

CANADIAN ELECTRICAL CODE

SUBJECT: Section 32 - Fire Alarm Systems, Fire Pumps and Carbon Monoxide Alarms

Rule 32-110 Installation of Smoke Alarms and Carbon Monoxide Alarms in Dwelling Units

The Alberta Building Code sets the requirements for the location of smoke alarms within dwelling units. Consequently, electrical installations are required to include provisions for smoke alarms, including their interconnection, on each floor level of a dwelling unit, including basements. Where more than one smoke alarm is installed in a residence, the Alberta Building Code requires that they must be interconnected.

Where a smoke alarm circuit in a combustible building is supplied from a Class 2 power supply, the interconnection of the smoke alarms is permitted to be an approved Class 2 wiring method. However, extra-low-voltage control cable (such as Type LVT, rated 30 V maximum) is not permitted to enter boxes, fittings or enclosures containing conductors connected to circuits of a higher voltage.

Regular residential smoke detectors normally require a 120V connection from a 15A circuit. Rule 32-100 requires that the conductors be of copper with an ampacity adequate to carry the maximum current provided by the circuit; therefore #14 AWG or larger.

Interconnection of Smoke Alarms with Carbon Monoxide Detectors

Some manufactures supply smoke alarms and carbon monoxide detectors that can be interconnected. Although the Canadian Electrical Code does not specifically address this practice, the installation may be permitted provided certain precautions are taken:

1. Each device is approved.
2. Each device is suitable for interconnection with each other (consult manufacturers' literature for each device).
3. Each device is installed according to rule 32-110 and the manufacturers' instructions.

**Table 32-1
Smoke alarm requirements**

Location	Requirement	Circuitry
All floor levels	<p>Smoke alarms must be installed on each floor level, including basements, 900 mm or more above or below an adjacent floor level. Each bedroom must be protected by a smoke alarm either in the bedroom or outside. If outside the bedroom, it must be installed within 5 m of a bedroom door. This measurement should be made along the corridors and through the bedroom door, not through walls or openings in walls.</p> <p>The maximum distance between smoke alarms on the same floor in rooms other than bedrooms is 15 m. This measurement should be made following corridors and going through doorways, not through walls or openings in walls.</p> <p>Smoke alarms must be installed on the ceiling or near the ceiling (see Article 9.10.19.2 of the NBCC).</p>	<p>Smoke alarms may be installed in any lighting and receptacle branch circuit, except for circuits that supply kitchen counter and dining area receptacles, refrigerators, outlets in a garage, and outdoor receptacles (see Rules 26-720 to 26-724).</p> <p>Smoke alarms must not be connected to circuits that are protected by an AFCI or GFCI, or to circuits that supply only receptacles [see Rule 32-110(a)(ii)].</p> <p>No switches or disconnecting means are allowed to be installed between the smoke alarm(s) and the overcurrent device for the branch circuit (see Article 9.10.19.3 of the NBCC).</p> <p>When more than one smoke alarm is required, alarms must be interconnected so that the actuation of one alarm causes all the alarms in the dwelling unit to sound (see Article 9.10.19.4 of the NBCC).</p> <p>Battery backup is recommended.</p>

**Table 32-2
Carbon monoxide (CO) alarm requirements**

Location requirements	Circuitry
<p>In a room or area that contains a solid-fuel-burning appliance, a CO alarm must be mounted on or near the ceiling of a room or area in a dwelling unit containing a solid-fuel-burning appliance (see Article 9.32.3.8 of the NBCC).</p> <p>In a unit/suite in a residential occupancy that contains a fuel-burning appliance or that shares a wall with a storage garage, a CO alarm must be located inside each bedroom or outside each bedroom within 5 m of each bedroom door, measured following corridors and doorways (see Article 9.32.3.9 of the NBCC).</p>	<p>CO alarms may be installed in any lighting and receptacle branch circuit, except for circuits that supply kitchen counter and dining area receptacles, refrigerators, outlets in a garage, and outdoor receptacles (see Rules 26-720 to 26-724).</p> <p>CO alarms must not be connected to circuits that are protected by an AFCI or GFCI, or to circuits that only supply receptacles.</p> <p>No switches or disconnecting means are allowed to be installed between the CO alarm(s) and the overcurrent device for the branch circuit (see Articles 9.32.3.8 and 9.32.3.9 of the NBCC).</p> <p>When required by the NBCC, a CO alarm must have an audible alarm (see Article 9.32.3.9 of the NBCC).</p>

Fire pumps

Fire pumps are usually installed in a building to maintain water pressure to sprinkler and standpipe systems during their use in an emergency. Section 32 is restricted to the electrical supply to equipment required by the NBCC and sets out requirements for the emergency power circuit and the feeder from the normal power source.

devices are permitted to be used to sound the *alert signals* and the *alarm signals*.

