Fire Marshal Bulletin

2023-001

REQUIREMENTS FOR ELECTROMAGNETIC LOCKS INSTALLED FOR SECURITY PURPOSES

Purpose

This document clarifies the position of Calgary Fire Department (CFD) regarding the installation and use of electromagnetic locks installed for security purposes.

Background

Electromagnetic lock installations have varied considerably over the years with little consistency. Installations are often based on lack of knowledge, lack of permits or incorrect installations as required by the Fire and Building Code in force at the time of installation. In many cases, the installation of magnetic locks has been completed without the appropriate City of Calgary permits and inspections required to ensure the devices are properly linked to the fire alarm and installed in a manner that does not impact an occupant's ability to evacuate safely. This document provides the code reference, subsequent interpretation, and position of the Calgary Fire Department.

SECTION 1

Code Interpretation

National Fire Code – Alberta Edition 2019

2.7.2.1. Exit Doors and Door Release Hardware

Code Reference	Interpretation
4) When doors are equipped with electromagnetic locks, these locks shall be tested at intervals not greater than 12 months.	
5) Door release hardware shall be installed on doors in conformance with the NBC(AE).	This section of the Fire Code drives the Fire Inspector to Building Code to ensure compliance.
6) Door release hardware, latches and locks shall be maintained in good working condition at all times.	
7) An *exit* door shall not be bolted, barred or locked other than with a device that complies with Sentence (5).	

National Building Code – Alberta Edition 2019

3.3.1.13. Doors and Door Hardware

Code Reference	Interpretation
2) Except as provided in Sentences (6) and (7), a door in an *access to exit* shall be readily openable in **travelling to an *exit* without requiring keys, special devices or specialized knowledge of the door-opening mechanism.**	Although it is permitted to have other releasing devices connected to the maglock like, push to open buttons, fob controls or keypads; **these cannot be the primary way of opening an exit door or a door in the means of egress**. "Push to exit" buttons located on the periphery of

3) Except as permitted by Sentence (4), door release hardware shall comply with Clause 3.8.3.8.(1)(b) and the **door shall be openable with not more than one releasing operation**. (See also Sentence 3.8.3.6.(4).)	the door frame or adjacent walls require more than one releasing operation (pressing the button then pushing the door) and requires special knowledge to operate as occupants may not be able to find the buttons in an emergency, or when crowd movement limits access to the button during an evacuation. Therefore, does not replace the requirement for door hardware as defined in 3.4.6.16. Door Release Hardware Sentence 4. **"Push to Exit Buttons" are not accepted by the Calgary Fire Department as door opening hardware within the City of Calgary.**
7) A door in an *access to exit* is permitted to be equipped with an electromagnetic lock conforming to Sentence **3.4.6.16.(4)** or (5)**.** Definition of *access to exit*	See notes under 3.4.6.16.(4) in Section 2 related to the use of magnetic locks in buildings other than detention, care, or treatment.

SECTION 2 OCCUPANCIES OTHER THAN CARE, TREATMENT, OR DETENTION

3.4.6.16. Door Release Hardware Sentence 4 (See Section 3 related to B2 & B3 Occupancies)

Code Reference	Interpretation
4) Electromagnetic locks that do not incorporate latches, pins or other similar devices to keep the door in the closed position are permitted to be installed on doors, other than those leading directly from a *high-hazard industrial occupancy*, provided	Maglocks are not to be used in a F1 occupancy.
a) the *building* is equipped with a fire alarm system,	Building **must** have fire alarm.
b) the locking device releases upon actuation of the *alarm signal* from the *building*'s fire alarm system,	When a single stage fire alarm is activated all maglocks in the building must disengage. When a two-stage fire alarm goes into *alarm* (second stage), all zones in *alarm* must disengage the maglocks, as well as all maglocks along the access to exit. Zoned areas of the building in *Alert* need not release until the zone is in *Alarm*.

