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Program Name: Decoded 4 – Codes for Electrified Hardware

Program Number: CDW408

Learning Units: One CEH (HSW)

Provider Number: J247

Provider Name: Allegion

Description:

Decoded 4 – Codes for Electrified Hardware:

The fourth class of this 4-part webinar series allows participants to select the appropriate hardware for various door openings, and learn about the code requirements for each. The seven basic sets of codes for electrified hardware are discussed: access control/free egress, delayed egress, controlled egress (I-2), elevator lobby egress, electromagnetic locks released by a sensor, electromagnetic locks released by door-mounted hardware, and stairwell reentry.

Decoded 4 – Codes for Electrified Hardware

Upon successful completion of this course participants should be able to:

1. Describe the concepts of “fail safe” and “fail secure”, which types of electrified hardware are available with each function, and when to specify them.
2. Properly apply code requirements for fire door assemblies and positive latching to applications with electrified hardware.
3. Differentiate between the two code sections relative to electromagnetic locks, and state which release devices are required for each application.
4. Identify delayed egress locks and the applications where doors may be locked in the direction of egress for additional security.
5. Apply the stairwell reentry requirements to doors serving egress stairs, including the various options allowed by NFPA 101 – The Life Safety Code and the International Building Code.

Session 4 – Electrified Hardware

- Electric Latch Retraction
- Access-Controlled Egress Doors
- Electromagnetically Locked Egress Doors
- Delayed Egress Locks
- Elevator Lobbies
- I-2 Special Egress Locks
- Stairwell Reentry

Session 4 – Electrified Hardware

- Electric Latch Retraction Panic Hardware
- Electromagnetic Lock
- Fail Safe Lock or Panic Hardware Trim
- Fail Secure Lock or Panic Hardware Trim
- Fail Safe or Fail Secure Electric Strike
- Delayed Egress Lock
- Alarm

Fail Safe vs. Fail Secure
Electrified Locks and Electrified Exit Device Trim

- Fail Safe
  - When power fails, access-side lever is unlocked.
  - Lock is latched.

- Fail Secure
  - When power fails, access-side lever is locked.
  - Lock is latched.

- Both types typically allow free egress.

Fail Safe vs. Fail Secure Electric Strikes

- Fail Safe
  - When power fails, keeper is free.
  - Latch can be pulled through keeper.

- Fail Secure
  - When power fails, keeper is secure.
  - Latch is captured behind keeper.

- Both types typically allow free egress.
- Electric strikes used on fire doors must be fail secure.


LISTED


SCHLAGE
1 2 3
4 5 6
7 8 9
* 0 #


VON DUPRIN
VON DUPRIN

*

Door #101
Fine Dining

- Existing kitchen
- Need new doors due to 20-minute fire rating
- Restaurant manager does not want doors to latch because of the noise and inconvenience
- No locking required
- One door will swing into kitchen, one door will swing out

- Which code-compliant product should we use to provide positive latching?

Door #101
Fine Dining

- Existing kitchen
- Need new doors due to 20-minute fire rating
- Restaurant manager does not want doors to latch because of the noise and inconvenience
- No locking required
- One door will swing into kitchen, one door will swing out

Electric Latch Retraction Panic Hardware
Electromagnetic Lock
Fail Safe Lock or Panic Hardware Trim
Fail Secure Lock or Panic Hardware Trim
Fail Safe or Fail Secure Electric Strike
Delayed Egress Lock
Alarm

Electric Latch Retraction Panic Hardware / Fire Exit Hardware

- Latch can be held retracted electrically.
- Must project upon fire alarm for fire rated doors so doors are latched to deter smoke and flames - refer to NFPA 80.
- EL/QEL may also be used to release latch for automatic doors (latch may be held back indefinitely and only projected on fire alarm).

Coordinate auto operator actuators with the access control system!

What's wrong with this picture?

Electric Latch Retraction

Apply Power – Latch Retracts

Remove Power – Latch Projects

Fire alarm can initiate latching.

Door #101
Fine Dining

- Existing kitchen
- Need new doors
- Fire Rating: 20 minutes
- Restaurant manager does not want doors to latch because of the noise
- One door will swing into kitchen, one door will swing out

- 4 components for a circuit – load, switch, power supply, and conductors

Don’t forget your conductors…

Don’t forget your conductors…

Door #102
All Glass

- Existing glass door – no stiles or rails
- Access control system will lock/unlock door on a time schedule
- Free egress is required

- Which code-compliant product should we use?

Door #102
All Glass

- Existing glass door – no stiles or rails
- Access control system will lock/unlock door on a time schedule
- Free egress is required

Electric Latch Retraction Panic Hardware
Electromagnetic Lock
Fail Safe Lock or Panic Hardware Trim
Fail Secure Lock or Panic Hardware Trim
Fail Safe or Fail Secure Electric Strike
Delayed Egress Lock
Alarm

Access-Controlled Egress Doors

- Used to control and monitor access.
- Must also provide life safety.
- Typically an electro-magnetic lock, access control device, and required release devices.
- A powerbolt may also be considered an Access-Controlled Egress Door.

Not all doors with access control are Access-Controlled Egress Doors!

- Controlled Access / Free Egress – hardware allows egress independent of access control system
- Delayed Egress – 15-second delay
- Stairwell Reentry – fail-safe lock
- I-2 (Hospitals / Nursing Homes) – fail-safe locks
- Elevator Lobbies (NFPA 101 only) – fail-safe locks
- Electromagnetically Locked Egress Doors – mag-lock with door-mounted release
- Access Controlled Egress Doors – mag-lock with motion sensor release

Access-Controlled Egress Doors

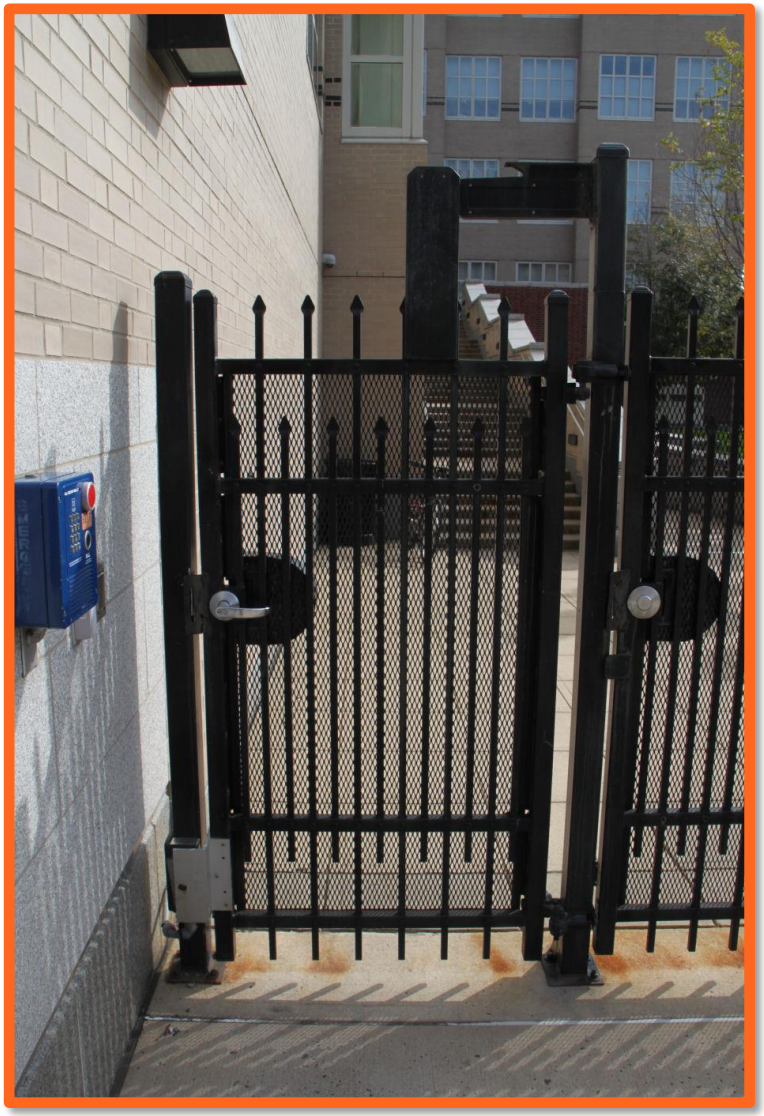
- Entrance doors & tenant entrance doors
- IBC Groups A, B, E, I-2, M, R-1 or R-2
- NFPA 101 – where allowed by occupancy chapter

- A sensor unlocks the lock.
- Power loss to lock unlocks the door.
- Manual release device (with sign) unlocks door for 30 seconds, independent of access control system.
- Actuation of fire/sprinkler system (if provided) unlocks door.


