CAN/ULC 531:2026

Standard for Smoke Alarms

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Standard for Smoke Alarms, CAN/ULC 531

Fifth Edition, Dated November 27, 2024

Summary of Topics

This revision of CAN/ULC 531 dated January 14, 2026 includes the following changes in requirements:

– Correcting Inconsistent Measurements; 19.5.2

– Commercial Vehicle Cabin Inclusion; 1.1, 5.1, 6.1A, 6.3A, 6.3B, 35.2, 37.8.1, 37.8.2, 41.5.6, 48.4, 74.1, 83.1, Section 83A, 85.1.2, 85.1.3, Section 88, 88.1.3, 88.1.4, 88.2.1, 88.2.2, 98.1, 98.7, Section 98A, 100.6

– Smoke Alarm Shipment; 97.1

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated June 20, 2025 and September 26, 2025.

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CAN/ULC 531:2026
Fifth Edition

ULSE Inc.
ANSI/UL 217
Tenth Edition

Standard for Smoke Alarms

November 27, 2024

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ANSI

ANSI/UL 217-2026

NATIONAL STANDARD OF CANADA
STANDARDS COUNCIL OF CANADA
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Commitment for Amendments

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This ANSI/UL Standard for Safety consists of the Tenth Edition including revisions through January 14, 2026. The most recent designation of ANSI/UL 217 as an American National Standard (ANSI) occurred on January 14, 2026. 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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ULC Preamble

International Classification for Standards (ICS): 13.220.20, 13.320

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Requests for interpretation of this Standard should be sent to ULC Standards. The requests should be worded in such a manner as to permit a “yes” or “no” answer based on the literal text of the requirement concerned.

This CAN/ULC 531 Standard is under continuous maintenance, whereby each revision is approved in compliance with the requirements of SCC for accreditation of a Standards Development Organization. In the event that no revisions are issued for a period of four years from the date of publication, action to revise, reaffirm, or withdraw the standard shall be initiated.

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PREFACE

This is the joint ULSE and ULC Standard for Smoke Alarms. It is the fifth edition of ULC 531 and the tenth edition of UL 217.

This Joint Standard was prepared by ULSE Inc. (ULSE), ULC Standards, and the NEMA Technical Harmonization Committee on Smoke Alarms and Smoke Detectors. The standard was formally approved by the ULSE Technical Committee on Smoke Detectors and Alarms; and the ULC Technical Committee on Smoke and Heat Detectors and Alarms. The efforts and support of the NEMA Technical Harmonization Committee, the ULSE Technical Committee, and the ULC Technical Committee are gratefully acknowledged.

Only metric SI units of measurement are used in this Standard. If a value for measurement is followed by a value in other units in parentheses, the second value may be approximate. The first stated value is the requirement.

In Canada, there are two official languages, English and French. All safety warnings must be in French and English. Attention is drawn to the possibility that some Canadian authorities may require additional markings and/or installation instructions to be in both official languages.

Annexes A, D, and F are identified as informative and are for informational purposes only.

Annexes B, C and E are identified as normative and forms a mandatory part of this 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 particular purpose.

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INTRODUCTION

1 Scope

1.1 These requirements cover electrically operated single and multiple station smoke alarms intended for open area protection in indoor locations and portable smoke alarms used as "travel" alarms in accordance with:

a) In Canada:

1) Installation of Smoke Alarms, ULC 553;

2) National Building Code of Canada; and

3) National Fire Code of Canada.

b) In the United States:

1) National Fire Alarm and Signaling Code, NFPA 72;

2) Standard for Recreational Vehicles, NFPA 501C, for smoke alarms intended for use in recreational vehicles;

3) For smoke alarms intended for use in recreational boats:

i) Fire Protection Standard for Pleasure and Commercial Motor Craft, NFPA 302,

ii) AC and DC Electrical Systems on Boats, ABYC E-11, and

iii) The applicable regulations of the United States Coast Guard.

4) Commercial vehicles as defined in 6.3A.

1.2 A single station smoke alarm (e.g. ionization-type, photoelectric-type, smoke alarm with supplementary heat detection type, combination smoke type, multi-criteria type), as defined by these requirements, is a self-contained fire alarm device that consists of an assembly of electrical components including a smoke sensor/ chamber, alarm sounding appliance, and provision for connection to a power supply source, either by splice leads, terminals, a cord and plug arrangement or containing integral batteries to detect one or more products of combustion. The products of combustion may consist of visible as well as invisible smoke particles, gases, heat, radiant energy, and water vapor. Additional functionality such as, a supplemental heat detector, terminals for connection to a remote audible signaling appliance (device) or accessory, and an integral transmitter to energize a remote audible signaling appliance (device) is permitted to be incorporated as part of the smoke alarm assembly.

