UL 50

STANDARD FOR SAFETY

Enclosures for Electrical Equipment, Non-Environmental Considerations

UL Standard for Safety for Enclosures for Electrical Equipment, Non-Environmental Considerations, UL 50

Fourteenth Edition, Dated February 29, 2024

Summary of Topics

This new Fourteenth Edition of ANSI/UL 50 dated February 29, 2024 includes (a) Optional Performance Tests for Certain Construction Requirements; (b) Revisions to Table 6.6; (c) Corrections to Annex B and Annex F; (d) Revision of Sketch F of Figure 6.10; (e) Addition of Annex G

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated December 16, 2022 and June 23, 2023.

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Third Edition

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UL 50
Fourteenth Edition

Enclosures for Electrical Equipment, Non-Environmental Considerations

February 29, 2024

ANSI/UL 50-2024

Commitment for Amendments

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This ANSI/UL Standard for Safety consists of the Fourteenth Edition. The most recent designation of ANSI/UL 50 as an American National Standard (ANSI) occurred on February 29, 2024. 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 ULSE standard for Enclosures for Electrical Equipment, Non-Environmental Considerations. It is the fourth edition of NMX-J-235/1-ANCE, the third edition of CAN/CSA C22.2 No. 94.1, and the fourteenth edition of UL 50. This edition of NMX-J-235/1-ANCE supersedes the previous edition published on October 16, 2015. This edition of CSA C22.2 No. 94.1 supersedes the previous edition published in 2015. This edition of UL 50 supersedes the previous edition published on October 16, 2015.

This harmonized standard was prepared by the Association of Standardization and Certification (ANCE), CSA Group, and ULSE. The efforts and support of the CANENA Technical Harmonization Committee 70/31 Enclosures Working Group are gratefully acknowledged.

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 CDI Control y Distribución Industrial from the Comité de Normalización de la Asociación de Normalización y Certificación, A.C., CONANCE, with the collaboration of the enclosures manufacturers and users.

This Standard was reviewed by the CSA Integrated Committee on Enclosures, 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 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 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 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 THSC investigated and found no existing IEC standards or work programs covering the scope of the products in this Standard.

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.

ENCLOSURES FOR ELECTRICAL EQUIPMENT, NON-ENVIRONMENTAL CONSIDERATIONS

1 Scope

1.1 This standard applies to enclosures for electrical equipment intended to be installed and used in non-hazardous locations in accordance with the Canadian Electrical Code, Part I, CSA C22.1, the provisions of the National Electrical Code, NFPA 70, and the provisions of Mexico's Electrical Installations, NOM-001-SEDE, as follows:

a) Enclosures for indoor locations, Types 1, 2, 5, 12, 12K, and 13; and

b) Enclosures for indoor or outdoor locations, Types 3, 3X, 3R, 3RX, 3S, 3SX, 4, 4X, 6, and 6P.

1.2 This standard covers the non-environmental construction and performance requirements for enclosures to provide a degree of protection to personnel against incidental contact with the enclosed equipment. The additional environmental construction and performance requirements for enclosures are located in CSA C22.2 No. 94.2, UL 50E, and NMX-J-235/2-ANCE (See Annex B, Ref. No. 15), which are intended to be used in conjunction with this standard.

1.3 Where an individual product standard contains requirements that are at variance with those of this standard, the requirements of the individual product standard take precedence.

1.4 In the United States and Mexico, cabinets and cutout boxes and junction and pull boxes are covered by Clauses 9 and 10 of this Standard. In Canada, junction boxes, cutout boxes, and pull boxes are covered by CSA C22.2 No. 40 and are not covered by this standard. See Annex B, Ref. No. 12.

1.5 Outlet boxes having a volume of not more than 1640 cm^3 (100 in^3) are covered by CSA C22.2 No. 18.1, NMX-J-023/1-ANCE, and the UL 514 series (see Annex B, Ref. No. 6 and 13) and are not covered by this standard.