EXIT

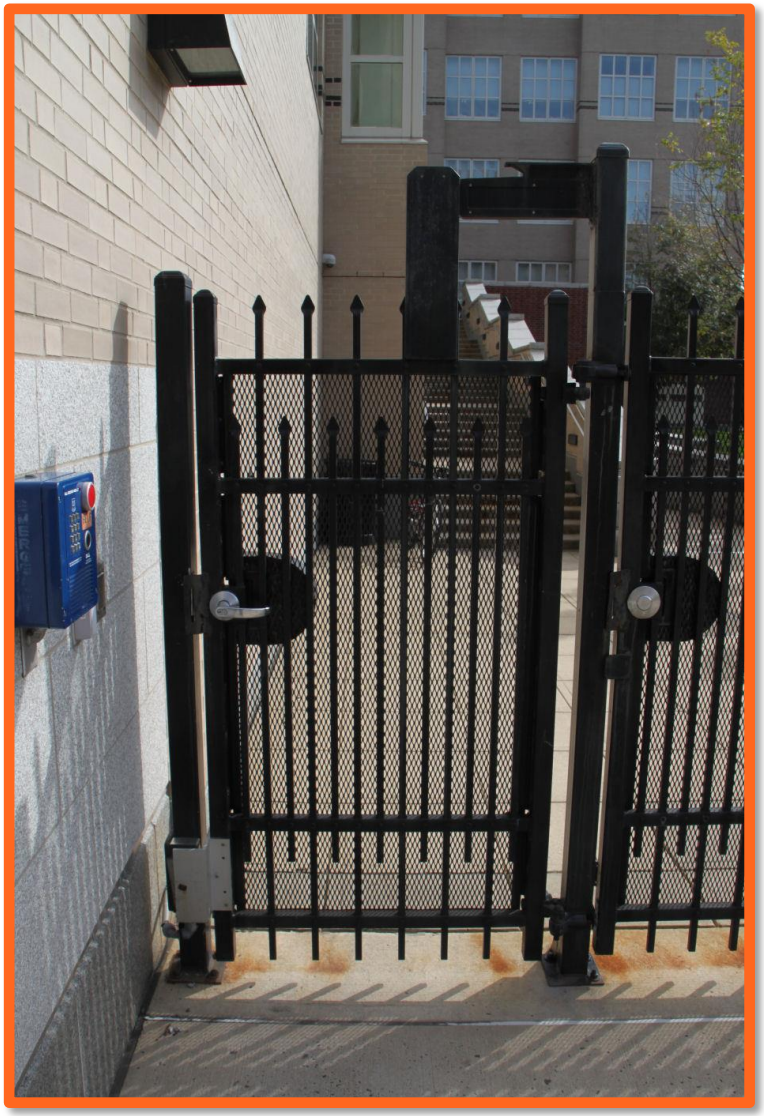

STAIR
1
DOOR LOCKED
CARD ACCESS ONLY
IN EMERGENCY
LIFT COVER
PUSH BUTTON
Please Close
Door Behind
You
FIRE ALARM
PULL DOWN
FOR EMERGENCY EXIT LIFT COVER

Mag-Locks can be an option for gates, but you may need a variance for the release devices.



TJ Bracket

With gates, you also need to think about conductors, closers, and access to hardware.



Is battery backup allowed?

- Codes require mag-locks to unlock upon loss of power, but “loss of power” is not defined.
- Is this loss of normal building power?
- Can the lock be powered by the emergency generator along with the rest of the building?

- NFPA 72 Interpretation - if the fire alarm system and mag-locks are on the same back-up power, this would meet the intent of the code.
- Do not specify separate battery back-up in the power supply for the locks.

Door #103
No Sensor

- The owner wants a mag-lock and card reader.
- A motion sensor won't work because it will be accidentally actuated by the room's occupants.
- Door has very narrow stiles.
- Free egress is required.

- What's the best option?

Electric Latch Retraction Panic Hardware
Electromagnetic Lock
Fail Safe Lock or Panic Hardware Trim
Fail Secure Lock or Panic Hardware Trim
Fail Safe or Fail Secure Electric Strike
Delayed Egress Lock
Alarm

Mag-Lock with Door-Mounted Release (RX Switch)

- 2009 edition of NFPA 101: Electrically Controlled Egress Door Assemblies
- 2009 edition of IBC: Electromagnetically Locked Egress Doors

Mag-Lock with Door-Mounted Release (RX Switch)

- Release device affixed to door leaf
- Obvious means of operation in direction of egress
- Operable with one hand
- Interrupts power supply and unlocks door
- Loss of power unlocks door
- No requirement for fire alarm release.

Direct-Hold Mag-Locks vs Shear Locks


LISTED
2599
AUXILIARY LOCKS

Interlocks (AKA man-traps), which often involve mag-locks, are not addressed in the IBC or NFPA 101.


AIR SHOWER

Door #104
Library Egress

- Library emergency exit
- Librarian wants to lock door
  and only allow egress if there is a fire alarm.
- Code is **NFPA 101-2009**

- Given that we're using NFPA 101, what's the best product application?

Electric Latch Retraction Panic Hardware
Electromagnetic Lock
Fail Safe Lock or Panic Hardware Trim
Fail Secure Lock or Panic Hardware Trim
Fail Safe or Fail Secure Electric Strike
Delayed Egress Lock
Alarm

Delayed Egress Devices

Delayed Egress

- Designed to delay egress to prevent unauthorized use of the door.
- Must allow egress for life safety.
- Typically a delayed egress exit device or magnetic lock with delayed egress controller.

Delayed Egress Locks (NFPA 101)

- Approved, listed, delayed egress locks
- Must be allowed by occupancy chapter
- Automatic sprinkler system or smoke/heat detection
- Quantity of delays per egress path varies by occupancy
- Immediate release by fire alarm, smoke detection system, or power failure
- Capability of releasing from fire command center
- 15 lbs. applied for 3 second begins 15-second timer (30-second if approved by AHJ)
- Audible local alarm
- Manual rearm
- Signage - “Push until alarm sounds. Door can be opened in 15 seconds.” (+ additional requirements)

Table 2: Occupancies Permitting Delayed Egress Locks NFPA 101 – 2003, 2006, 2009 Editions	
Occupancy	**Condition**
Assembly	Only doors other than main entrance/exit doors may be equipped with delayed egress locks.
Educational / Day Care	No restrictions.
Health Care, Lodging and Rooming Houses, Hotels and Dormitories, Apartment Buildings	Not more than one delayed egress device may be encountered in any egress path.
Residential Board and Care	Exterior doors only. Not more than one delayed egress device may be encountered in any egress path.
Ambulatory Health Care	No restrictions (Editions of NFPA 101 prior to 2003 limit the use of delayed egress devices in ambulatory health care occupancies to exterior doors.)
Mercantile, Business, Industrial, Storage	No restrictions.


PUSH UNTIL ALARM SOUNDS
DOOR CAN BE OPENED
IN 15 SECONDS


PUSH UNTIL ALARM SOUNDS
DOOR CAN BE OPENED
IN 15 SECONDS

EMERGENCY EXIT ONLY

PICK UP PHONE FOR EMERGENCY EXIT


KEEP PUSHING
THIS DOOR WILL
OPEN IN 15 SECONDS
ALARM WILL SOUND
EMERGENCY EXIT ONLY
→ EXIT THROUGH
MAIN LOBBY
Push until alarm sounds.
Door can be opened in 15 seconds.
EMERGENCY EXIT ONLY
→ EXIT THROUGH
MAIN LOBBY
Push until alarm sounds.
Door can be opened in 15 seconds.
NOT AN EXIT
EXIT


PUSH UNTIL ALARM SOUNDS
DOOR CAN BE OPENED
IN 15 MINUTES

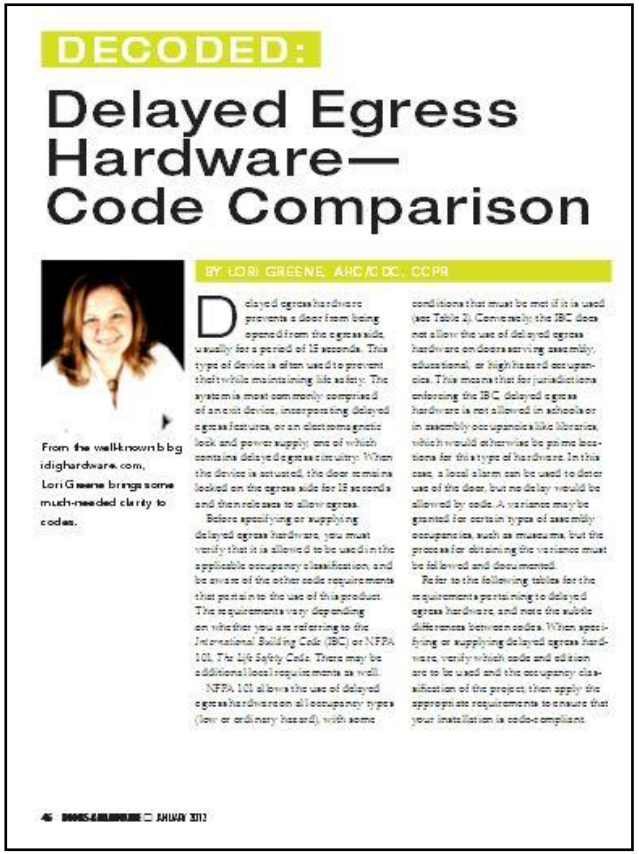
Door #104
Library Egress

- Library emergency exit
- Librarian wants to lock door and only allow egress during a fire alarm.
- ~~Code is NFPA 101-2009~~

- What if the code was the 2009 IBC?

