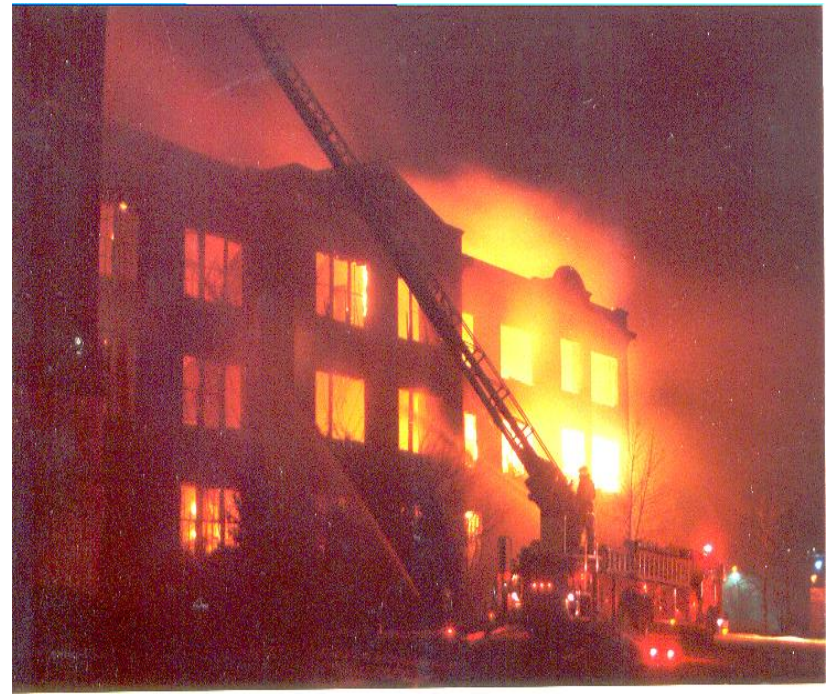


Balancing Security with Fire Safety in Educational Occupancies



Instructor Bio

- John Swanson
- Inspector/Plans Examiner
- Deputy State Fire Marshal (MN)
- NFPA 72 Technical Committee
- Previous member – IBC Fire Safety Committee
- Instructor for International Code Council and National Fire Academy
- Appointed by MN Gov. Mark Dayton to Board of Architecture & Engineering (2013-2017)



Fire & Life Safety Interests...



- Fire Alarm Systems



Fire & Life Safety Interests...



- Fire Alarm Systems



- School Fire Safety

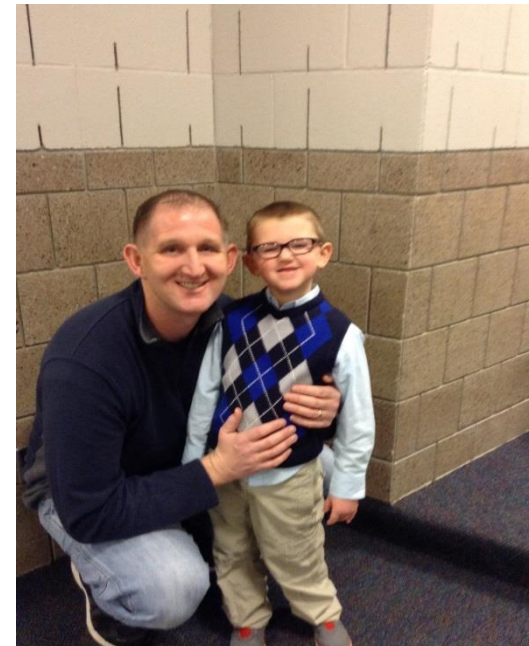
Fire & Life Safety Interests...



- Fire Alarm Systems



- School Fire Safety



- Autism/Fire & Life Safety

Miscellaneous Information

- Restrooms
- Breaks
- Roster
- Informal
- Participate
- Please ask questions

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"You're not allowed to use the sprinkler system to keep your audience awake."