c) the locking device releases immediately upon loss of power controlling the electromagnetic locking mechanism and its associated auxiliary controls,	Loss of power disengages the lock using a "**fail safe**" (failed open) wiring configuration. If emergency power or battery back-up power supplies are used to power maglocks, all associated controls must also be on the same backup power supply.
d) except for locking devices installed in conformance with Sentence (5), the locking device releases immediately upon actuation of a manually operated switch readily accessible only to authorized personnel,	Only authorized people have access to the switch which controls a maglock. All maglocks in a building must be controlled by a manual switch.
e) except as provided in Clause (k), a force of not more than **90 N** applied to the door opening hardware initiates an irreversible process that will release the locking device within **15 s** and not re-lock until the door has been opened,	Without any other devices or buttons, the door must open within 15 seconds when a force of less than 90 N is applied the door hardware.
f) upon release, the locking device must be reset manually by the actuation of the switch referred to in Clause (d),	If the time delay release or the switch is used to release maglock(s) then the switch needs to be used to re-engage maglock(s). If there is no delay on the maglock, manual reset is not required and can re-lock after opening
g) a legible sign is permanently mounted on the door to indicate that the locking device will release within 15 s of applying pressure to the door-opening hardware,	Doors with maglocks must be signed indicating the use of hardware will release the door within 15 sec.
h) the total time delay for all electromagnetic locks in any path of egress to release is not more than 15 s,	You cannot have more than a 15 sec delay in the path of egress leading outside or to another building. If there are multiple doors in the path of egress, then the delay at each door combined cannot exceed 15 sec.
i) where a bypass switch is installed to allow testing of the fire alarm system, actuation of the switch;	A bypass switch to prevent the release of maglocks when the fire alarm is being tested, if installed, must have an audible and visual indication on the panel when it is engaged and notify the monitoring station that the bypass switch is in use. If a "bypass switch" is installed the building not only must have a fire alarm but be monitored as well. Verification of fire alarm auxiliary and ancillary devices is required for all functions and locations
i. can prevent the release of the locking device by the fire alarm system, as stated in Clause (b), during the test, and ii. causes an audible and visual signal to be indicated at the fire alarm annunciator panel required by Article 3.2.4.9. and at the monitoring station specified in Sentence 3.2.4.8.(4),	
j) emergency lighting is provided at each door, and	Each door with a maglock must have emergency lights near or above the door which would enable a person to see and read the sign in "g)". These can be either battery operated lights or lights powered by a genset.

k) where they are installed on doors providing emergency crossover access to *floor areas* from *exit* stairs in accordance with Article 3.4.6.18.,	
i. the locking device releases immediately upon the operation of a manual station for the fire alarm system located on the wall on the *exit* stair side not more than 600 mm from the door, and	Maglocks on doors required to access the crossover floor must have a fire pull station on the stairwell side of the door and be signed to indicate it will release upon activation of the fire alarm.
ii. a legible sign with the words "re-entry door unlocked by fire alarm" written in letters at least 25 mm high with a stroke of at least 5 mm is permanently mounted on the door on the *exit* stair side. (See Note A-3.4.6.16.(4).)	

A-3.4.6.16.(4) Electromagnetic Lock.

Electromagnetic locks are intended for use where there is a need for security additional to that provided by traditional exit hardware. **They are not intended for indiscriminate use as alternative locking devices. The design of these devices requires evaluation to ensure that their operation will be fail-safe in allowing exiting in the event of foreseeable emergencies.** If more than one locking device is used in a building, it is expected that **one switch will release and reset all devices simultaneously**.	Indiscriminate use of maglocks will not be accepted by the fire department and may adversely impact the outcome of a fire inspection.

Example of non-compliant magnetic lock and push to exit buttons.

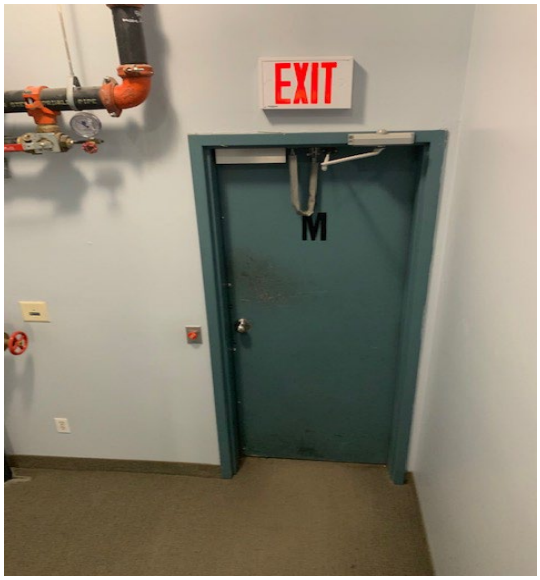

Figure 1: The images portray "push to exit" buttons. These require special knowledge, are not door hardware, and require two motions to open the doors.

Example of code compliance alternatives for buildings other than Care, Treatment, or Detention Occupancies

Figure 2: Panic hardware tied into the magnetic lock

Strike plate allowing the door to mechanically override the lock

Although all new installations must comply with the National Fire Code (AE) and the National Building Code (AE) as per the interpretations above, one option that may reduce the burden on customers with previous non-compliant installs would be to add an electrical/mechanical push bar to doors where "push to exit" buttons are currently installed for releasing the maglocks as shown in figure 2. The "push to exit" bar will release the magnetic lock and allow the door to open with a single motion as required by the codes. This option may provide the same level of safety without requiring special knowledge.

However, a better option may be electric strike plates, which can be designed to "fail-secure". This means that when the power is removed the locking mechanism stays in the locked position and the door hardware still allows for the door to open in the direction of travel, with a single motion, while preventing unauthorized access. This is great for public buildings as panic hardware and other door control devices, which works in conjunction with the strike plate, allow for the security of your building while providing uninhibited access to egress and exits.