Delayed Egress (IBC)

- Allowed in all occupancies except Assembly, Educational, and High Hazard
- One delay before entering an exit
- 15 lbs. applied for 1 second begins 15-second timer (30-second if approved by AHJ)
- BOCA option (automatic rearm) is not required for IBC compliance.



DECODED:

Delayed Egress Hardware—Code Comparison

BY: LORI GREENE, AHC/OSC, CCPR

From the well-known blog idighardware.com, Lori Greene brings some much-needed clarity to codes.

Delayed egress hardware prevents a door from being opened from the egress side, usually for a period of 15 seconds. This type of device is often used to prevent theft while maintaining life safety. The system is most commonly comprised of an exit device, incorporating delayed egress features, or an electromagnetic lock and power supply, one of which contains delayed egress circuitry. When the device is activated, the door remains locked on the egress side for 15 seconds and then releases to allow egress.

Before specifying or supplying delayed egress hardware, you must verify that it is allowed to be used in the applicable occupancy classification, and be aware of the other code requirements that pertain to the use of this product. The requirements vary depending on whether you are referring to the *International Building Code* (IBC) or NFPA 101, *The Life Safety Code*. There may be additional local requirements as well.

NFPA 101 allows the use of delayed egress hardware on all occupancy types (low or ordinary hazard), with some conditions that must be met if it is used (see Table 2). Conversely, the IBC does not allow the use of delayed egress hardware on doors serving assembly, educational, or high hazard occupancies. This means that for jurisdictions enforcing the IBC, delayed egress hardware is not allowed in schools or in assembly occupancies like libraries, which would otherwise be prime locations for this type of hardware. In this case, a local alarm can be used to deter use of the door, but no delay would be allowed by code. A variance may be granted for certain types of assembly occupancies, such as museums, but the process for obtaining the variance must be followed and documented.

Refer to the following tables for the requirements pertaining to delayed egress hardware, and note the subtle differences between codes. When specifying or supplying delayed egress hardware, verify which code and edition are to be used and the occupancy classification of the project, then apply the appropriate requirements to ensure that your installation is code-compliant.

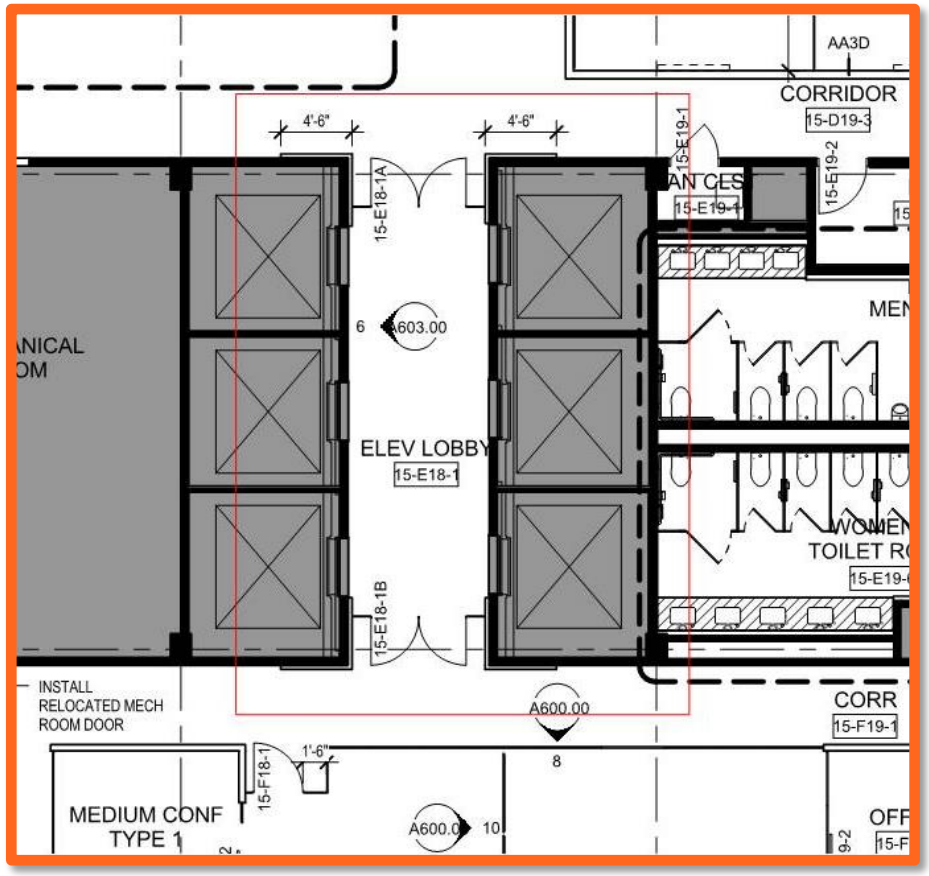
Sometimes an alarm is the most secure solution you can offer.

