CAN/ULC 538:2020 (R2025)

Standard for Single and Multiple Station Carbon Monoxide Alarms for Non-Residential Applications

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Standard for Single and Multiple Station Carbon Monoxide Alarms for Non-Residential Applications, CAN/ULC 538

First Edition, Dated June 30, 2020

Summary of Topics

This reaffirmation of CAN/ULC 538 dated April 8, 2025 is being issued to update the title page to reflect the latest SCC approval dates as a National Standard of Canada (NSC). No changes in requirements are involved.

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 requirements are substantially in accordance with Proposal(s) on this subject dated January 10, 2025.

PLEASE NOTE THAT CERTAIN CODES MAY REFER TO A SUPERSEDED VERSION OF THIS STANDARD. IN THOSE INSTANCES, THE RELEVANT VERSIONS ARE AVAILABLE FOR PURCHASE.

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CAN/ULC 538:2020 (R2025)

Standard for Single and Multiple Station Carbon Monoxide Alarms for Non-Residential Applications

ICS 13.320, 91.120

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FIRST EDITION . . . . . **JUNE 30, 2020**
REAFFIRMED . . . . . APRIL 8, 2025

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PREFACE

This is the First Edition of CAN/ULC 538, Standard for Single and Multiple Station Carbon Monoxide Alarms for Non-Residential Applications.

This First Edition of the Standard was developed by the ULC Standards Working Group on Carbon Monoxide Alarms, and was formally approved by the ULC Committee on Fire Alarm and Life Safety Equipment and Systems.

This Standard has been developed in compliance with the requirements of SCC for accreditation of a Standards Development Organization.

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.

Annex A, identified as Informative, is for information purposes only.

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.

Attention is drawn to the possibility that some of the elements of this Canadian standard may be the subject of patent rights. ULC Standards shall not be held responsible for identifying any or all such patent rights.

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 538 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.

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

This Standard is intended to be used for conformity assessment.

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INTRODUCTION

1 Scope

1.1 These requirements cover electrically operated single and multiple station *carbon monoxide (*CO*)* alarms intended for protection in non-residential or ordinary (nonhazardous) areas.

1.2 *Carbon monoxide* alarms covered by these requirements are intended to respond to the presence of *carbon monoxide* from sources such as, but not limited to, exhaust from internal-combustion engines, abnormal operation of fuel-fired appliances, and fireplaces. *Carbon monoxide* alarms are intended to alarm at *carbon monoxide* levels below those that cause a loss of ability to react to the dangers of *carbon monoxide* exposure. See Table 39.1, Part A, Alarm – *carbon monoxide* concentration and response time.

1.3 *Carbon monoxide* alarms covered by this standard are not intended to alarm when exposed to long-term, low-level *carbon monoxide exposures* or slightly higher short-term transient *carbon monoxide exposures*, possibly caused by air pollution and/or properly installed/maintained fuel-fired appliances and fireplaces. See Table 39.1, Part B – False alarm resistance specifications.

1.4 These requirements, where applicable, also cover all remote accessories that may be connected to or are intended to be employed with a single or multiple station *carbon monoxide* alarm. See 35.2.1.

1.5 *Carbon monoxide* alarms covered by this Standard shall be installed, tested and maintained in accordance with the National Building Code of Canada, the National Fire code of Canada and with the Authority Having Jurisdiction.

1.6 This standard does not cover the following:

a) Single and multiple station smoke alarms that are covered by the Standard for Smoke Alarms, CAN/ULC 531;

b) Smoke alarms 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, CAN/ULC 529;

c) Mechanically operated single and multiple station fire alarm devices that are specified in the Standard for Heat Actuated Fire Detectors for Fire Alarm Systems, CAN/ULC-S530;

d) Heat alarm requirements which are covered in the ULC-ORD 539, Single and Multiple Station Heat Alarms;

e) *Carbon monoxide* gas detectors intended for use in hazardous locations as defined in the International Maritime Dangerous Goods Code IMO 2006;

f) Residential carbon monoxide alarming devices, CSA 6.19; and

g) Standard for Gas and Vapour Detectors and Sensors, Including Accessories, CAN/ULC 588.

1.7 Except as indicated in 1.8, 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.

1.8 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

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b) Is superseded by a requirement in this standard.

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

1.10 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.

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

2 Reference Publications

2.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

Documents Published by the Acoustical Society of America (ASA)
1305 Walt Whitman Rd #300, Melville, NY 11747, U.SA
Telephone: 516-576-2360
www.acousticalsociety.org

• ANSI/ASA S12.31, Standard Precision Methods for the Determination of Sound Power Levels of Broad-Band Noise Sources in Reverberation Rooms
• ANSI/ASA S12.32, Standard Precision Methods for the Determination of Sound Power Levels of Discrete-Frequency and Narrow-Band Noise Sources in Reverberation Rooms.