1.3 Smoke alarms not intended for interconnection are defined as single-station type.

1.4 Multiple station units are single station smoke alarms that are:

a) Interconnected so that actuation of one results in alarm sounding by all interconnected smoke alarms, or

b) Smoke alarms that are connected to remote heat detectors or heat alarms.

1.5 These requirements, where applicable, also cover all remote accessories that are to be connected.

1.6 This standard does not cover the following:

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a) Smoke detectors of the non-self-contained type that are intended for connection to a household or industrial system control unit. These are included in the Standard for Smoke Detectors for Fire Alarm Systems, UL 268 / ULC 529;

b) Mechanically operated single and multiple station fire alarm devices that are specified in the Standard for Single and Multiple Station Heat Alarms, UL 539 / ULC 589;

c) Heat detectors – except for the requirements in the Fire Test – Smoke Alarm with Supplementary Heat Detection, Section 72, incorporated as part of a single station smoke alarm assembly whose requirements are covered in the Standard for Single and Multiple Station Heat Alarms, UL 539 / ULC 589 and/or when part of a multi-criteria smoke alarm;

d) An accessory that is provided with a means to transmit alarm signals to a constantly attended, remote monitoring location. Any accessory capable of transmitting these types of signals is covered by the requirements in the Standard for Household Fire-Warning System Units, UL 985 or ULC-S545, Residential Fire Warning System Control Units;

e) A gas and vapor detector or sensor incorporated as a part of a smoke alarm assembly and covered by the Standard for Single and Multiple Station Carbon Monoxide Alarms, UL 2034, or CSA 6.19, Standard for Carbon Monoxide Alarming Devices, except when part of a multi-criteria smoke alarm.

2 Assembly

2.1 A smoke alarm shall be so constructed that it will be reliable and sufficiently durable for its intended installation and use.

2.2 A component of a smoke alarm shall comply with the requirements for that component, except that such requirements may be modified if appropriate for the particular application.

2.3 Unless specifically indicated, the construction requirements specified for a smoke alarm shall also apply to any remote accessories with which it is to be used.

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 D for a list of standards covering components used in the products covered by this standard.

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 statement 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.

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4 Units of Measurement

4.1 Values in parentheses are explanatory or approximate information.

5 Referenced Publications

5.1 Where reference is made to other publications, such reference shall be considered to refer to the latest edition and all amendments published to that edition up to the time when this Standard was approved.

ASA S3.41, *Audible Emergency Evacuation (E2) and Evacuation Signals with Relocation Instructions (ESRI)*

ASA S12.51, *Determination of sound power levels and sound energy levels of noise sources using sound pressure – Precision methods for reverberation test rooms*

ABYC-E_11, *AC and DC Electrical Systems on Boats*

ASTM B117, *Standard for Salt Spray (Fog) Testing*

ASTM MNL12, *Manual on the Use of Thermocouples in Temperature Measurement*

CSA C22.1, *Canadian Electrical Code, Part I, Safety Standard for Electrical Installations*

CSA C22.2 No. 0.15, *Adhesive Labels*

CSA C22.2 No. 17, *Evaluation of Properties of Polymeric Materials*

CSA C22.2 No. 77, *Motors with Inherent Overheating Protection*

CSA 6.19, *Residential Carbon Monoxide Alarming Devices*

CSA C22.2 No. 65, *Wire Connectors*

CSA C22.2 No. 153, *Electrical Quick-Connect Terminals*

CSA C22.2 No. 158, *Terminal Blocks*

MIL-STD-105, *Sampling Procedures and Tables for Inspection by Attributes*

MIL-STD-1916, *Preferred Methods for Acceptance of Products*

MIL-HDBK-217F, *Reliability Prediction of Electronic Equipment*

MIL-STD-750E, *Test Methods for Semiconductor Devices*

MIL-STD-750F Change 2, *Test Methods for Semiconductor Devices*

MIL-STD-883B, *Test Methods Standard Microcircuits*

MIL-STD-883D, *Test Methods Standard Microcircuits*

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MIL-STD-883H, *Test Methods Standard Microcircuits*