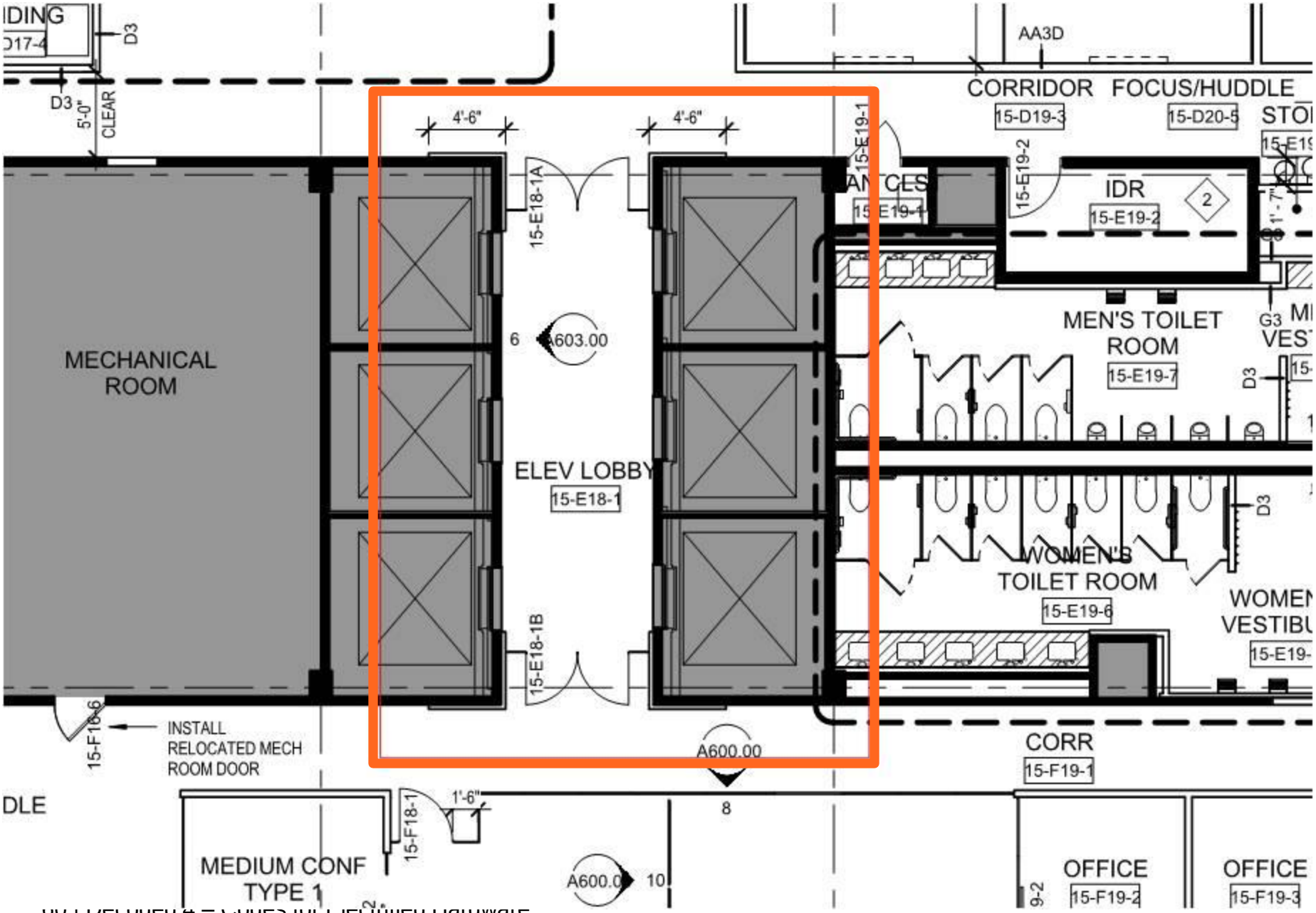

EMERGENCY
EXIT
BREAK
GLASS
FIRE EXIT ONLY

EMERGENCY
EXIT
BREAK
GLASS
UL

Door #105
Elevator Lobby

- Means of egress from the elevator lobby is through the tenant space

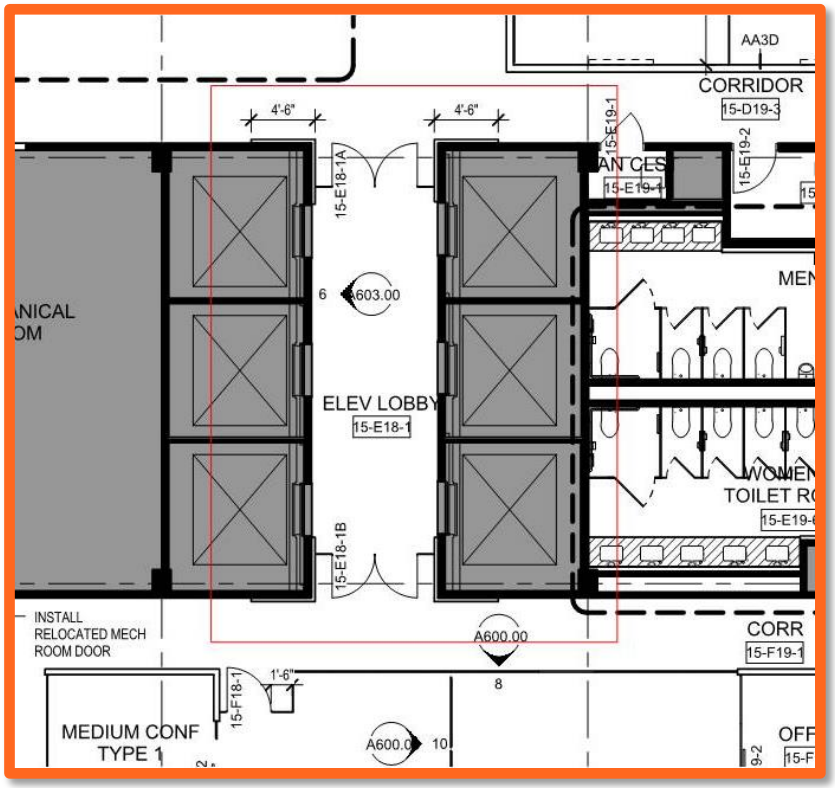



MECHANICAL ROOM
ELEV LOBBY
15-E18-1
15-E18-1A
15-E18-1B
4'-6"
4'-6"
A603.00
A600.00
INSTALL RELOCATED MECH ROOM DOOR
15-F18-6
CORRIDOR
15-D19-3
FOCUS/HUDDLE
15-D20-5
AA3D
IDR
15-E19-2
MEN'S TOILET ROOM
15-E19-7
WOMEN'S TOILET ROOM
15-E19-6
CORR
15-F19-1
MEDIUM CONF TYPE 1
15-F18-1
OFFICE
15-F19-2
OFFICE
15-F19-3
D3
5'-0" CLEAR

Door #105
Elevator Lobby

- Means of egress from the elevator lobby is through the tenant space

- How can you provide security from the elevator lobby into the tenant space?



Electric Latch Retraction Panic Hardware
Electromagnetic Lock
Fail Safe Lock or Panic Hardware Trim
Fail Secure Lock or Panic Hardware Trim
Fail Safe or Fail Secure Electric Strike
Delayed Egress Lock
Alarm

Elevator Lobby Egress

- **2009 IBC:** *708.14.1: "Elevator lobbies shall have at least one means of egress complying with Chapter 10 and other provisions within this code."*
- **2009 NFPA 101:** *7.2.1.6.3 Elevator Lobby Exit Access Door Assemblies Locking.*
  - Fail safe lock – unlocks on fire alarm and power failure (battery backup not allowed)
  - Must be allowed by occupancy chapter
  - Switch listed per UL 294 Access Control System Units
  - Two-way communication system in elevator lobby
- Some state codes also have modifications for elevator lobby doors.

*

Door #106
Pediatric Ward

- What product can you offer to allow the hospital to secure the doors on the egress side if the code is the 2009 IBC or 2009 NFPA 101?

Electric Latch Retraction Panic Hardware
Electromagnetic Lock
Fail Safe Lock or Panic Hardware Trim
Fail Secure Lock or Panic Hardware Trim
Fail Safe or Fail Secure Electric Strike
Delayed Egress Lock
Alarm

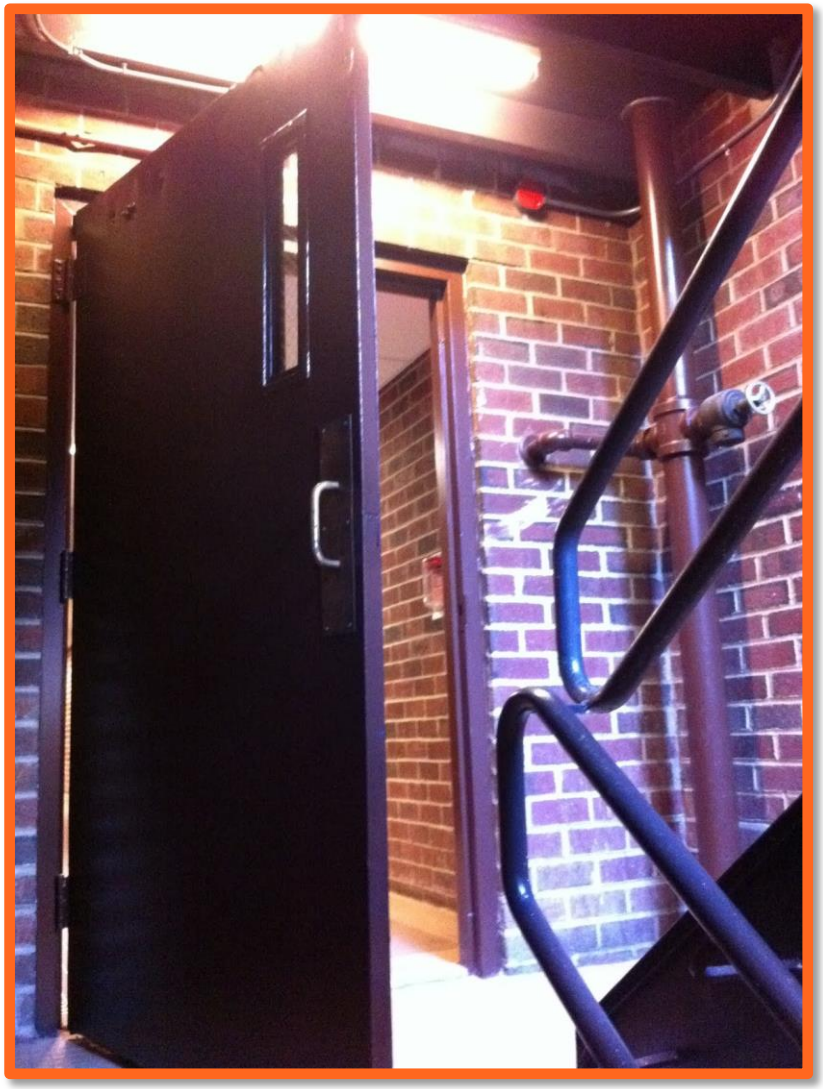
I-2 Special Egress Locks

- Must have fire protection/detection system
- Doors unlock upon activation of sprinkler/fire alarm and loss of power controlling lock
- Capability of remote unlock
- One special egress lock max. before entering an exit
- Procedures must be part of emergency planning and preparedness
- All clinical staff carry keys/code/credentials to operate locks
- Emergency lighting at the door
- Protective needs (maternity, pediatrics, emergency, dementia) vs. security measures (detention, forensics)

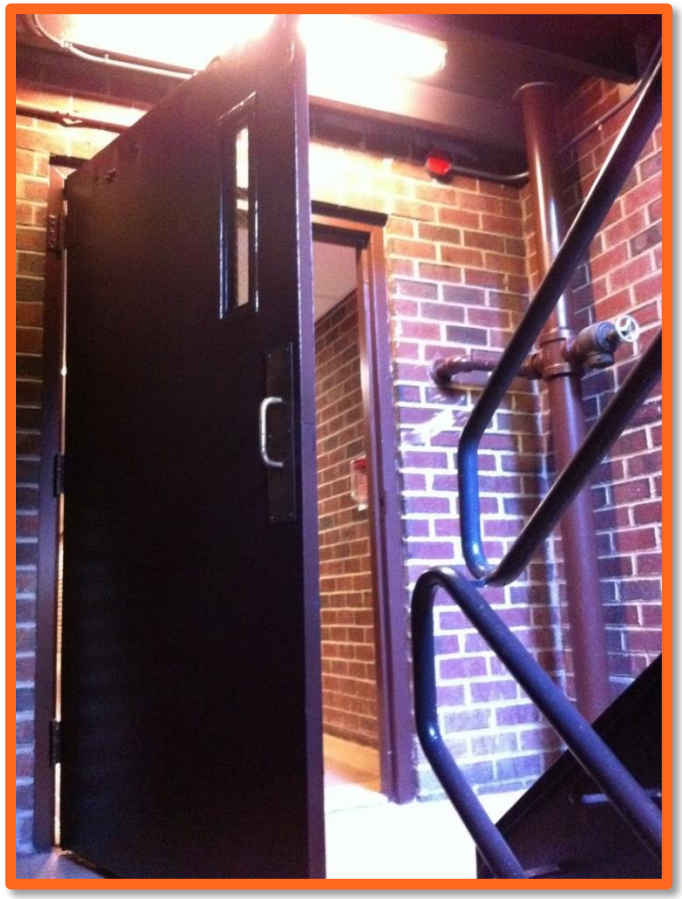
Door #107
Stair Door

- Replacing existing stair doors
- High-rise building
- Multi-tenant
- Card readers on stair side
- Code is 2009 IBC

- We need a product that meets requirements for fire door assemblies and stairwell reentry.