Documents Published by the American Society for Testing and Materials (ASTM)
100 Barr Harbour Drive, PO Box C700, West Conshohocken, PA 19428-2959 U.S.A.
Telephone: (610) 832-9585
www.astm.org

• ANSI/ASTM E230/E230M, Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples

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Standards Published by the CSA Group
178 Rexdale Blvd, Toronto, ON M9W 1R3 Canada

Telephone: (416) 747-4000 or 1-800-463-6727

• CSA 6.19, Residential carbon monoxide alarming devices
• 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. 0.17, Evaluation of Properties of Polymeric Materials
• CSA C22.2 No. 38, Thermoset-Insulated Wires and Cables
• CSA C22.2 No. 42, General Use Receptacles, Attachment Plugs and Similar Wiring Devices
• CSA C22.2 No. 49, Flexible Cords and Cables
• CSA C22.2 No. 65, Wire Connectors
• CSA C22.2 No. 66.1, Low Voltage Transformers – Part 1: General Requirements
• CSA C22.2 No. 66.2, Low Voltage Transformers – Part 2: General Purpose Transformers
• CSA C22.2 No. 66.3, Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers
• CSA C22.2 No. 75, Thermoplastic-Insulated Wires and Cables

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• CSA C22.2 No. 77, Motors with Inherent Overheating Protection
• CSA C22.2 No. 111, General-Use Snap Switches
• CSA C22.2 No. 198.1, Extruded Insulating Tubing
• CSA C22.2 No. 223, Power Supplies with Extra-Low-Voltage Class 2 Outputs
• CSA C22.2 No. 4248.1, Fuseholders – Part 1: General Requirements
• CSA C22.2 No. 4248.4, Fuseholders – Part 4: Class CC
• CSA C22.2 No. 4248.5, Fuseholders – Part 5: Class G
• CSA C22.2 No. 4248.6, Fuseholders – Part 6: Class H
• CSA C22.2 No. 4248.8, Fuseholders – Part 8: Class J
• CSA C22.2 No. 4248.9, Fuseholders – Part 9: Class K
• CSA C22.2 No. 4248.11, Fuseholders – Part 11: Class C
• CSA C22.2 No. 4248.12, Fuseholders – Part 12: Class R
• CSA C22.2 No. 4248.15, Fuseholders – Part 9: Class T

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• National Building Code (NBC) of Canada 2015

• National Fire Code (NFC) of Canada 2015

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Telephone: +1-847-272-8800
www.ul.com

• UL 94, Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
• UL/ULC 510, Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
• UL 796, Printed-Wiring Boards

Document Published by the United States Department of Defense
Available from Automation and Production Service,
Building 4/D, 700 Robbins Avenue,
Philadelphia, PA 19111-5094
Telephone: (215) 697-2179
http://assist.daps.dla.mil/quicksearch/

• MIL-HDBK-217B-1974, Military Handbook: Reliability Prediction of Electronic Equipment
• MIL-HDBK-217F-1995, Military Handbook: Reliability Prediction of Electronic Equipment

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7 Underwriters Road, Toronto, ON M1R 3A9 Canada
Telephone: (416) 757-3611 or 1-866-937-3852
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• CAN/ULC 527, Control Units and Accessories for Fire Alarm Systems
• CAN/ULC 529, Standard for Smoke Detectors for Fire Alarm Systems
• CAN/ULC-S530, Standard for Heat Actuated Fire Detectors for Fire Alarm Systems

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• CAN/ULC 531, Standard for Smoke Alarms
• ULC-ORD 539, Single and Multiple Station Heat Alarms
• CAN/ULC 588, Standard for Gas and Vapour Detectors and Sensors, Including Accessories

3 Glossary

For the purpose of this standard the following definitions apply.

3.1 *ALARM SIGNAL* – A signal intended to indicate an emergency condition.

3.2 *BATTERY TROUBLE LEVEL SIGNAL* – Any combination of battery voltage and series resistance that results in an audible *trouble signal* specific to the alarm device.

3.3 *CARBON MONOXIDE (CO)* – A colorless, odorless, tasteless and non-irritating highly poisonous gas, formed by the incomplete combustion of carbon.

3.4 *CARBON MONOXIDE EXPOSURES* – Situation resulting in a *carbon monoxide* concentration of:

a) LONG-TERM, LOW-LEVEL – A concentration not exceeding 30 *ppm* for less than 30 days; or

b) SHORT-TERM – A concentration not exceeding 70 *ppm* for less than 60 minutes.

3.5 *CARBOXYHEMOGLOBIN OR CARBONMONOXYHEMOGLOBIN (COHb)* – A stable combination of *carbon monoxide* and hemoglobin formed in the blood when *carbon monoxide* is inhaled. % *carboxyhemoglobin* indicates the degree to which the oxygen-carrying capacity of the blood is impeded by the uptake of *carbon monoxide* by the hemoglobin.

3.6 *DRIP-PROOF* – A product that is constructed, or so protected, so that falling drops of liquid or solid particle striking the enclosure, from 0 – 15 degrees downward from the vertical, do not interfere with the intended operation of the equipment.

3.7 *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.

3.8 *LIMITED LIFE COMPONENT* – A component that provides a minimum of one year of service but is expected to periodically fail and be replaced and that is supervised for failure that affects normal operation or *sensitivity*. Typical examples of such components include incandescent lamps, electronic tube heaters, functional heating elements, and batteries.

3.9 *MULTIPLE STATION ALARM* – A *single station alarm* that is able to be interconnected with one or more other alarms for common alarm annunciation.

3.10 *PPM* – A measure of gas concentration in parts per million.

3.11 *PRE-ALARM* – An optional signal unique from the trouble and *alarm signal*, intended to provide an early notification of the detection of *carbon monoxide* prior to an *alarm signal*.

3.12 *RELIABLE COMPONENT* – A component that is not expected to fail or be periodically replaced and is not supervised.

3.13 SELF-CONTAINED UNIT – A *single station alarm* powered only by an internal battery or batteries.

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