Introductions



- Please introduce yourself:
 - Employer
 - Years of experience



Challenges



- Balancing security with fire/life safety with the primary purpose of schools: educating students.
- Schools are a mix of hazards under one roof:
 - Assembly Uses (lots of people),



Challenges



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 - Fire Risks (cooking, open flames, labs, shops, cutting/welding),



Challenges



- Balancing security with fire/life safety with the primary purpose of schools: educating students.
- Schools are a mix of hazards under one roof:
 - Assembly Uses (lots of people),
 - Fire Risks (cooking, open flames, labs, shops, cutting/welding),
 - **Vulnerable population (by society's standards).**

Vulnerable Population



Challenges for Safety in Schools Then and Now...



**JUST A FEW YEARS AGO
SCHOOLS WERE DESIGNED TO
ACHIEVE AN OPEN AND
INVITING CAMPUS**

Multiple open entrances

Large windows for natural light

Open style designs with no walls or
doors



Challenges for Safety in Schools...



- **Now...**

- Design professionals understand the need for enhanced security in schools.
 - Compartmentation
 - Secure entry and main ingress/egress routes
 - Limiting size and placement of windows
 - Site design features such as limiting pedestrian and vehicle routes, parking areas, & enhanced lighting.

Security vs. Fire



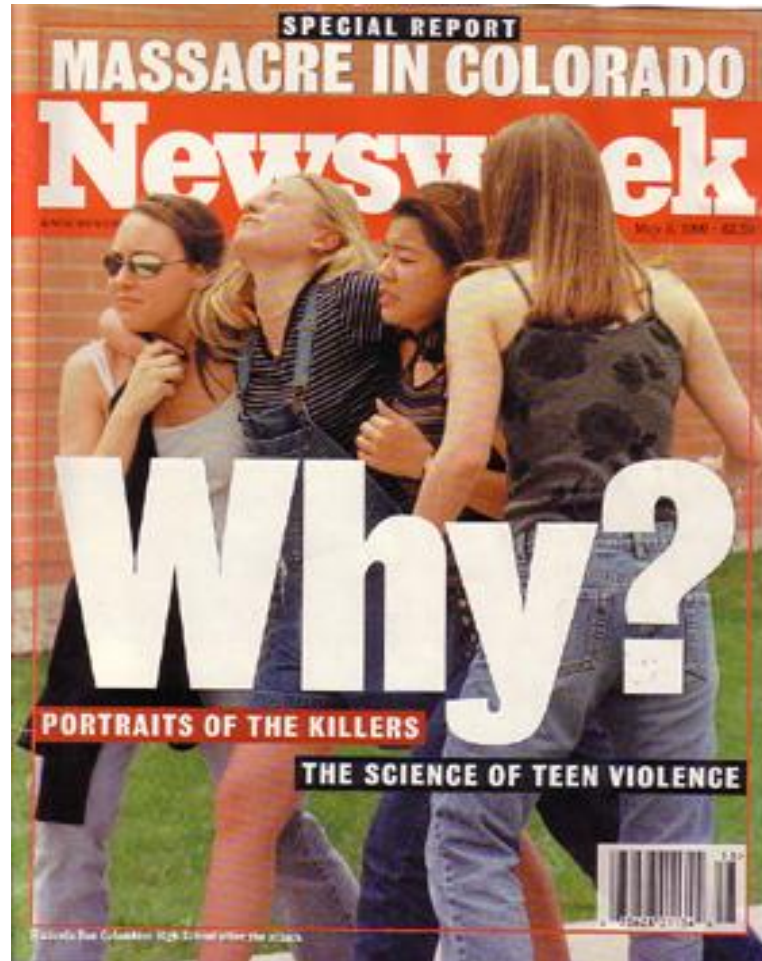
• Security

- Single controlled point of access in & out of building
- Limit number of doors by providing physical constraints to their use
- Large open space with limited vehicle access to building

• Fire

- Provide required egress and size of exits
- Exit doors must be openable from the egress side without the use of a key, special knowledge or effort
- Fire department & emergency vehicle access to building