Door #107
Stair Door



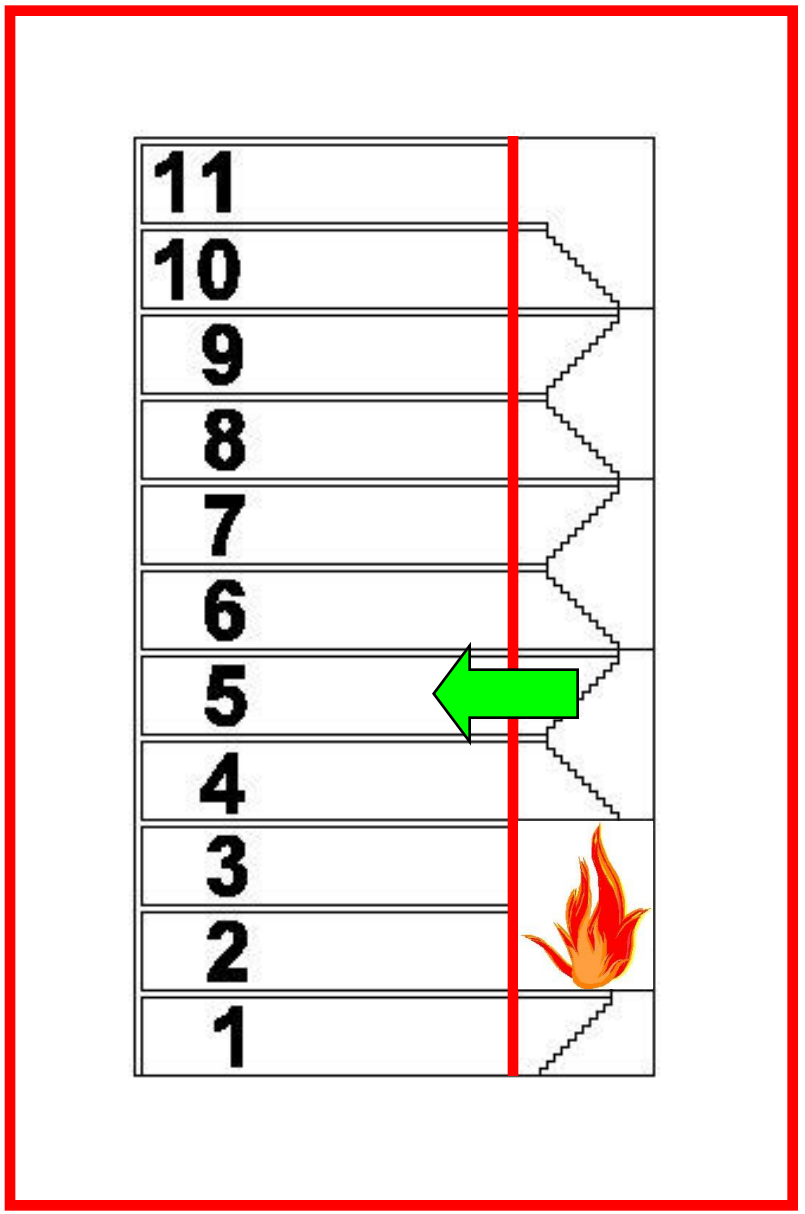
- Replacing existing stair doors
- High-rise building
- Multi-tenant
- Card readers on stair side
- Code is 2009 IBC

- We need a product that meets requirements for fire door assemblies and stairwell reentry.

Electric Latch Retraction Panic Hardware
Electromagnetic Lock
Fail Safe Lock or Panic Hardware Trim
Fail Secure Lock or Panic Hardware Trim
Fail Safe or Fail Secure Electric Strike
Delayed Egress Lock
Alarm

Stairwell Reentry

- Stairwell doors are often locked to prevent entry to restricted floors.
- During a fire, occupants must be able to move from the stairwell onto floors through doors that are normally locked.

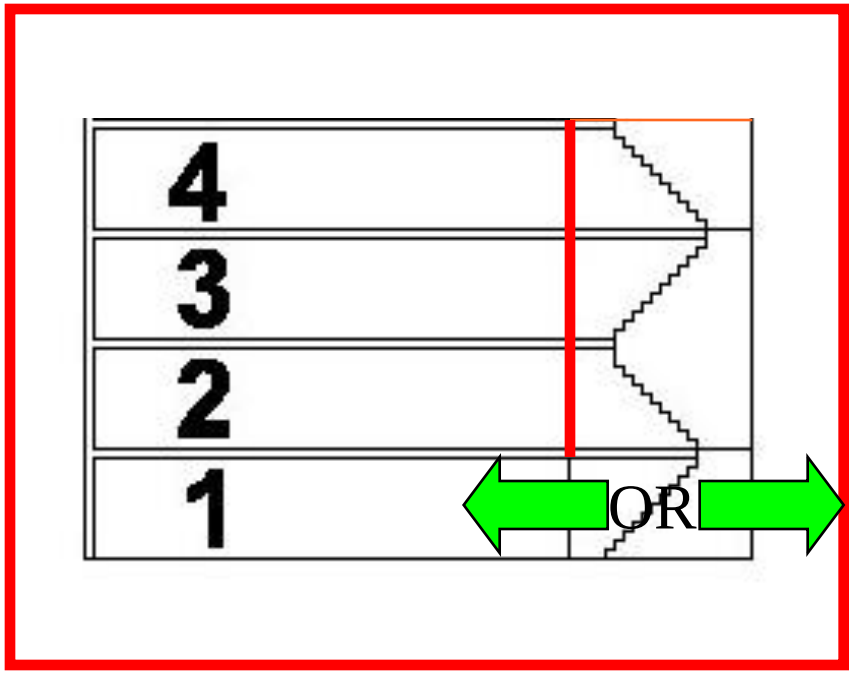


Stairway Doors

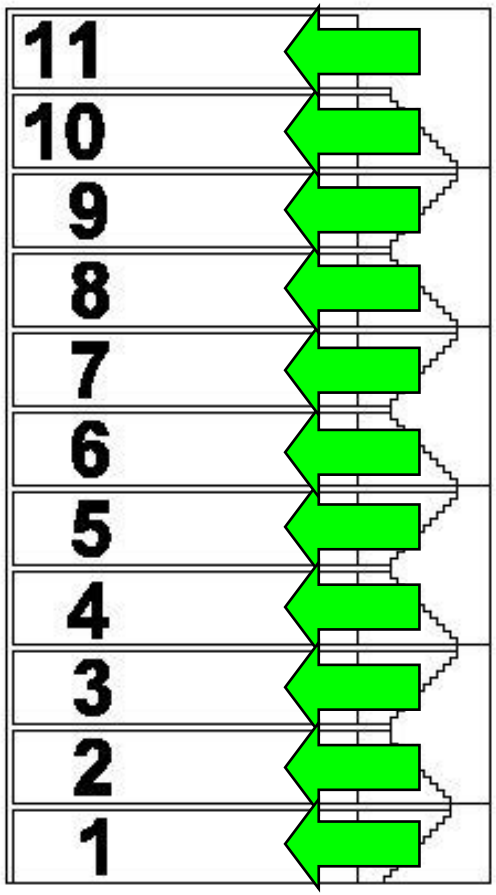
- Interior stairway means of egress doors openable from both sides without a key or special knowledge or effort
  - Discharge doors openable from egress side
  - High rise buildings (403.5.3)

- Unlocked without unlatching by a signal from the fire command center
- Stairway communication system required
  - Stairs serving 4 stories or less – recent changes

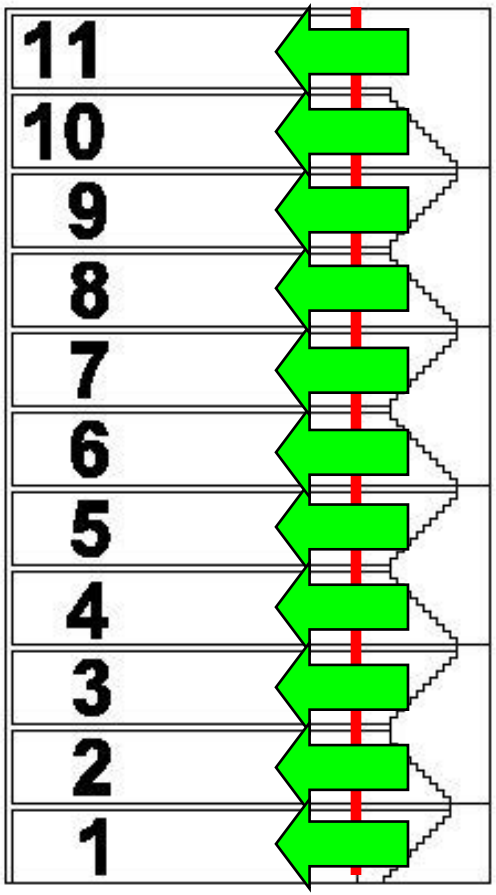
- The 2003 edition of the IBC allowed stairs serving not more than four stories to have mechanical locksets on the stair side of doors other than the stair discharge.
- Later editions require fail safe locks controlled remotely, even on stairs serving 4 stories or less.



