

BC BUILDING CODE INTERPRETATION COMMITTEE

A joint committee with members representing
AIBC, EGBC, BOABC

File No: 12-0095

INTERPRETATION

Page 1 of 6

Interpretation Date:	June 19, 2018
Building Code Edition:	BC Building Code 2012
Subject:	Elevators without an elevator machine room
Keywords:	Elevators without an elevator machine room, elevator controller, integrity of elevator hoistway, protection of electrical conductors, elevator recall
Building Code Reference(s):	3.2.4.12., 3.2.6.5.(6), 3.2.7.10, , 3.5.3.1, 3.5.3.3

Questions:

With emerging technologies, elevators in buildings are sometimes designed without a separate elevator machine room. Instead, some installations provide elevator control by way of a testing and inspection panel which is mounted in the elevator door frame and an elevator controller which is integrated within the elevator hoistway. Since this type of installation was not contemplated when drafting the current wording of the building code, the current wording does not adequately address the potential hazards of this installation.

Integrity of Fire Separation of Elevator Hoistway

1. If an elevator controller is located within the wall assembly of an elevator hoistway, is a fire separation required between the elevator controller and the elevator lobby?
2. If an elevator controller is installed within the wall assembly of an elevator hoistway, is a fire separation required between the elevator controller and the elevator hoistway?
3. Some elevator manufacturers attach the sheet metal box that houses the elevator controller to the side of the elevator door frame. They have tested the elevator door, frame and sheet metal box in accordance with Clause 3.1.8.4.(1)(a) and CAN4-S104-M "Fire Tests of Door Assemblies", which confirms that the entire assembly provides a 90 min fire protection rating.

This test also verified that the elevator door interlock mechanism remained operational for 1 hour as required by Clause 3.2.6.5.(3)(a) as noted below.



Patrick Shek, P.Eng., CP, FEC, Committee Chair

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File No: 12-0095

INTERPRETATION

Page 2 of 6

3.2.6.5.(3) Each elevator for use by firefighters shall

- a) be provided with a *closure* at each shaft opening so that the interlock mechanism remains mechanically engaged and electrical continuity is maintained in the interlock circuits and associated wiring for a period of not less than 1 h when the assembly is subjected to the standard fire exposure described in CAN4-S104-M, "Fire Tests of Door Assemblies,"

Is it appropriate to consider the sheet metal box that houses the elevator controller as part of the door frame, rather than part of the elevator hoistway wall?

Protection of Electrical Conductors Serving Elevators

4. Which elevators are required to have their electrical conductors protected against exposure to fire?
5. Which electrical conductors that serve elevators must be protected against exposure to fire?
6. Can the elevator hoistway be considered as a service space for the protection of electrical conductors from exposure to fire as described in Clause 3.2.6.5.(6)(a)?
7. If the electrical conductors as described in question 5 have not been tested to ULC-S139 "Fire Test for Evaluation of Integrity of Electrical Cables" as per Sentence 3.2.7.10.(2), can they be exposed within the elevator hoistway?

Elevator Recall

8. If the elevator controller is located within the elevator hoistway, are smoke detectors for elevator recall required at the location of the elevator controller as described in Clause 3.2.4.12.(1)(g) and Sentence 3.2.4.12.(4) for elevator recall?

Interpretation:

Integrity of Fire Separation of Elevator Hoistway

1. Yes.

Article 3.5.3.1 requires that an elevator hoistway be separated from all other portions of each adjacent storey, which includes the elevator lobby, with a fire separation with a fire resistance rating as described in Table 3.5.3.1.



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File No: 12-0095

INTERPRETATION

Page 3 of 6

Sentence 3.5.3.3.(1) requires a “room” that contains elevator machinery be separated from all parts of the building with a fire separation with a fire resistance rating that is the same as the elevator hoistway. Although the elevator hoistway, which contains the elevator controller, is not considered to be a “room”, the concept to separate the elevator controller from the adjacent parts of the building is still appropriate.