MIL-STD 883K, *Test Methods Standard Microcircuits*

MIL-STD 883L, *Test Methods Standard Microcircuits*

Canada Nuclear Safety and Control Act (1997, c.9)

FCC 47 CFR Part 15.247

IEEE C62.41, *IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits*

ICES-003, *Information Technology Equipment (Including Digital Apparatus) – Limits and Methods of Measurement*

ISO 8201, *Acoustics – Audible Emergency Evacuation Signal*

ISO/FDIS 8201, *Acoustics – Audible and other emergency evacuation signals*

NFPA 70, *National Electrical Code*

NFPA 72, *National Fire Alarm and Signaling Code*

NFPA 302, *Fire Protection Standard for Pleasure and Commercial Motor Craft*

National Building Code of Canada

TP 1332 E, *Construction Standard for Small Vessels*

UL 94, *Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*

UL 486E, *Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors*

UL 539, *Single and Multiple Station Heat Alarms*

UL 969, *Marking and Labeling Systems*

UL 985, *Household Fire Warning System Units*

UL 1730, *Smoke Detector Monitors and Accessories for Individual Living Units of Multifamily Residences and Hotel/Motel Rooms*

UL 2075, *Gas and Vapor Detectors and Sensors*

ULC-S540, *Residential Fire and Life Safety Warning Systems: Installation, Inspection, Testing and Maintenance*

ULC 552, *Maintenance and Testing of Smoke Alarms*

ULC 553, *Installation of Smoke Alarms*

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ULC 589, *Single and Multiple Station Heat Alarms*

6 Glossary

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

6.1A AEROSOL – Particles suspended in gas or air used to stimulate a response from the smoke sensor, including but not limited to canned smoke, wick or punk stick.

6.2 BROILING – The fresh-frozen hamburger cooking process used to cook the fresh-frozen hamburger in the oven of an electric range.

6.3 COMBINATION SMOKE ALARM – A smoke alarm that employs more than one smoke detecting principle in one unit. The sensor output signals are individually evaluated but not combined to determine when an alarm signal is warranted.

6.3A COMMERCIAL VEHICLES (US Only) – US GVWR (Gross Vehicle Weight Rating) Class 6 – 8 as defined by the United States Code (U.S.C.) Title 49 – Transportation Subtitle VI – Motor Vehicle And Driver Programs, Part B – Commercial.

6.3B COMMERCIAL VEHICLE CABIN (US Only) – Enclosed space in a commercial vehicle that is occupied by the driver and/or passengers.

6.4 COMPONENT, LIMITED-LIFE – A component which is likely to fail during the anticipated service life of a smoke alarm and be periodically replaced and the failure of which is monitored, when failure of the component affects the intended operation, gas and/or smoke sensitivity, or both. Typical examples of such components include incandescent lamps, electronic tube heaters, and functional heating elements.

6.5 COMPONENT, RELIABLE – A component that is not expected to fail or be periodically replaced and is not monitored. A reliable component shall have a predicted failure rate of 2.5 or less failures per million hours as determined for a "Ground Fixed" (GF) environment by MIL-HDBK 217F, or equivalent (see Annex C).

6.6 CONFORMAL COATING – A protective covering applied on a printed-wiring board capable of conforming to the configuration of objects coated, used to increase the dielectric voltage-withstand capability between conductors and/or to protect against environmental conditions. Conformal coatings may be used on printed wiring boards where electrical spacing's are insufficient between uninsulated live parts of opposite polarity or between such parts and accessible dead-metal parts.

6.7 DRIFT COMPENSATION – A feature of a smoke alarm that monitors and automatically adjusts the smoke alarm's smoke sensitivity, example: to the gradual build-up of contaminants in the sensing chamber or degradation of the sensor component(s).

6.8 END-OF-LIFE-SIGNAL – An audible signal, differing from the alarm signal, intended to indicate that the device has reached the end of its useful life and should be replaced. It is permitted for the audible component of the signal to be of the same format as a trouble signal, provided a visual indicator is employed to differentiate between the end-of-life and other trouble conditions.

6.9 FIRMWARE – For the purpose of this Standard, software programs residing permanently on a microprocessor or in a nonvolatile memory chip within smoke alarm and accessory devices.

6.10 GAS SENSITIVITY – Relative degree of response of gas sensor(s) that are used within the multi-criteria smoke alarm as defined by the manufacturer and verified by the tests required in this Standard.

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