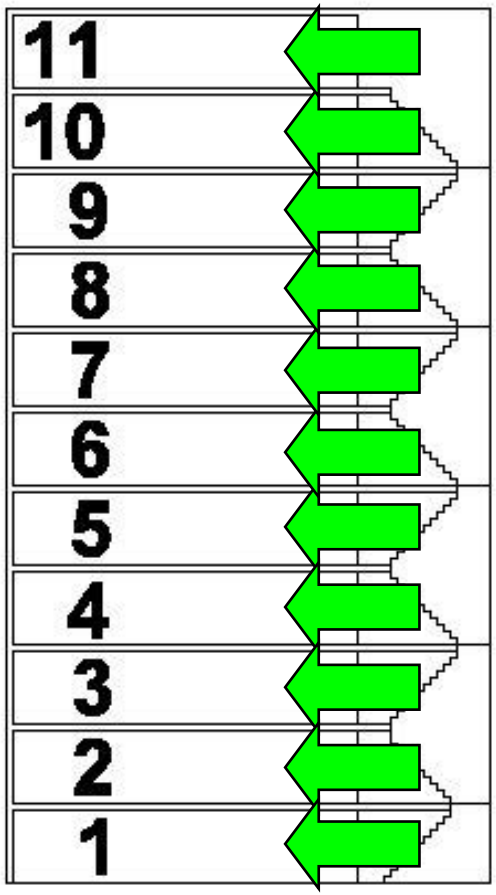
Free Access



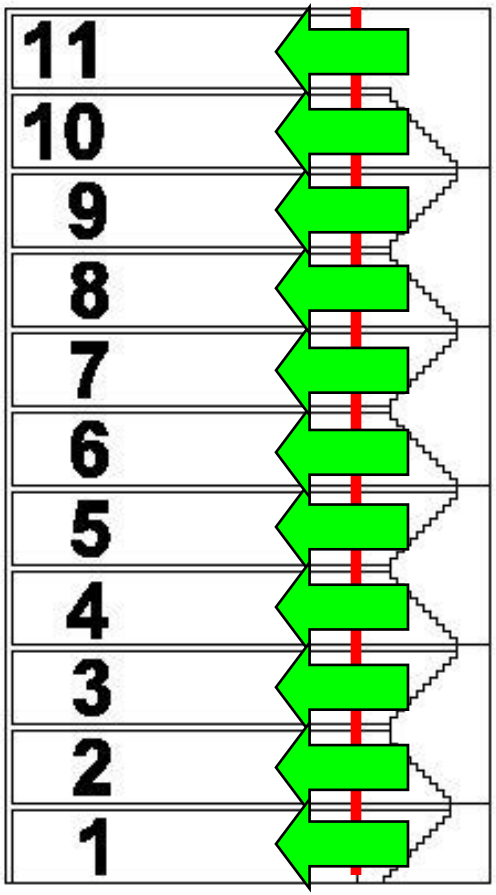
Unlock on Fire Alarm



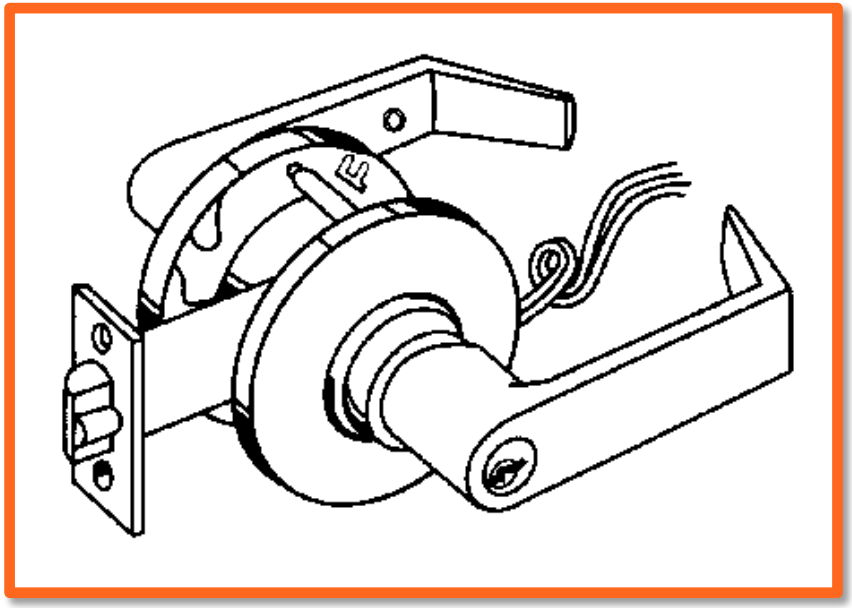
Free Access

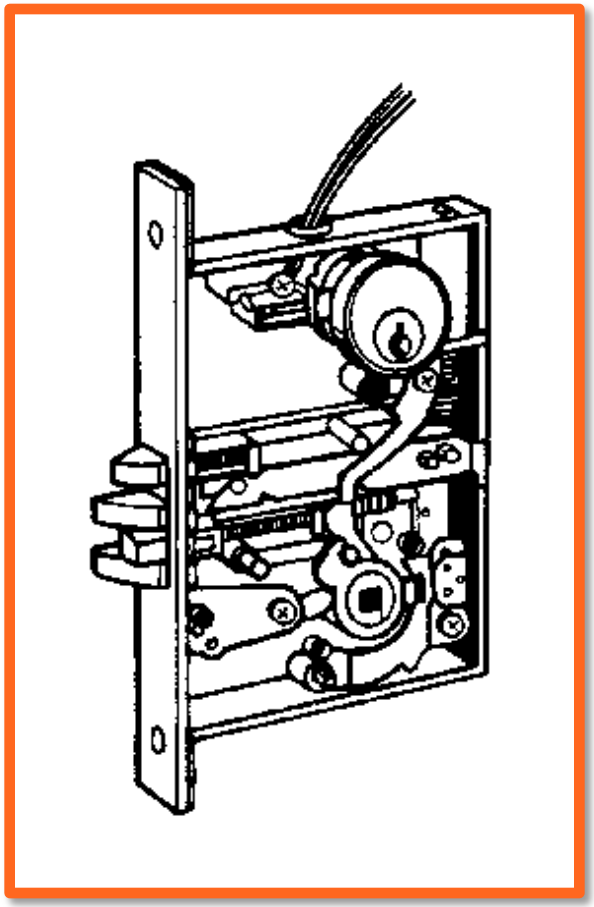


Unlock on Fire Alarm



Electrified Locks





Fail Safe vs. Fail Secure

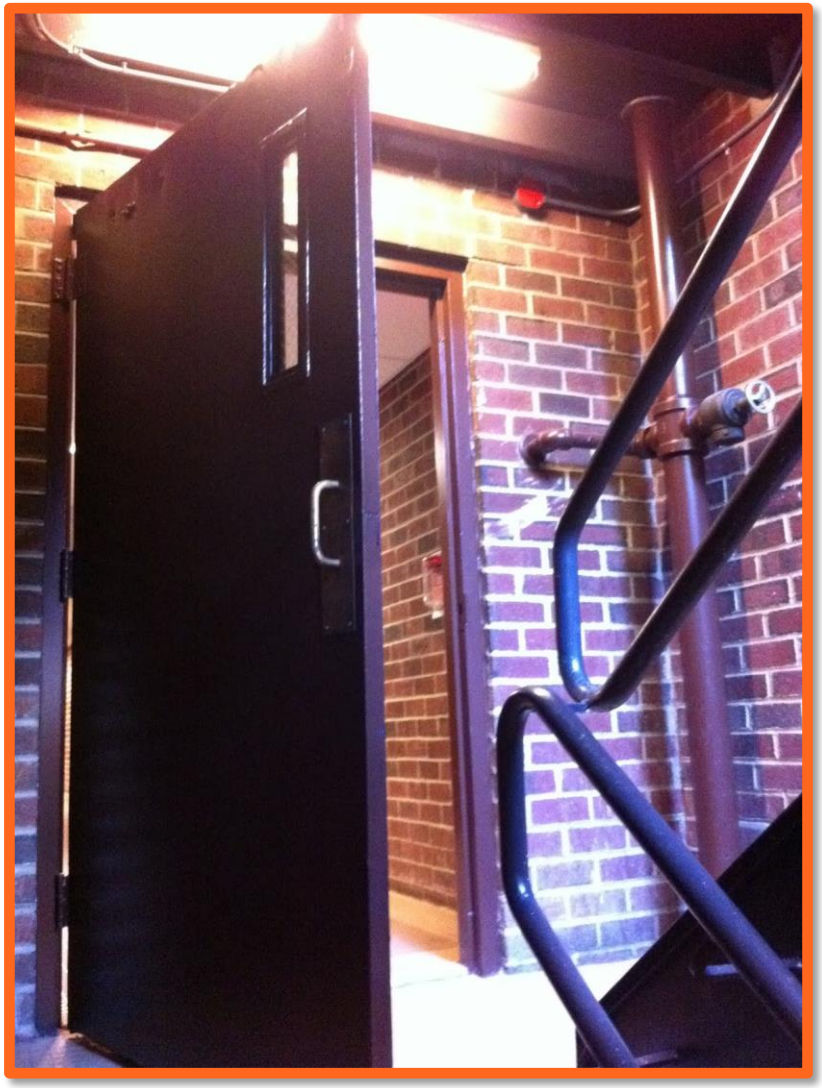
- Fail Safe - When power fails, lock is unlocked.
  - Lock is still latched.
- Fail Secure - When power fails, lock is locked.
  - Lever on secure side is locked.
  - Lever on egress side is not locked.