2. No

Sentence 3.5.3.3.(2) waives the requirement for a fire separation between a “room” that contains elevator machinery and the elevator hoistway. Although the elevator hoistway, which contains the elevator controller, is not considered to be a “room”, the concept to waive the fire separation between the elevator controller and the hoistway is still appropriate.

3. No

The CAN4-S104-M test is intended for use on door assemblies to verify the fire protection rating of the door and door frame. Including the sheet metal box that houses the elevator controller as part of the “door frame” is inappropriate, particularly when the box can be quite large and contains critical electrical components for the operation of the elevator.

As per Sentence 3.1.7.1.(1) elevator hoistway wall assemblies must be tested to CAN/ULC-S101 , “Fire Endurance Tests of Building Construction and Materials” to verify their fire resistance rating. Alternatively, as per Sentence 3.1.7.1.(2) they could be designed the prescriptive requirements of Appendix D.

The CAN/ULC-S101 test for wall assemblies includes a limit on the temperature rise of the wall assembly between the fire side and the non-fire side, whereas the CAN/ULC-S104 test for doors and door frames does not include a temperature rise limitation.

Although the elevator door and door frame tested to CAN/ULC-S104 verified that the elevator door interlock mechanism remained operational for 1 hour as required by Clause 3.2.6.5.(3)(a), the test did not verify that the elevator controller itself would remain operational for 1 hour as inferred in Clause 3.2.6.5.(6)(b) for electrical conductors.

Although the current wording of the building code does not address any fire testing or operational requirements of the elevator controller when installed as part of the elevator door frame, there is an expectation that that operational requirements of the elevator controller under fire conditions are more critical than the door interlock mechanism.



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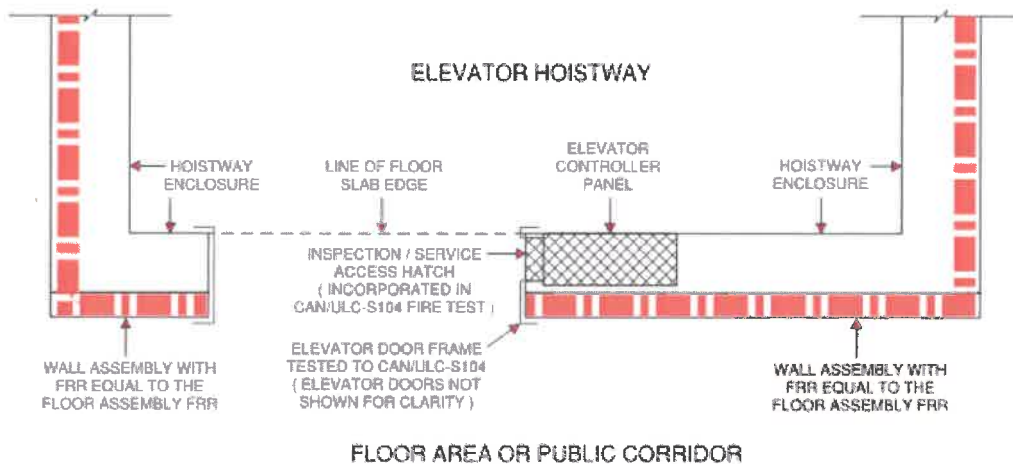
File No: 12-0095

INTERPRETATION

Page 4 of 6

In order to maintain the integrity of the fire separation of the elevator hoistway wall assembly, the portion of the hoistway wall between the sheet metal box containing the elevator controller and the elevator lobby should meet the temperature rise criteria of CAN/ULC S101.

The sketch below illustrates a conceptual approach for maintaining the integrity of the fire separation of the elevator hoistway wall assembly at the elevator controller.