1.6 In Canada and the United States, swimming pool type junction boxes are covered by CSA C22.2 No. 89 and UL 1241 (see Annex B, Ref. No. 11) and are not covered by this standard.

2 Units of Measurement

2.1 The values given in SI (metric) units shall be normative. Any other values given shall be for informational purposes only.

3 Components

3.1 Except as indicated in 3.2, a component of a product covered by this standard shall comply with the requirements for that component. See Annex A for a list of standards covering components generally used in the products covered by this standard. A component shall comply with the ANCE, CSA Group, or UL standards as appropriate for the country where the product is to be used.

3.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

3.3 A component shall be used in accordance with its rating established for the intended conditions of use.

3.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

4 References

4.1 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 up to the time the standard was approved.

4.2 In Canada, general requirements are as indicated in Annex B, Ref. No. 10.

5 Definitions

5.1 The following definitions apply in this standard:

5.2 ACCESSIBLE EDGES – Edges that are subject to contact by persons installing, using, or maintaining the product.

5.3 BOX – That portion of an enclosure not including the cover or door.

5.4 BREAKOUT – A portion of a wall of a cast or molded enclosure so fashioned, usually by the use of one or more rings of reduced thickness of the wall material, that the material within the outer perimeter of the ring to be removed may be readily broken away at the time of installation in order to provide an opening similar to that provided by a knockout.

5.5 CABINET – See Annex B, Ref. No. 17.

5.6 COVER – An unhinged portion of an enclosure that covers an opening.

5.7 CUTOUT BOX – See Annex B, Ref. No. 17.

5.8 DEGREE OF PROTECTION – The extent of protection provided by an enclosure against access to parts which result in a risk of injury, ingress of foreign solid objects, and/or ingress of water as verified by standardized test methods.

5.9 DESIGN TESTS – Tests to demonstrate performance of a product designed to applicable standards; they are not intended to be production tests.

5.10 DOOR – A hinged portion of an enclosure that covers an opening.

5.11 ENCLOSURE – A surrounding case constructed to provide a degree of protection to personnel against access to hazardous parts and to provide a degree of protection to the enclosed equipment against specified environmental conditions. The specific enclosure types, their applications, and the environmental conditions for which they are designed to protect against are as follows:

TYPE 1 – Enclosures constructed for indoor use to provide a degree of protection to personnel against access to hazardous parts and to provide a degree of protection against ingress of solid foreign objects (falling dirt).

TYPE 2 – Enclosures constructed for indoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt); and to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (dripping and light splashing).

TYPE 3 – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, and snow); and that will be undamaged by the external formation of ice on the enclosure.

TYPE 3R – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, and snow); and that will be undamaged by the external formation of ice on the enclosure.

TYPE 3S – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, and snow); and for which the external mechanism(s) remain operable when ice laden.

TYPE 3X – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, and snow); that provide an increased level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure.

TYPE 3RX – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, and snow); that provide an increased level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure.

TYPE 3SX – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, and snow); that provide an increased level of protection against corrosion; and for which the external mechanism(s) remain operable when ice laden.

TYPE 4 – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose-directed water) and that will be undamaged by the external formation of ice on the enclosure.

TYPE 4X – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts ; to provide a degree of protection against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose-directed water); that provides an increased level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure.

TYPE 5 – Enclosures constructed for indoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt and settling airborne dust, lint, fibers, and flyings); and to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (dripping and light splashing).

TYPE 6 – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, hose-directed water and the entry of water during occasional temporary submersion at a limited depth); and that will be undamaged by the external formation of ice on the enclosure.

TYPE 6P – Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, hose-directed water, and the entry of water during prolonged submersion at a limited depth); and that will be undamaged by the external formation of ice on the enclosure.

TYPE 12 – Enclosures constructed (without knockouts) for indoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt and circulating dust, lint, fibers, and flyings); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (dripping and light splashing); and to provide a degree of protection against light splashing and consequent seepage of oil and non-corrosive coolants.