Emergency Planning

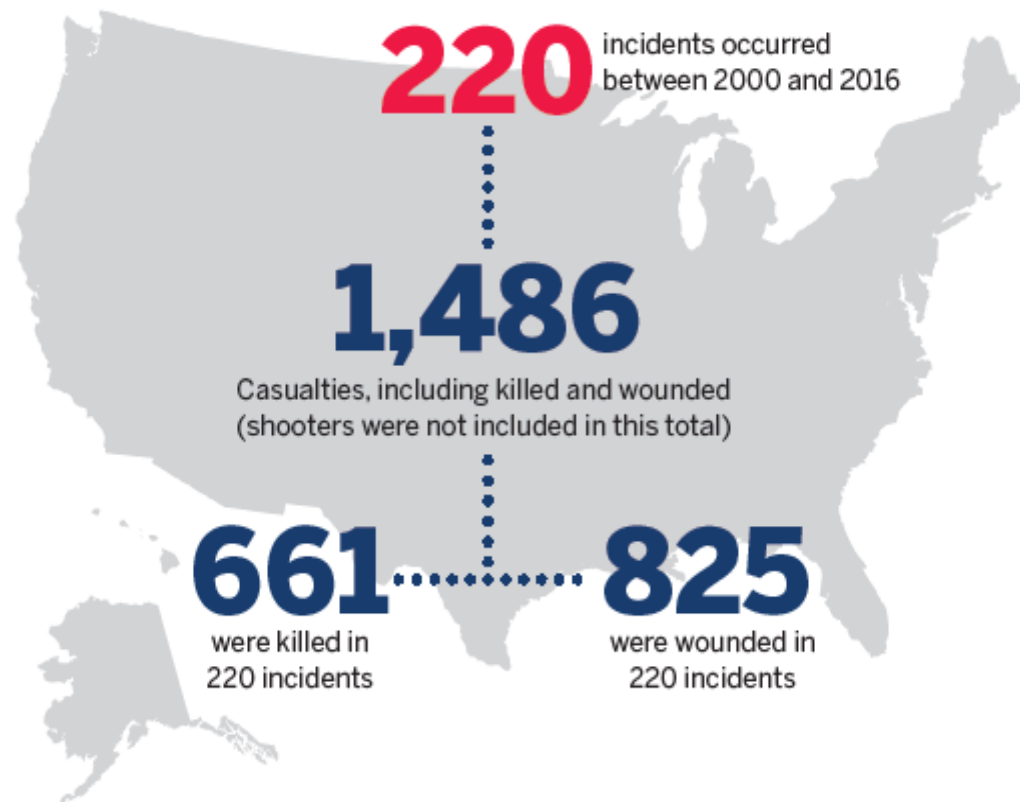


Reasons to increase security...



By the Numbers

Active shooter events in the US: 2000–2016



Reasons to increase to security...



- 2000 – 2015

- 410 deaths

- 2015 – 2018

- 161 deaths



Reasons to maintain fire safety...



- US Fire Administration
 - 2017
 - 5,100 school fires



International Fire Code



Security Devices – Section 316.5



- Any security device that emits a product that could obscure the means of egress is prohibited



Fog Emitting Security Product



Does this meet fire code?



Emergency Planning



IFC Chapter 4

911



Emergency Planning



- **An *approved* fire safety and evacuation plan shall be prepared and maintained in Group E occupancies**
 - In accordance with section 404
- **1st drill of each school year within 10 days of beginning of classes**
- **Varying times**
- **Assembly points identified**

Approved



- ***Approved. Acceptable to the fire code official.***



Fire Safety and Lockdown Plans



- Emergency egress or escape routes and whether evacuation of the building is complete, staged, or defend-in-place
- Procedures for employees
- Accounting for students/staff



Fire Safety



- Fire safety plans shall include:
 - Procedures for reporting a fire
 - How to notify occupants
 - Procedures for occupants under defend-in-place
 - Procedures for evacuating occupants

Fire Safety



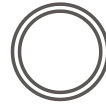
- Site plan requirements:
 - Assembly points
 - FD personnel should assist with determining assembly points outside of building
 - Hydrant locations
 - Fire department vehicle access

Fire Safety



- Floor plan requirements:
 - Exits
 - Primary evacuation routes
 - Secondary evacuation routes
 - Accessible routes
 - Areas of refuge
 - Exterior areas of rescue assistance
 - Manual alarm boxes
 - Fire Extinguishers
 - Fire alarm controls

Lockdown Plans



- 2009 IFC lockdown plans were added to code.
 - Section 404.3.3
- Applies to any occupancy with a lockdown plan (not just Group E)
- Plan must be approved