2) If audible signal devices with voice reproduction capabilities are intended for paging and similar voice message use, other than during a fire emergency, they shall be installed so that *alert signals* and *alarm signals* take priority over all other signals.

3) Audible signal devices forming part of a fire alarm or voice communication system shall not be used for playing music or background noise.

4) In a *building* or portion thereof intended for use primarily by persons with hearing impairment, visual signal devices shall be installed in addition to audible signal devices.

3.2.4.19. Audibility of Alarm Systems

(See Appendix A.)

1) Audible signal devices forming part of a fire alarm system shall be installed in a *building* so that *alert signals* and *alarm signals* are clearly audible throughout the *floor area* in which they are installed. (See Appendix A.)

2) The temporal pattern of an *alarm signal* shall conform to the temporal pattern defined in Clause 4.2 of International Standard ISO 8201, "Acoustics - Audible emergency evacuation signal." (See Appendix A.)

3) The signals from *smoke alarms* and the patterns of *alert signals* shall be sufficiently different from the signals or patterns of *alarm signals* that there is no possibility of confusion.

4) The fire *alarm signal* sound pressure level shall be not more than 110 dBA in any normally occupied area. (See Appendix A.)

5) The sound pressure level in a sleeping room from a fire alarm audible signal device shall be not less than 75 dBA in a *building* of *residential occupancy* when any intervening doors between the device and the sleeping room are closed. (See Appendix A.)

6) The sound pressure level from a fire alarm audible signal device in a *floor area* used for *occupancies* other than *residential occupancies* shall be not less than 10 dBA above the ambient noise level, but with a minimum value not less than 65 dBA.

7) Fire alarm audible signal devices shall be supplemented by visual signal devices in any *floor area* in which

- a) the ambient noise level is more than 87 dBA, or
- b) the occupants of the *floor area*
 - i) use ear protective devices,
 - ii) are located within an audiometric booth, or

iii) are located within sound insulating enclosures.

8) Sentence (7) shall also apply in an *assembly occupancy* in which music and other sounds associated with performances could exceed 100 dBA.

9) An audible signal device located within a *dwelling unit* shall incorporate a means that enables the device to be silenced for a period of not more than 10 min, after which the device shall restore to normal operation. (See Appendix A.)

10) An audible signal device located within a *dwelling unit* or a *suite* of *residential occupancy* shall be connected to the fire alarm system in a manner that disconnection of, or damage to, that device will not interfere with the ability of devices in other *dwelling units*, *public corridors*, or *suites* to sound an alarm.

11) Audible signal devices referred to in Sentence (10) are not required to have individual electrical supervision.

12) Audible signal devices shall be installed in a *service space* referred to in Sentence 3.2.1.1.(7) and shall be connected to the fire alarm system.

3.2.4.20. Visual Signals

1) Visual signal appliances shall conform to CAN/ULC-S526, "Standard for Visual Signal Appliances." NB

2) Visual signal devices required by Sentences 3.2.4.18.(4) and 3.2.4.19.(7) and (8) shall be installed so that the signal from at least one device is visible throughout the *floor area* or portion thereof in which they are installed. (See Appendix A.)

3) A visual signal appliance shall be installed in close proximity to each required audible signal appliance.

4) In addition to the requirements for the fire alarm and detection systems in this Subsection, visual signals from *smoke detectors* required in sleeping rooms of Group B *occupancy* shall be provided so that staff serving these rooms can easily identify the room or location of fire alarm initiation. (See Appendix A.)

3.2.4.21. Smoke Alarms

1) *Smoke alarms* conforming to CAN/ULC-S531-M, "Standard for Smoke-Alarms," shall be installed in each *dwelling unit* and, except for *care or detention occupancies* required to have a fire alarm system, in each sleeping room not within a *dwelling unit*.

