UL 104

STANDARD FOR SAFETY

Elevator Door Locking Devices and Door or Gate Closed Detection Means

UL Standard for Safety for Elevator Door Locking Devices and Door or Gate Closed Detection Means, UL 104

Twelfth Edition, Dated November 30, 2023

Summary of Topics

This new Twelfth Edition of ANSI/UL 104, Standard for Elevator Door Locking Devices and Door or Gate Closed Detection Means, dated November 30, 2023 is being issued as first time UL/CSA bi-national standard.

The requirements are substantially in accordance with Proposal(s) on this subject dated June 23, 2023.

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CSA B44.11:23
First Edition

ULSE Inc.
UL 104
Twelfth Edition

Elevator Door Locking Devices and Door or Gate Closed Detection Means

November 30, 2023

Approved American National Standard

ANSI/UL 104-2023

Commitment for Amendments

This standard is issued jointly by the Canadian Standards Association (operating as "CSA Group") and ULSE Inc. (ULSE). Comments or proposals for revisions on any part of the standard may be submitted to CSA Group or ULSE at anytime. Revisions to this standard will be made only after processing according to the standards development procedures of CSA Group and ULSE. CSA Group and ULSE will issue revisions to this standard by means of a new edition or revised or additional pages bearing their date of issue.

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This Standard is subject to review within five years from the date of publication, and suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to inquiries@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 Twelfth Edition.

The most recent designation of ANSI/UL 104 as an American National Standard (ANSI) occurred on November 30, 2023. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page (front and back), or the Preface.

Comments or proposals for revisions on any part of the Standard may be submitted to ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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PREFACE

This is the harmonized CSA Group and ULSE Standard for Elevator Door Locking Devices and Door or Gate Closed Detection Means. It is the First edition of CSA B44.11 and the Twelfth edition of UL 104. This edition of CSA B44.11 replaces CSA LTR D-001, published in 2018. This edition of UL 104 supersedes the previous edition(s) published on February 26, 2016.

This harmonized standard was prepared by the CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the Joint Technical Subcommittee (JTSC) for the Standard for Elevator Door Locking Devices and Contacts 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 Elevator Door Locking Devices and Contacts, under the jurisdiction of the CSA Technical Committee on Elevator Safety Code and the CSA Strategic Steering Committee on Mechanical Industrial Equipment Safety, and has been formally approved by the CSA Technical Committee.

Application of the 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 CSA Group and ULSE.

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.

Notes:

1) Use of the singular does not exclude the plural (and vice versa) when the sense allows.

2) This Standard contains SI (Metric) units. (Standard for use of the International System of Units (SI): The Modern Metric System, IEEE/ASTM SI 10 or ISO 80000-1:2009 Quantities and units – Part 1: General are used as a guide in making metric conversion from yard/pound quantities.) If a value for a measurement and a corresponding value in other units are stated, the first stated value to be regarded as the requirement. The given corresponding value may be approximate. If a value for a measurement and a corresponding value in other units are both specified as a quoted marking requirement, the first stated unit, or both shall be provided.

3) 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.

4) This Standard was developed by consensus, which is defined by CSA Policy governing standardization – Code of good practice for standardization as “substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity”. It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.

5) To submit a request for interpretation of this Standard, please send the following information to inquiries@csagroup.org and include “Request for interpretation” in the subject line:

a) define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;

b) provide an explanation of circumstances surrounding the actual field condition; and

c) where possible, phrase the request in such a way that a specific “yes” or “no” answer will address the issue. Committee interpretations are processed in accordance with the CSA Directives and Guidelines governing standardization and are available on the Current Standards Activities page at standardsactivities.csa.ca.