FLOOR PLAN DIAGRAM AT ELEVATOR

Protection of Electrical Conductors Serving Elevators

4. The only elevators that are required to have their electrical conductors protected against exposure to fire are firefighter's elevators in high buildings as per Sentence 3.2.6.5.(6) and Sub-clause 3.2.7.10.(2)(a)(iii).
5. As described in Clause 3.2.6.5.(6)(b), the only electrical conductors that must be protected against exposure to fire are ones that serve firefighter's elevators in high buildings that lead from the "service entrance of the emergency power supply, or the normal service entrance of the normal power supply, to the **equipment being served**". The termination point of the

electrical conductors to the "**equipment being served**" is considered to be the elevator disconnect switch, which, for elevators that do not have elevator machine rooms, is usually located within the elevator controller.

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File No: 12-0095

INTERPRETATION

Page 5 of 6

All electrical conductors that are downstream of the elevator disconnect switch are considered to be branch wiring which does not need to be protected against exposure to fire.

This is clarified in Appendix A-3.2.7.10.(5)(b) as noted below:

A-3.2.7.10.(5)(b) Electrical Conductors in the Same Room. If the distribution panel and the equipment it serves are within the same room, only the electrical conductors leading up to the distribution panel need to be protected. It is assumed that the distribution panel and the equipment it serves are within sufficient proximity to each other such that a fire in the same area of origin would affect both

6. No

Clause 3.2.6.5.(6)(a) allows the electrical conductors that serve firefighter's elevators in high buildings to be located within *service spaces* that do not contain other *combustible* material.

An elevator hoistway is considered to be a *vertical service space* as defined in Division A Article 1.4.1.2., but since the elevator hoistway contains many combustible components, such as the elevator cab finishes, it does not meet the requirements of Clause 3.2.6.5.(6)(a) for protection of electrical conductors.

7. No

Since the elevator hoistway cannot be used to protect the electrical conductors that serve the elevator, Clause 3.2.6.5.(6)(a) does not apply.

The only other method of protecting the electrical conductors that are exposed within the elevator hoistway is Clause 3.2.6.5.(6)(b), which requires that any exposed conductors within the elevator hoistway that serve firefighter's elevators in high buildings must comply with ULC-S139. The portion of electrical conductors that are exposed within the elevator hoistway that lead from the service entrance of the power supply to the elevator disconnect switch within the controller must comply with ULC-S139.

It should be noted that elevator cabs incorporate an indicator light with a firefighter's helmet.

This indicate light flashes when any of the following fire alarm detection devices are actuated:

- Smoke detectors at the top of the elevator hoistway,
- Smoke detectors in the elevator machine room (not applicable for elevators without elevator machine rooms), and
- Heat detectors in the elevator pit

The purpose of the indicator light is to warn firefighters to avoid using the elevators for emergency purposes because the elevator may be compromised.



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INTERPRETATION

Page 6 of 6

Elevator Recall

8. Yes

Clause 3.2.4.12.(1)(g) requires a smoke detector in an elevator machine room. As described in Sentence 3.2.4.12.(4), the purpose of this is for elevator recall.

Where there is no elevator machine room, this is addressed in ASME A17.1-2010/CSA B44-10

"Safety Code for elevators and Escalators", in reference 2.27.3.2.2:

In jurisdictions enforcing the NBCC, smoke detectors, or heat detectors in environments not suitable for smoke detectors (fire alarm initiating devices), used to initiate Phase I Emergency Recall Operation, shall be installed in conformance with the requirements of the NBCC, and shall be located

(a) at each floor served by the elevator

(b) in the associated elevator machine room, machinery space containing a motor controller or electric driving machine, control space, or control room.

"Control space" is defined as:

"control space, elevator, dumbwaiter, material lift: a space inside or outside the hoistway, intended to be accessed with or without full bodily entry, that contains the motor controller. This space could also contain electrical and/or mechanical equipment used directly in connection with the elevator, dumbwaiter, or material lift but not the electric driving machine or the hydraulic machine."

Since the elevator controller is usually located at the uppermost storey of the building, a smoke detector at the top of the elevator shaft is considered to meet the intent of Clause 3.2.4.12.(1)(g).

See also past interpretation 12-0007.



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