  - Fail safe locks are required for stairwell reentry.
  - Fail safe strikes may not be used because they are not listed for use on a fire door.

Door #104
Stair Door

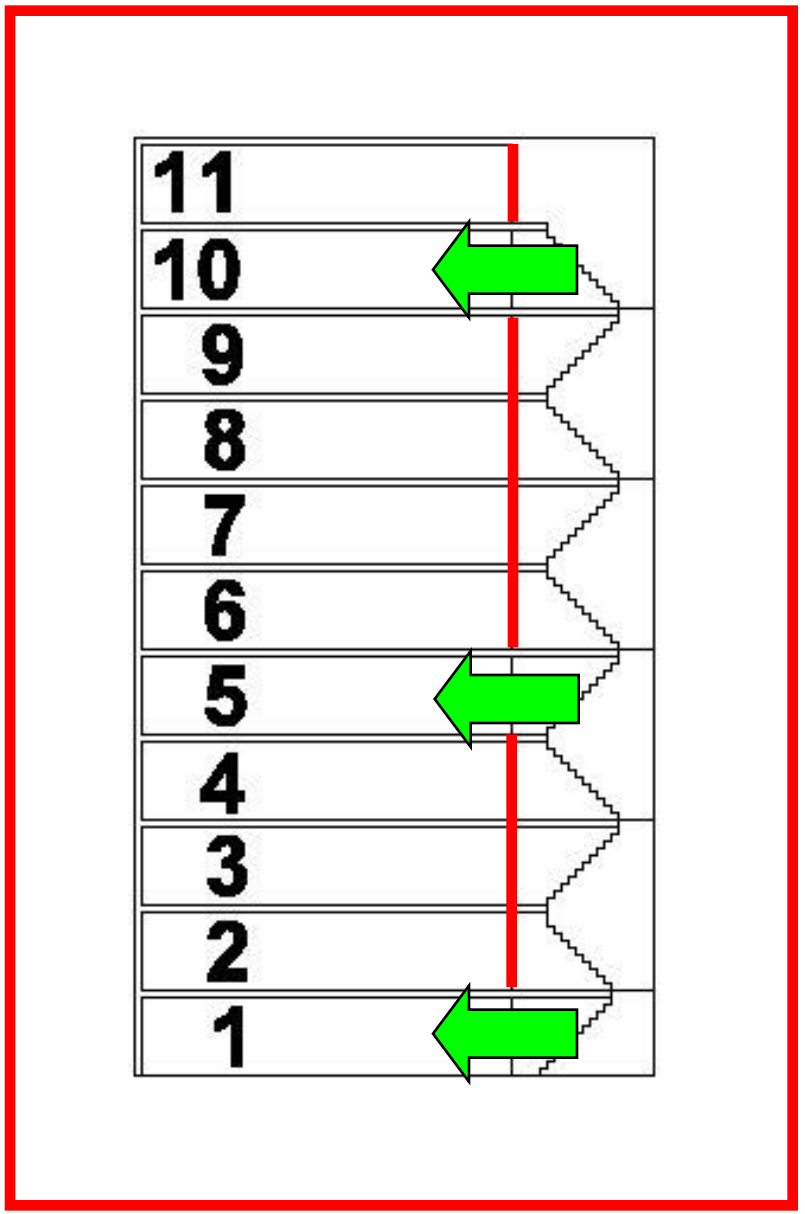
- Replacing existing stair doors
- High-rise building
- Multi-tenant
- Card readers on stair side
- ~~Code is 2009 IBC~~

- If the code is NFPA 101, selected reentry is an option.



Selected Reentry

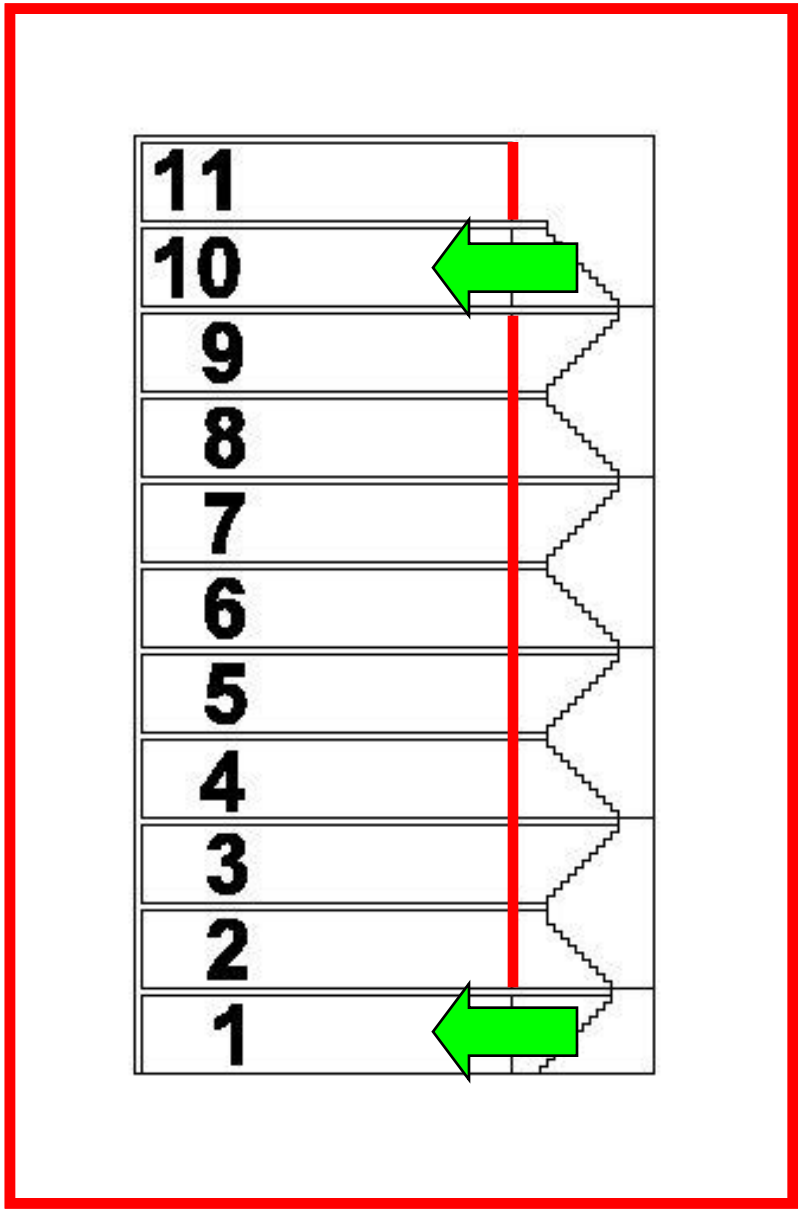
- Allows mechanical locking of some doors
- Selected reentry is not covered in the IBC