INTRODUCTION

1 Scope

1.1 These requirements cover the following devices intended for installation and operation on horizontal and vertically opening hoistway doors and gates and car doors and gates in accordance with the requirements of ASME A17.1/CSA B44:

a) Hoistway Door Interlocks;

b) Hoistway Door Closed Detection Means;

c) Hoistway Door Combination Mechanical Lock and Electric Contacts;

d) Hoistway Gate Electric Contacts;

e) Car Door Interlocks;

f) Car Door Closed Detection Means; and

g) Car Gate Closed Detection Means.

1.2 These requirements are intended to be used in conjunction with the relevant sections of ASME A17.1/CSA B44.

1.3 These requirements do not cover:

a) Devices with a rated voltage exceeding 600 volts;

b) Hoistway door interlock retiring cam device as defined by ASME A17.1/CSA B44; or

c) Devices for use only in platform lifts within the scopes of CSA B355 and ASME A18.1.

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component.

2.2 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.

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

2.4 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.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Referenced Publications

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 to that edition up to the time that Standard was approved.

4.2 The following publications are referenced in this Standard:

ASME A18.1, *Safety Standard for Platform Lifts and Stairway Chairlifts*

ASME A17.1/CSA B44, *Safety Code for Elevators and Escalator*

CSA B44.1/ASME A17.5, *Elevator and escalator electrical equipment*

CSA B355, *Platform lifts and stair lifts for barrier-free access*

CSA C22.2 No. 14-18, *Industrial control equipment*

UL 508, *Industrial Control Equipment*

5 Glossary

5.1 For the purpose of this standard the following definitions apply.

5.2 CAR DOOR INTERLOCK – A device having two related and interdependent functions, which are:

a) To prevent the operation of the driving machine by the normal operating device unless the car door is locked in the closed position; and

b) To prevent the opening of the car door from inside the car unless the car is within the unlocking zone and is either stopped or being stopped.

5.3 CLOSED POSITION OF CAR AND HOISTWAY DOORS AND GATES – As specified in ASME A17.1/CSA B44:

a) Horizontally sliding hoistway doors and gates, specified in the requirements for 2.12.2.2, Closed Position of Hoistway Doors of ASME A17.1/CSA B44;

b) Horizontally sliding car doors and gates, specified in the requirements for 2.14.4.11, Closed Position of Car Doors or Gate of ASME A17.1/CSA B44; and

c) Vertically sliding counterweighted and counterbalanced hoistway doors, specified in the requirements for 2.12.3.2, Closed Position of Hoistway Doors of ASME A17.1/CSA B44.

5.4 CAR DOOR OR GATE CLOSED DETECTION MEANS – An electrical device, the function of which is to prevent operation of the driving machine by the normal operating device unless the car door or gate is in the closed position.

5.5 HOISTWAY DOOR COMBINATION MECHANICAL LOCKS AND CLOSED DETECTION MEANS – A combination mechanical and electrical device with two related, but entirely independent, functions, that are:

a) To prevent operation of the driving machine by the normal operating device unless the hoistway door is in the closed position; and

b) To lock the hoistway door in the closed position and prevent it from being opened from the landing side unless the car is within the landing zone.

As there is no positive mechanical connection between the electric contact and the door locking mechanism, this device ensures only that the door will be closed, but not necessarily locked, when the car leaves the landing. Should the lock mechanism fail to operate as intended when released by a stationary or retiring car-cam device, the door can be opened from the landing side even though the car is not at the landing. If operated by a stationary car-cam device, it does not prevent opening the door from the landing side as the car passes the floor.

5.6 HOISTWAY DOOR INTERLOCK – A device having two related and interdependent functions, that are:

a) To prevent the operation of the driving machine by the normal operating device unless the hoistway door is locked in the closed position; and

b) To prevent the opening of the hoistway door from the landing side unless the car is within the unlocking zone and is either stopped or being stopped.

CONSTRUCTION

6 General

6.1 A hoistway door interlock, car-door interlock, hoistway door combination mechanical lock, closed detection means, and car door and gate closed door detection means shall have the strength and rigidity necessary to resist the abuses to which they may be subjected without resulting in a risk of fire, electric shock, or injury to persons due to total or partial collapse with resulting interference with the functioning of parts, loosening or displacement of parts, or reduction of spacings.