2018 IFC – Lockdown Plans



- 2018 IFC expanded lockdown plan criteria
- Includes the following criteria:
 - Authorized individuals to issue lockdown order
 - Security measures that could adversely impact affect egress or FD operations
 - Plan should outline if certain security products will be used
 - If certain fire doors or other access areas will be secured

2018 IFC – Lockdown Plans



- Outline how the locking means/methods are in compliance with egress requirements
- Procedures for documenting the presence or absence of occupants
- Means for providing two-way communication
- Procedures for terminating the lockdown

Training – Section 406



- Employees shall be trained in the emergency procedures
 - Training should include all staff and substitute teachers
 - Staff shall be familiar with the fire alarm and evacuation procedures
 - Training on lockdown procedures shall be provided so staff understand their responsibilities.

Maintenance of Plan



- Fire safety and evacuation plans shall be reviewed and updated annually
 - More frequently as needed
 - Plan shall be provided to the occupants

Evacuation Procedures



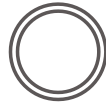
- Defend-in-place has been used for years in Group I occupancies
- Should fire officials consider approving defend-in-place in school buildings?
- When is it acceptable for a school to utilize defend-in-place vs. full evacuation?
- What safety features should be in place in order to utilize defend-in-place?

Law Enforcement Perspective



- Law enforcement is concerned an intruder will enter the building and activate the fire alarm system to bring students/staff into common areas
 - Law enforcement typically does not want building evacuated when fire alarm sounds

Law Enforcement Perspective



- How can the fire service address law enforcement's concerns but still maintain fire/life safety?



School Security & Pull Stations



- One of law enforcement's concerns is students activating a pull station
 - Some schools have more pull stations than are required by code.
 - Pull station locations in Group E depend on the level of fire protection

School Security & Pull Stations



- Manual pull stations are not required when:
 - Exception #1
 - Corridors are protected with smoke detection
 - Assembly spaces, shops and labs are protected with approved detection
 - IFC section 907.2.3

School Security & Pull Stations



- Manual pull stations are not required when:
 - Exception #2
 - Building equipped throughout with an automatic sprinkler system
 - Voice alarm will activate upon sprinkler water-flow
 - Manual activation is provided at a constantly attended location

Fire Alarm System



- School intruder incidents often involve activation of the fire alarm system:
 - Westside Middle School – Jonesboro, AR
 - Columbine High School – Littleton, CO
 - Red Lake High School – Red Lake, MN
- Intruders activated a manual pull station to get students into the halls

Fire Alarm System Options



- Schools can also utilize features outlined in NFPA 72 that delay the activation of the fire alarm system notification appliances
 - Pre-Signal
 - Positive alarm sequencing

Pre-Signal



- Section 23.8.1.2-Systems may have a pre-signal feature when approved by the authority having jurisdiction.
 - A pre-signal feature must meet the following criteria:
 - FA sounds only in offices, control rooms, fire brigade stations or other constantly attended location (no general evacuation throughout)
 - Transmission to supervising station (when required) shall commence upon activation from the initial fire alarm signal

Pre-Signal



- **IFC Section 907.5.1**

- Pre-signal shall not be used unless approved by the fire code official.
- When pre-signal is used, a signal shall be annunciated at a constantly attended location approved by the fire code official.
- Constantly attended location can activate occupant notification.

Pre-Signal



- Pre-signal features (cont.):
 - Requires human action to activate the general fire alarm (manual pull)
 - Pre-signal should only be considered in limited cases when approved by the AHJ



Positive Alarm Sequencing



- Section 23.8.1.3-Fire alarm systems may utilize positive alarm sequencing (PAS) when approved by the AHJ
- PAS must comply with the following:
 - FA signal must be acknowledged within 15 seconds of when the signal is received
 - If signal is not acknowledged within 15 seconds, notification signal and general evacuation shall commence.

Positive Alarm Sequencing



- PAS must comply with the following (cont.):
 - If signal is acknowledged, a delay of the evacuation signal of up to 180 seconds begins for staff to investigate the source of the alarm signal.
 - If FA system is not reset after 180 seconds ends, notification appliances commence and general evacuation shall begin.