TYPE 12K – Enclosures constructed (with knockouts) for indoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection against ingress of solid foreign objects (falling dirt and circulating dust, lint, fibers, and flyings); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (dripping and light splashing); and to provide a degree of protection against light splashing and consequent seepage of oil and non-corrosive coolants.

TYPE 13 – Enclosures constructed for indoor use to provide a degree of protection to personnel against access to hazardous parts ; to provide a degree of protection against ingress of solid foreign objects (falling dirt and circulating dust, lint, fibers, and flyings); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (dripping and light splashing); and to provide a degree of protection against the spraying, splashing, and seepage of oil and non-corrosive coolants.

5.12 INDOOR LOCATIONS – Areas that are protected from exposure to the weather.

5.13 JUNCTION OR PULL BOX – An enclosure which is provided with a cover secured by fasteners other than hinges.

5.14 KNOCKOUT – A portion of a wall of a sheet metal enclosure so fashioned that it may be removed readily by a hammer, screwdriver, and pliers at the time of installation in order to provide a hole for the attachment of an auxiliary device or raceway, cable, or fitting.

5.15 NONVENTILATED– Constructed so as to provide no intentional circulation of external air through the enclosure.

5.16 OIL-RESISTANT GASKETS – Gaskets made of material that is resistant to oil and oil fumes.

5.17 OUTDOOR LOCATIONS – Areas that are exposed to the weather.

5.18 THREADED CONDUIT ENTRY – A conduit entry that is threaded so as to secure a rigid conduit without the use of a bushing or locknut.

5.19 VENTILATED – Constructed so as to provide for the circulation of external air through the enclosure to remove excess heat, fumes, or vapors.

6 Construction

6.1 General

6.1.1 An enclosure shall completely enclose all live parts that may be housed in it.

6.1.2 All enclosures, other than those designed to be free standing or those designed for a specific installation, such as a cast-metal box intended to be installed in poured concrete, shall be provided with means for mounting.

6.1.3 Any part that is not required in order to comply with the requirements in this standard and does not serve to maintain the mechanical, electrical, or environmental integrity of the enclosure need not comply with the requirements of this standard.

6.1.4 An enclosure, frame, or similar device shall not have accessible edges that are sharp or pointed such that they constitute a risk of injury to persons during normal installation, maintenance, and use, unless:

a) Accessible edges are protected by guards or the use of handles to minimize access to sharp edges or points, or

b) An accessible edge or portion of an accessible edge is required to be sharp in order to perform a working function, or

c) If it is possible to avoid the hazard through proper procedures, then signs, labels or the manufacturer's instructions shall describe the procedure to avoid the hazard during installation, maintenance, and use.

When considering sharp edges and points, all stages of the installation process shall be considered.

6.1.5 Whenever reference measurements are necessary to determine that a part as mentioned in 6.1.4 is not sufficiently sharp to constitute a risk of injury to persons, the method described in Annex B, Ref. No. 9, shall apply. In Canada, 6.1.5 shall not apply.

6.1.6 An enclosure shall have the necessary strength and rigidity to maintain its shape so that doors will close tightly .

6.1.7 Metal into which screws are threaded shall provide for the engagement of at least two full threads, other than as permitted by 6.1.8. Sheet metal shall be permitted to be extruded at a tapped hole to give the thickness necessary for two full threads if the original thickness is not less than the pitch of the thread. Rivets, screws, bolts, and similar fastenings in a sheet-metal enclosure shall have a diameter at least 50 percent greater than the thickness of the finished sheet metal with which they are used.

6.1.8 The following combinations of minimum number of threads and minimum thickness steel shall be considered acceptable:

a) 32 threads per 25.4 mm (32 threads per inch) installed in 1.35 mm (0.053 in);

b) 28 threads per 25.4 mm (28 threads per inch) installed in 1.70 mm (0.067 in);