6.2 Electrical components shall be suitable for the intended application and shall:

a) Comply with the requirements of the pertinent standards covering such components; or

b) Be specifically evaluated for the intended use.

7 Enclosure

7.1 The enclosure shall be constructed and assembled so that it will withstand handling during shipment and installation, and so that it will have the strength and rigidity necessary to resist the abuses to which it is likely to be subjected, without resulting in a hazard due to reduction of spacings, loosening or displacement of parts, or other serious defects.

7.2 The enclosure and parts, such as covers, shall be provided with means for firmly securing them in place.

7.3 Bolts, screws, or other parts used for mounting the device shall be independent of those used for securing parts of the device to the frame, base, or enclosure.

7.4 A sheet metal enclosure shall not be less than 1.35 mm (0.053 inch) thick.

7.5 A cast metal enclosure, whether iron or other metal, shall be at least 3.2 mm (1/8 inch) thick at all points and of greater thickness at reinforcing ribs and door edges, and not less than 6.4 mm (1/4 inch) thick at tapped holes for conduit.

7.6 The mechanical strength of a nonmetallic enclosure shall be at least equivalent to a sheet metal enclosure of the minimum thickness specified in 7.4.

7.7 Polymeric enclosures shall comply with Polymeric Enclosures, Clause 6 of CSA B44.1/ASME A17.5.

7.8 Among the factors taken into consideration when evaluating the acceptability of a nonmetallic enclosure are:

a) The mechanical strength;

b) Resistance to impact;

c) Moisture-absorption properties;

d) Combustibility and resistance to ignition from electrical sources;

e) Dielectric strength, insulation resistance, and resistance to arc tracking; and

f) Resistance to distortion and creeping at temperatures to which the material may be subjected under conditions of normal or abnormal usage.

All these factors are considered with respect to aging.

7.9 The enclosure and parts shall be arranged so that wiring connected to the device terminals would not be abraded by, nor interfere with the operating parts of the device.

7.10 The enclosure shall be provided with suitable means for the connection of metal-clad cable or conduit.

7.11 Live screwheads or nuts on the underside of a base shall be reliably prevented from loosening and shall be adequately insulated or spaced from the mounting surface. This may be accomplished by:

a) Countersinking such parts not less than 3.2 mm (1/8 inch) in the clear and then covering them with a waterproof insulating sealing compound which will not melt at a temperature of 65 °C (149 °F); or

b) Reliably securing such parts and insulating them from the mounting surface by means of a barrier or the equivalent, or by means of through-air and over-surface spacings as specified in Spacings, Section 9.

8 Wiring Terminals

8.1 The parts to which wiring connections are made may consist of clamps or wire-binding screws with cupped washers, terminal plates having upturned lugs, or the equivalent, to hold the wire in position.

8.2 A wire-binding screw at a wiring terminal shall not be smaller than No. 8 (4.2 mm diameter).

Note: A No. 6 (3.5 mm diameter) screw may be used for the connection of one 14 AWG (2.1 mm^2), one 16 AWG (1.3 mm^2), or one 18 AWG (0.82 mm^2) size wire.

8.3 The terminal plate for a wire-binding screw shall be of metal not less than 0.76 mm (0.030 inch) thick, and there shall not be less than two full threads in the metal.

8.4 A wire-binding screw shall not thread into material other than metal.

8.5 A wiring terminal shall be secured to its supporting surface by methods other than friction between surfaces so that it will be prevented from turning.

9 Spacings

9.1 The spacings shall be not less than those indicated in Table 9.1. Greater spacings may be required if the enclosure, because of its size, shape, or the material used, is not considered to be sufficiently rigid to warrant the minimum spacings.