Positive Alarm Sequencing



- PAS must comply with the following (cont.):
 - If a second automatic fire detector is actuated during the investigation (180 second) phase, notification appliances and general evacuation shall be activated.
 - If any other FA initiating device is actuated (manual pull), notification signals and evacuation shall be activated
 - The FA system shall provided a means for bypassing the PAS

Fire Alarm System



- For combination systems, fire alarm systems shall be distinctive, clearly recognizable and indicated as follows:
 1. Signals associated with life safety
 - Lockdown can take precedence over fire
 2. Signals associated with property protection
 3. Trouble signals associated with life and/or property protection
 4. All other signals

Lockdown/Intruder Alarm



- Some schools are voluntarily installing lockdown/intruder alarms
- These systems are not permitted to use the same “fire” notification appliances
 - Other “Alert” devices are permitted
 - Intruder alarm cannot use the T3 pattern
- Audible requirements for minimum/maximum sound pressure levels outlined in NFPA 72 (chapter 18) still apply



Combination Fire/Intruder Alarms



- Combination fire/intruder alarms are permitted
- Must use “Alert” devices
- Two kinds of combination systems:
 - Horn systems
 - Emergency voice alarm communication systems



Combination Fire/Intruder Alarms



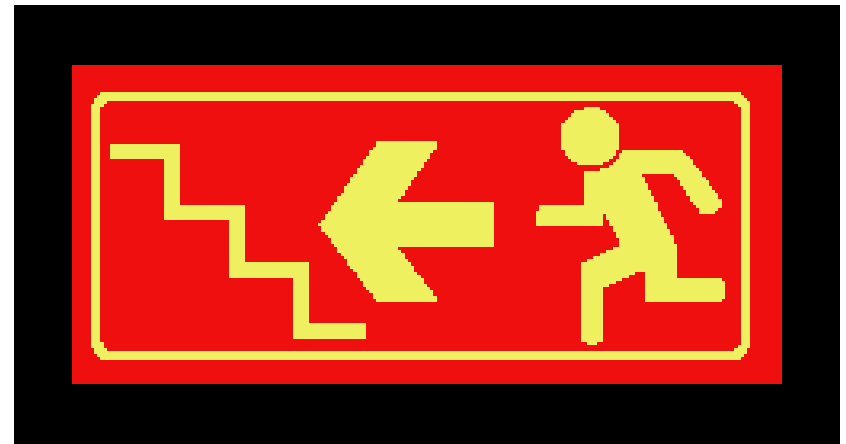
Lockdown – Horn only (no voice)



Lockdown – Horn & voice



Means of Egress



Means of Egress



- Most conflicts regarding security vs. fire safety revolve around egress
 - Law enforcement wants to lock doors/restrict access to areas
 - Fire officials want egress to be unobstructed and clear without any locks or latches



Security Product



ONLY ON
WCCO 

Frank Vascellaro

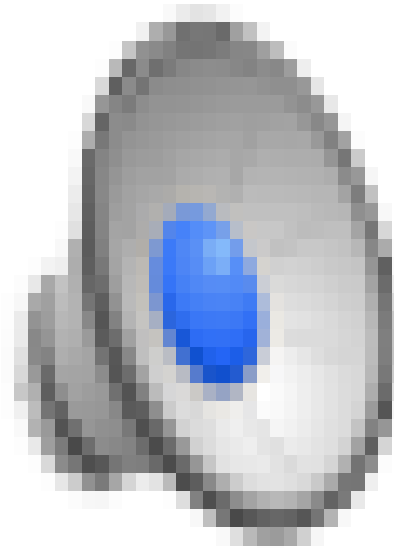
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Security Product

12news.com



Security Product



Door Operations – 1010.1.9



- Egress doors shall be readily openable from the egress side without the use of a key, special knowledge or effort.
- Hardware height: 34 – 48” above floor [Section 1008.1.9.2]