SECTION 3 CARE, TREATMENT, OR DETENTION OCCUPANCIES

Care, Treatment, and Detention Centre's

Sentence 5 of 3.4.6.16 relates to the use of magnetic locks installed on doors in Group B, Division 2 and Division 3 occupancies as outlined in the National Building Code (Alberta Edition).

3.4.6.16. Door Release Hardware Sentence 5

Code Reference	Interpretation
5) Electromagnetic locks that do not incorporate latches, pins or other similar devices to keep the door in the closed position are permitted to be installed on doors in Group B, Division 2 and Division 3 *occupancies*, provided	In Group B2 & B3 occupancies maglocks can be installed in the following manner but only in these occupancy types. The main difference is that the door hardware does not open the door. It is controlled by the switch mentioned in (b)(iii), via auxiliary devices that are installed, or through the activation of the fire alarm only. Access to and from the space is controlled by the staff within the space. This configuration is meant to provide safety to those who are confined to the space as they could come to harm if they were to escape (dementia wards, psychiatric wards).
a) the building is	
i. equipped with a fire alarm system, and	Building must have a fire alarm
ii. sprinklered,	Building must be sprinklered
b) the electromagnetic lock releases upon	
i. actuation of the alarm signal from the building's fire alarm system,	When a single stage fire alarm is set off all maglocks in the building must disengage. When a two-stage fire alarm goes into *alarm* (second stage), all zones in *alarm* must disengage the maglocks as well as all maglocks along the access to exit.
ii. loss of its power supply and of power to its auxiliary controls,	Loss of power must disengage the maglock using a "**fail safe**" (failed open) wiring configuration and can only be reactivated by the appropriate "manually operated switch" referenced in 3.4.6.16.(5)(b)(iii). Therefore, emergency power or battery back-up power supplies are not to be used to provide backup power to maglocks for any purpose when an alarm is activated.

iii. actuation of a manually operated switch that is readily accessible at a constantly attended location within the locked space, and	Different from sentence (4) these switches are to be contained within the locked space and control only that space. There could be, depending on the construction of the building, several locked spaces all needing their own individual switch. **Definition:** "constantly attended" Oxford 2nd Ed. **Constant**: *1 continuous (needs constant attention), 2 occurring frequently, 3 unchanging, 4 faithful, n1 anything that does not vary*. This indicates that the location must have staff continually present and readily available to operate the switch within the locked area. Sufficient staffing would be required to manage patients and still be readily available to operate the switch without delay.
iv. actuation of the manual station installed within 0.5 m of each door and equipped with an auxiliary contact, which directly releases the electromagnetic lock,	This is the manual fire alarm pull station and not a "blue" pull station.
c) upon release, the electromagnetic lock requires manual resetting by actuation of the switch referred to in Subclause (b)(iii),	If the switch is used to release maglock(s) then the switch needs to be used to re-engage maglock(s). Meaning it becomes an On/Off switch.
d) a legible sign with the words "EMERGENCY EXIT UNLOCKED BY FIRE ALARM" written in letters at least 25 mm high with a stroke at least 5 mm wide is permanently mounted on the door,	Every door having a maglock must have a sign indicating it will release upon the activation of the fire alarm.
e) the operation of any by-pass switch, where provided for testing of the fire alarm system, sets off an audible signal and a visual signal at the fire alarm annunciator panel and at the monitoring station referred to in Sentence 3.2.4.7.(4), and	A bypass switch to prevent the release of maglocks when the fire alarm is being tested, if installed, must have an audible and visual indication on the panel when it is engaged and notify the monitoring station that the bypass switch is in use. In this case, this means that the building not only must have a fire alarm but be monitored as well.
f) emergency lighting is provided at the doors. (See Note A-3.4.6.16.(5).)	Each door with a maglock must have emergency lights near or above the door which would enable a person to see and read the sign in "g)". These can be either battery operated lights or lights powered by a genset.

A-3.4.6.16.(5) Electromagnetic Locks in Care and Treatment Occupancies.

The installation of electromagnetic locks in care and treatment occupancies requires special provisions to address the compromised condition of residents and the nature of daily operations. Accordingly, to reduce the incidence of false operation by residents, transparent boxes that set off an audible signal when opened can be installed to cover the manual stations. Also, an optional additional release device (e.g. swipe card device, key pad) can be installed to facilitate the free movement of staff and visitors in the building).	Auxiliary devices are allowed to be installed but are not intended to replace the required devices to be present (i.e. – manual fire pull station).

It is the expectation of the Calgary Fire Department that all buildings designed as Care, Treatment, or Detention centers fully comply with the National Building Code (Alberta Edition) in force at the time of construction, renovation, or upon issuance of a permit as well as the National Fire Code (Alberta Edition) for ongoing operations and maintenance.

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