Table 9.1
Minimum Spacings

Location	Spacing type	Potential involved, volts					
		51 – 150		151 – 300		301 – 600	
		mm	(inch)	mm	(inch)	mm	(inch)
Between any uninsulated live part and an uninsulated live part of opposite polarity, uninsulated grounded part other than the enclosure, or exposed metal part.	Through air	3.2[a]	(1/8)	6.4	(1/4)	9.5	(3/8)
	Over surface	6.4	(1/4)	9.5	(3/8)	12.7	(1/2)
Between any uninsulated live part and the walls of a metal enclosure, including fittings for conduit or armored cable.[b]	Shortest distance	12.7	(1/2)	12.7	(1/2)	12.7	(1/2)

[a] The spacing between wiring terminals of opposite polarity and the spacing between a wiring terminal and a grounded dead metal part shall not be less than 6.4 mm (1/4 inch) if short-circuiting or grounding of such terminals may result from projecting strands of wire.

[b] For the purpose of this requirement, a metal piece attached to the enclosure is considered to be a part of the enclosure if deformation of the enclosure is likely to reduce spacings between the metal piece and uninsulated live parts.

9.2 Except as noted in 9.3, an insulating barrier or liner used as the sole separation between uninsulated live parts and grounded dead metal parts (including the enclosure), or between uninsulated live parts of opposite polarity, shall be of material of a type which is suitable for the mounting of uninsulated live parts and not less than 0.8 mm (1/32 inch) thick.

9.3 Except as noted in 9.4, an insulating barrier or liner which is used in addition to an air space in lieu of the required spacing through air shall not be less than 0.8 mm (1/32 inch) thick. If the barrier or liner is of fiber, the air space shall not be less than 0.8 mm (1/32 inch), and if the barrier or liner is of other material type which is not suitable for the support of uninsulated live parts, the air space provided shall be such that, upon investigation, it is determined to be acceptable for the particular application.

9.4 A barrier or liner which is used with not less than one-half the required spacing through air may be less than 0.8 mm (1/32 inch), but not less than 0.4 mm (1/64 inch) thick, if the barrier or liner is:

a) Of a material of a type that has been investigated and determined to be acceptable for the mounting of uninsulated live parts;

b) Of adequate mechanical strength if exposed or otherwise likely to be subjected to mechanical damage;

c) Securely held in place; and

d) Located so that it will not be affected adversely by operation of the equipment in service.

10 Insulating Material

10.1 Insulating materials for the support or separation of live parts shall be investigated and determined acceptable for the purpose. They shall be able to withstand the most severe normal and abnormal conditions likely to be encountered in service, including the influence of the arc formed by the operation of contacts, insulating materials shall comply with Insulating Materials, Clause 11 of CSA B44.1/ASME A17.5.

10.2 Among the factors that shall be considered in evaluating electrical insulation are:

a) Mechanical and electrical strength;

b) Resistance to burning;

c) Moisture;

d) Arcing and creep (flow due to stress); and

e) Thermal endurance and resistance to temperatures during usage.

10.3 Vulcanized fiber may be used for insulating bushings, washers, separators, and barriers but shall not be used as the sole support for uninsulated current-carrying parts of other than low-voltage circuits.

11 Corrosion Protection

11.1 Iron and steel parts, except bearings and the like, where such protection is impracticable, shall be protected against corrosion by enameling, galvanizing, sherardizing, plating, or other equivalent means.

11.2 The requirement in 11.1 applies to all enclosing cases whether of sheet steel or cast iron, to all iron or steel current-carrying parts, and to all springs and other parts upon which intended mechanical operation may depend.

11.3 The requirement in 11.1 does not apply to small minor parts of iron or steel, such as washers, screws, and the like.

12 Operating Mechanism

12.1 A compression spring shall be restrained to prevent displacement from its intended position.

12.2 Locking elements for hoistway door interlocks and car door interlocks shall be constructed such that there is at least 7 mm (0.28 inch) of engagement before the interlock detection means detects the closed