Security Hardware



Security Hardware



Security Hardware



Security Hardware



Security Hardware



Security Hardware



Security Hardware



Security Hardware



Security Hardware



Security Hardware



Security Hardware



Security Hardware



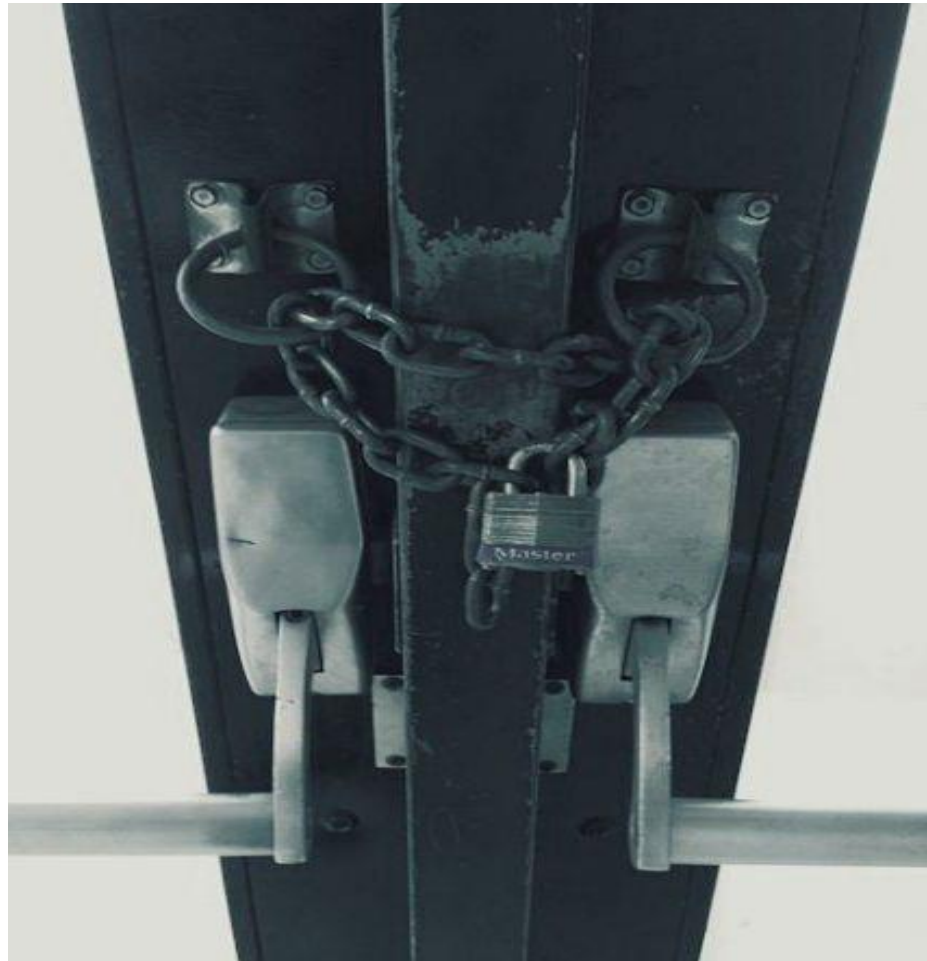
Security Hardware



Security Hardware



Security Hardware



Security Hardware



Violation ?



Violation ?



Violation ?



Locks & Latches – 1008.1.9.3



- Locks & latches can prevent door operation in:
 - Places of detention & restraint,
 - Main exits of Groups A, B, F, M & S,
 - Inactive leaf of double doors,
 - Group R dwelling or sleeping units less than 10 people can have night latch, dead bolt, or security chain.
 - Fire doors after the minimum elevated temperature has been reached

Group E Locking Arrangements – 1010.1.4.4



- Guidance provided in the IFC to address security in Group B and E occupancies

**NEW
2018**

- The door shall be capable of being unlocked from outside the room with a key or other approved means
- The door shall be openable from within the room in accordance with 1010.1.9
- Modifications shall not be made to the panic hardware, fire door hardware or door closers



Locking Arrangements – 1008.1.9.3



- Locks and latches can prevent door operation (9 conditions):
 - Detention or restraint
 - Groups A, B, F & S occupancies (main door key-locking exception)
 - Pair of doors – inactive leaf
 - Dwelling / sleeping unit doors
 - Fire-rated door hardware*

Locking Arrangements

- Controlled egress doors in Group I-1 and I-2 – 1010.1.9.7
 - Not permitted in Group E
- Delayed egress door locks – 1010.1.9.8
 - Only classrooms with occupant load <50
- Electrically locked egress doors – 1010.1.9.10
- Locking arrangements in buildings within correctional facilities – 1010.1.9.11
 - Not permitted in Group E

