J-010-ANCE
Thermoplastic-Insulated Wires and Cables

NMX-J-017-ANCE
Conduit, Tubing and Cable Fittings

NMX-J-451-ANCE
Thermoset-Insulated Wires and Cables

NMX-J-543-ANCE
Wire Connectors

NMX-J-548-ANCE
Splicing Wire Connectors

CSA (Canadian Standards Association)

Note: For products intended for use in Canada, general requirements are given in CAN/CSA-C22.2 No. 0 and grounding and bonding requirements are given in CSA C22.2 No. 0.4.

C22.1-12
Canadian Electrical Code, Part I

CAN/CSA-C22.2 No. 0-10
General requirements – Canadian Electrical Code, Part II

C22.2 No. 0.4-04,
Bonding and grounding of electrical equipment

C22.2 No. 18.3
Conduit, tubing, and cable fittings

C22.2 No. 21-95 (R2004)
Cord sets and power supply cords

C22.2 No. 42-99 (R2004)
General use receptacles, attachment plugs, and similar wiring devices

C22.2 No. 51-09
Armoured cables

C22.2 No. 65-03
Wire connectors

C22.2 No. 188-04
Splicing wire connectors

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UL 4*Standard for Armored Cable***UL 44***Thermoset-Insulated Wires and Cables***UL 83***Thermoplastic-Insulated Wires and Cables***UL 486A-486B***Wire Connectors***UL 486C***Splicing Wire Connectors***UL 514B***Conduit, Tubing, and Cable Fittings***ASTM (American Society for Testing and Materials)****A 90/A 90M-01***Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings***A 653/A 653M-04a***Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process***IEEE (Institute of Electrical and Electronics Engineers)****IEEE 837-2002***Standard for Qualifying Permanent Connections Used in Substation Grounding***NFPA (National Fire Protection Association)****NFPA 70-2011***National Electrical Code (NEC)***3 Units of measurement**

The values given in SI (metric) units shall be normative, except for AWG/kcmil conductor sizes and other trade sizes. Any other values given shall be for information only.

4 Definitions

The following definitions apply in this Standard:

Bonding bushing – a bushing having one or more screws intended to provide the bonding function between the bushing and the enclosure (see Figure 1(c)).

Ground clamp – a device used for connection of a grounding conductor to a grounding electrode (see Figure 1(a)).

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Grounding bushing – a bushing having provision for the connection of a bonding or grounding conductor (see Figure 1(b)).

Note: A grounding bushing may also be provided with one or more screws intended to supplement the bonding function between the bushing and the enclosure.

Ground mesh – a copper wire mesh that is intended to be installed in ground or embedded in concrete and bonded to a grounding electrode system for the purpose of improving ground planes.

Intersystem bonding termination – a device that provides a means for connecting bonding conductor(s) for communications systems to the grounding electrode system.

Plate electrode – a metal plate, having a defined surface area, with a means for attachment to the system-grounding conductor.

Protective-type clamp – a ground clamp designed so that the grounding conductor and its connection will be effectively protected against mechanical damage.

Separable connector – a wire connector that is removable from the bushing with which it is used.

Strap-type clamp – a clamp constructed of perforated or expanded flexible metal suitable for assembly on pipe.

5 Components

A component shall comply with the ANCE, CSA Group or UL standards as appropriate for the country where the product is to be used.

6 Construction

6.1 General

6.1.1 A grounding or bonding device shall be constructed of metals or metal alloys that provide sufficient strength and rigidity to permit installation and use in the intended manner without either:

- a) adversely affecting the function of the device; or
- b) damaging the grounding or bonding conductor, the grounding electrode, or equipment to which the device is attached.

6.1.2 A grounding or bonding device marked for direct burial shall be provided with all screws necessary for assembly or connection of the device, and all components shall be constructed of:

- a) copper or a copper alloy containing not less than 80% copper;
- b) stainless steel; or
- c) materials other than aluminum and aluminum alloys, if investigated and found to be acceptable for the application.

Note: Among the factors to be taken into consideration when judging the acceptability of such materials are the

- a) *change of resistance across the bonding-grounding joint; and*

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