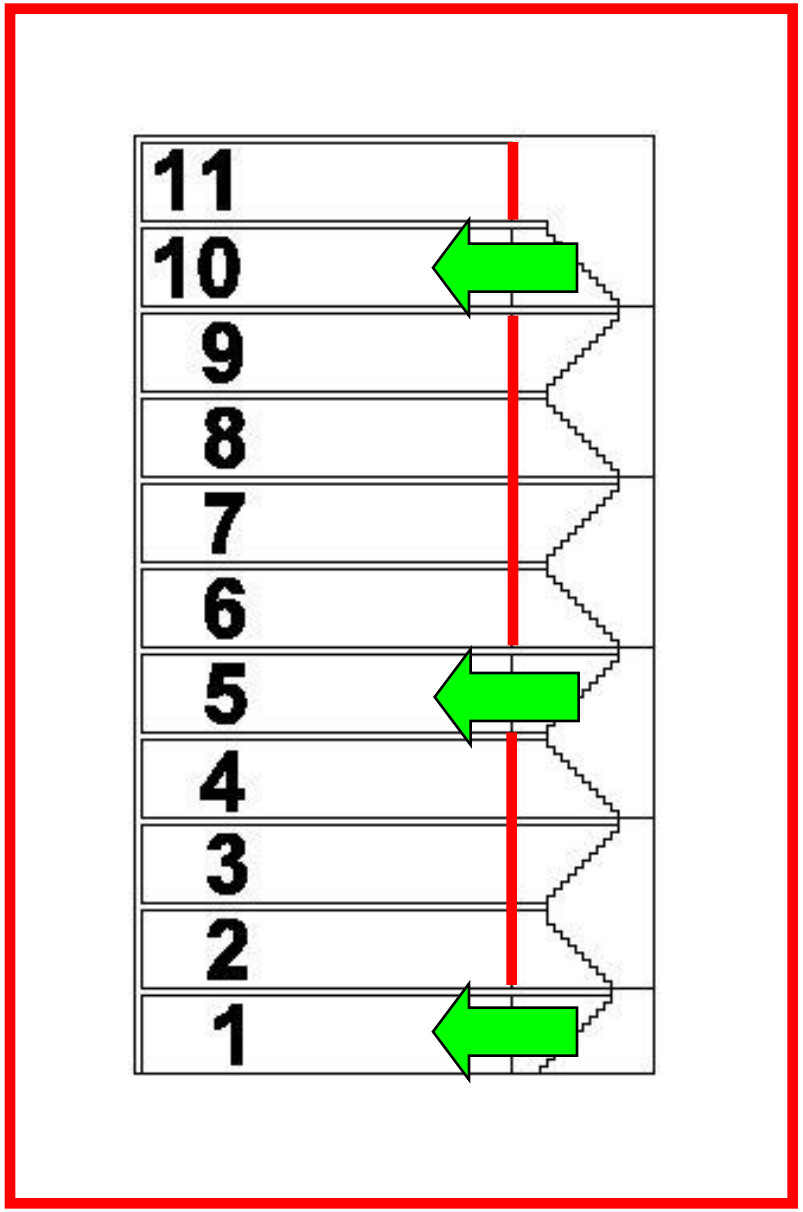
Selected Reentry

- **NFPA 101 -** Door assemblies on stair enclosures shall be permitted to be equipped with hardware that prevents re-entry into the interior of the building, provided that the following criteria are met:

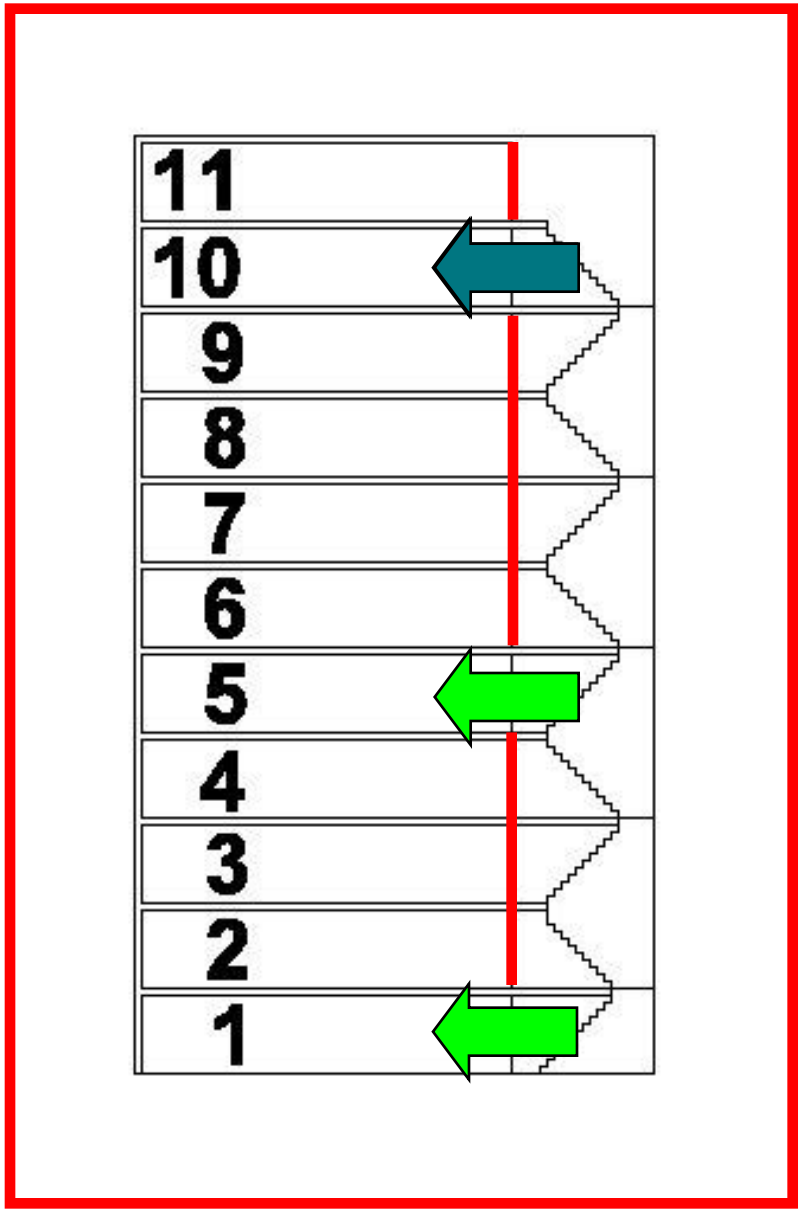
- (1) There shall be not less than two levels where it is possible to leave the stair enclosure to access another exit.



- (2) There shall be not more than four stories intervening between stories where it is possible to leave the stair enclosure to access another exit.

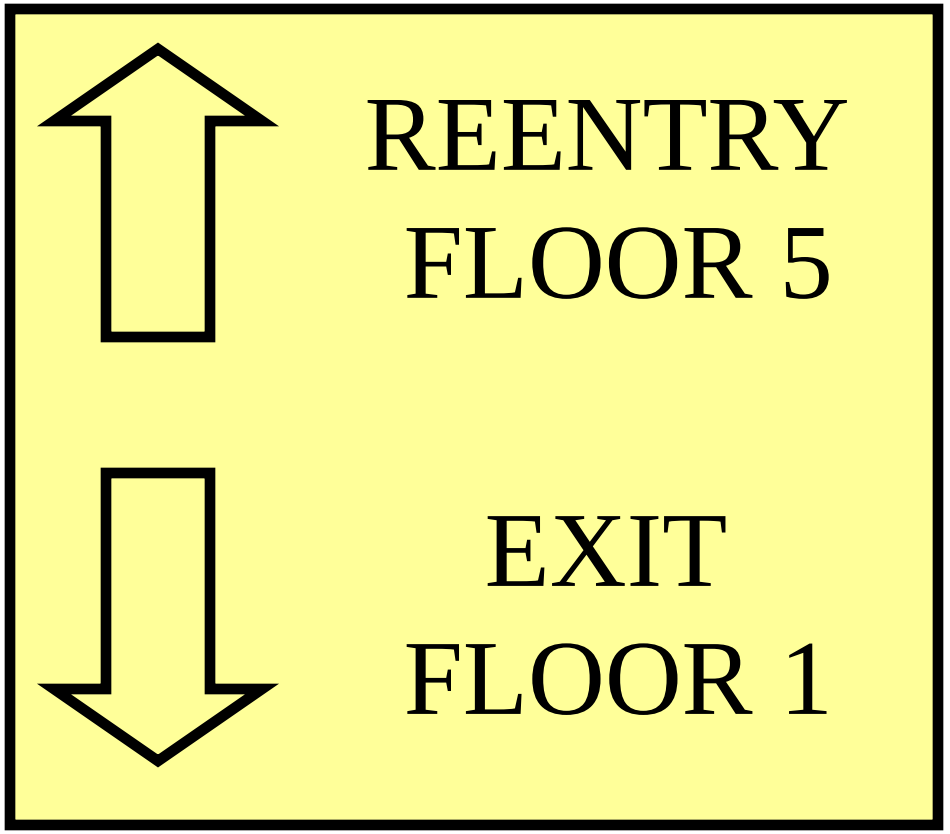


- (3) Re-entry shall be possible on the top story or next-to-top story served by the stair enclosure, and such story shall allow access to another exit.



- (4) Door assemblies allowing re-entry shall be identified as such on the stair side of the door leaf.

- (5) Door assemblies not allowing re-entry shall be provided with a sign on the stair side indicating the location of the nearest door opening, in each direction of travel, that allows re-entry or exit.



Session 4 – Electrified Hardware

- Electric Latch Retraction
- Access-Controlled Egress Doors
- Electromagnetically Locked Egress Doors
- Delayed Egress Locks
- Elevator Lobbies
- I-2 Special Egress Locks
- Stairwell Reentry

More information on codes for electrified hardware:

- Doors with Access Control
- Fail Safe vs. Fail Secure – When and Where?
- Code Requirements for Electromagnetic Locks
- Elevator Lobby Egress
- Electromagnetically Locked Egress Doors
- Stairwell Reentry – Myths and Facts
- Delayed Egress Hardware – Code Comparison
- Special Egress Locks in I-2 Occupancies
- NFPA 72 on Access Control

Thank You!

This concludes the American Institute of Architects Continuing Education Systems Program

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