2) At least one *smoke alarm* shall be installed on each *storey* of a *dwelling unit*.

3.2.4.22.

3) On any *storey* of a *dwelling unit* containing sleeping rooms, a smoke alarm shall be installed in a location between the sleeping rooms and the remainder of the *storey*, and if the sleeping rooms are served by a hallway, the *smoke alarm* shall be located in the hallway.

4) A *smoke alarm* shall be installed on or near the ceiling.

5) A *smoke alarm* shall be installed with permanent connections to an electrical circuit and shall have no disconnect switches between the overcurrent device and the *smoke alarm*. (See Appendix A.)

6) If more than one *smoke alarm* is required in a *dwelling unit*, the *smoke alarms* shall be wired so that the actuation of one *smoke alarm* will cause all *smoke alarms* within the *dwelling unit* to sound.

7) A *smoke alarm* required by Sentence (1) shall be installed in conformance with CAN/ULC-S553-M, "Standard for the Installation of Smoke-Alarms."

8) A manually operated device is permitted to be incorporated within the circuitry of a *smoke alarm* installed in a *dwelling unit* so that it will silence the signal emitted by the *smoke alarm* for a period of not more than 10 min, after which the *smoke alarm* will reset and again sound the alarm if the level of smoke in the vicinity is sufficient to reactuate the *smoke alarm*.

3.2.4.22. Voice Communication Systems

1) A voice communication system required by Subsection 3.2.6. shall consist of

- a) a 2-way communication system in each *floor area*, with connections to the central alarm and control facility and to the mechanical control centre, and
- b) loudspeakers operated from the central alarm and control facility which are designed and located so as to be audible and the messages intelligible in all parts of the *building*, except that this requirement does not apply to elevator cars. (See Appendix A.)

2) The voice communication system referred to in Sentence (1) shall include provision for silencing the *alarm signal* in a single stage fire alarm system when voice messages are being transmitted, but only after the *alarm signal* has sounded initially for not less than 60 s.

3) The voice communication system referred to in Sentence (1) shall include provision for silencing the *alert signal* and the *alarm signal* in a 2 stage fire alarm system when voice messages are being transmitted, but only after the *alert signal* has sounded initially for not less than

- a) 30 s in hospitals that have supervisory personnel on duty for twenty-four hours each day, or
- b) 60 s for all other *occupancies*.

4) The voice communication system referred to in Clause (1)(b) shall be designed so that voice instructions can be transmitted selectively to any zone or zones while maintaining an *alert signal* or *alarm signal* to other zones in the *building*.

5) The 2-way communication system referred to in Clause (1)(a) shall be installed so that emergency telephones are located in each *floor area* near *exit* stair shafts.

3.2.5. Provisions for Fire Fighting

(See A-3, Fire Fighting Assumptions, in Appendix A.)

3.2.5.1. Access to Above Grade Storeys

1) Except for *storeys* below the *first storey*, direct access for fire fighting shall be provided from the outdoors to every *storey* that is not *sprinklered* throughout and whose floor level is less than 25 m above *grade*, by at least one unobstructed window or access panel for each 15 m of wall in each wall required to face a *street* by Subsection 3.2.2.

- 2) An opening for access required by Sentence (1) shall
- a) have a sill no higher than 900 mm above the inside floor, and
- b) be not less than 1 100 mm high by not less than
- i) 550 mm wide for a *building* not designed for the storage or use of dangerous goods, or
- ii) 750 mm wide for a *building* designed for the storage or use of dangerous goods.

3) Access panels above the *first storey* shall be readily openable from both inside and outside, or the opening shall be glazed with plain glass.

3.2.5.2. Access to Basements

1) Direct access from at least one *street* shall be provided from the outdoors in a *building* that is not *sprinklered* to each *basement* having a horizontal dimension more than 25 m.

- 2) The access required by Sentence (1) is permitted to be provided by
- a) doors, windows or other means that provide an opening not less than 1 100 mm high and 550 mm wide, with a sill no higher than 900 mm above the inside floor, or
- b) an interior stairway immediately accessible from the outdoors.

High Rise
No Sp. + 200