Delayed Egress Locks



- Permitted in educational occupancies
- CANNOT be on exits served by assembly spaces
 - Cafeteria
 - Media center
 - Theater
 - Gymnasium



Delayed Egress Door Locks



- Allowed for occupancies other than Group A and Group H
- Requires:
 - Full sprinkler system (NFPA 13) or smoke detection system
 - Doors to unlock upon activation of sprinkler or alarm system

Delayed Egress Door Locks



- **Requires:**

- Doors to unlock upon loss of power to lock
- Capable of being unlocked from fire command center
- Initiation of irreversible process to release the door (15 second delay permitted)

Delayed Egress Door Locks



- **Requires:**

- Signage on door
- Emergency lighting at the door
- Maintenance and testing required

Delayed Egress Door Locks



Emergency
Illumination



Mag-lock

PUSH UNTIL ALARM SOUNDS
DOOR CAN BE OPENED
IN 15 SECONDS



EXIT



Control panel: audible
alarm, bypass, and
manual reset

Delayed Egress Door Locks



Emergency Illumination



PUSH UNTIL ALARM SOUNDS
DOOR CAN BE OPENED
IN 15 SECONDS



Separate power supply

Some hardware kits include locking device, timed release, audible alarm, bypass and reset all in one assembly

Delayed Egress Locks – 1010.1.9.8

- Additional occupancies permitted to install delayed egress locks
 - Allowed in Group B, F, I, M R S and U
 - Classrooms inside Group E with an occupant load less than 50

**NEW
2018**



Electrically Locked Doors – 1010.1.9.9



**NEW
2018**

- Sensor release of electrically locked doors
 - Previously referred to as Access Controlled Egress
- 2018 IFC allows on all occupancies except Group H



Electrically Locked Doors – 1010.1.9.10



- Electromagnetically locked egress doors modified
 - Changed to “Door hardware release of electrically locked egress doors”
 - Allowed on any occupancy except Group H

**NEW
2018**



Electrically Locked Doors – 1010.1.9.10



- Electromagnetically locked egress doors come in two styles:
 - Pressure sensitive
 - Electrically conductive
 - Electrically conductive often does not work with gloves on



Approved Hardware



So...what hardware CAN
schools use?

Approved Hardware



Approved Hardware



Approved Hardware



Gates



- Gates must meet the same requirements as doors,
- Cannot block or obstruct egress,
- Cannot form “dead-ends”.



Gates



Gates and Barriers



Gates



Gates



Security Devices – Section 1031.2.1



- Maintenance of means of egress
 - Section 1031 (2018 IFC)
- Security devices impacting means of egress shall be *approved*
- Devices or locking arrangements that restrict, control, or delay egress shall comply with chapter 10



Locking Arrangements – Section 1031.2.2



- Group E, I-4 and B used for educational purposes, locking arrangements designed to keep intruders from entering are permitted when:
 1. The door can be unlocked from outside the room with a key or other approved means
 2. The door shall be openable from the egress side in accordance with section 1010.1.9

Locking Arrangements – Section 1031.2.2

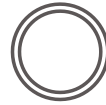


- Group E, I-4 and B used for educational purposes, locking arrangements designed to keep intruders from entering are permitted when (cont.):

3. Modifications shall not be made to existing listed panic hardware, fire door hardware or door closers

4. Any modifications to fire door assemblies shall comply with NFPA 80

NFPA 3000



- *Standard for Preparedness and Response to Active Shooter and/or Hostile Events*
- Dec. 2017: NFPA Standards Council approved the plan to proceed with the development of NFPA 3000
- Document printed spring, 2018



NFPA 3000



- Intent is to identify minimum program elements necessary for:
 - Organizing
 - Managing
 - Sustaining
- ...an active shooter and/or hostile incident
- The document will address...

NFPA 3000



- Risk assessment
- Planning
- Resource Management
- Organizational deployment
- Incident management
- Facility readiness
- Finance
- Communications
- Competencies for law enforcement
- Competencies for Fire departments
- Competencies for EMS
- Personal protective equipment
- Training
- Communication education
- Information sharing
- Readiness of receiving hospitals
- Recovery

Questions/Comments



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Security

Fire Safety

