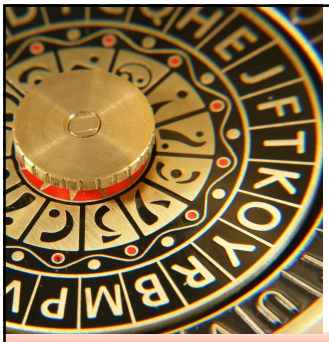


Decoded Series

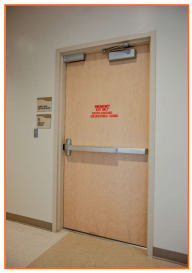
- Class 1 – Introduction to Codes + Accessibility Requirements
- Class 2 – Fire Door Assemblies
- **Class 3 – Egress and Life Safety**
- Class 4 – Codes for Electrified Hardware

Lori Greene
DAHC/CDC, CCPR, FDHI, FDAI
Allegion, Manager – Codes & Resources

1

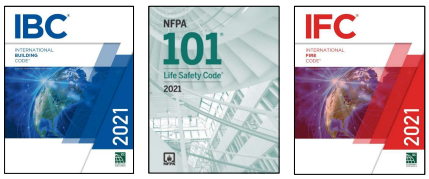
Egress & Life Safety

- IBC – NFPA 101 – IFC
- Occupancy Types – Use Groups
- Occupied vs. Unoccupied
- Opening Protectives
- Means of Egress
  - travel distance, common path of travel, dead end corridors
  - clear width, projections, & door swing
  - opening force & auto operators
  - unlatching, bolts, hardware operation & height
  - panic hardware



2

Building Code vs. Life Safety Code or Fire Code



A building code is typically used during design/construction and for renovations. After completion of construction, the applicable fire code is enforced throughout the life of the building.

3

Approved

- Approved = Acceptable to the Authority Having Jurisdiction

4

Occupancy Classifications (NFPA 101 – Chapter 6)

- Assembly
- Educational
- Day Care
- Health Care
- Ambulatory Health Care
- Detention and Correctional
- Residential
- Residential Board and Care
- Business
- Mercantile
- Industrial
- Storage

Use Groups (IBC – Chapter 3)

- Assembly
- Business
- Educational
- Factory and Industrial
- High Hazard
- Institutional
- Mercantile
- Residential
- Storage
- Utility & Maintenance

Most are divided into sub-groups

5

Occupancy Classifications and Use Groups

College classroom building	• Business or Assembly occupancy
Ambulatory health care in NFPA 101	• Usually Group B (Business) for IBC
Child day care centers	• Day Care occupancies per NFPA 101, but either I (Institutional) or E (Educational) use groups per IBC
Office training room	• Business or Assembly per IBC

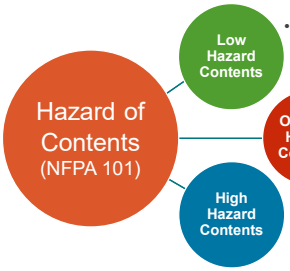
6

Multiple Occupancies NFPA 101
A building or structure in which 2 or more classes of occupancy exist

MIXED Occupancy	SEPARATED Occupancy
A multiple occupancy where the occupancies are intermingled (follow most stringent requirements throughout)	A multiple occupancy where the occupancies are separated by fire-resistance–rated assemblies (follow separate requirements for each area)

7

Hazard of Contents (NFPA 101)



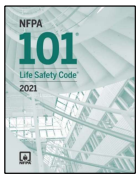
- Such low combustibility that no self propagating fire can occur.
- Likely to burn with moderate rapidity or to give off a considerable volume of smoke (most buildings are ordinary hazard).
- Likely to burn with extreme rapidity or from which explosions are likely.

8

Occupied vs. Unoccupied (NFPA 101)

- Open for general occupancy, or
- Open to the public, or
- Occupied by more than 10 persons

9



- Chapter 7 – Means of Egress
- Chapter 8 – Features of Fire Protection
- Chapters 12-42 – Occupancy Chapters

- Chapter 7 – Fire and Smoke Protection Features
- Chapter 10 – Means of Egress

10

Opening Protectives - IBC

Table: IBC

TABLE 716.1(2)
OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE[a]	FIRE-RATED GLAZING MARKING DOOR VISION PANEL[c,e]	MINIMUM SIDELIGHT/ TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDELIGHT/TRANSOM PANEL	
					Fire protection	Fire resistance	Fire protection	Fire resistance
Fire walls and fire barriers having a required fire-resistance rating greater than 1 hour	4	3	See Note b	D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3[e]	See Note b	D-H-W-180	Not Permitted	3	Not Permitted	W-180
	2	1 1/2	100 sq. in.	≤ 100 sq. in. = D-H-90 >100 sq. in.= D-H-W-90	Not Permitted	2	Not Permitted	W-120
	1 1/2	1 1/2	100 sq. in.	≤ 100 sq. in. = D-H-90 >100 sq. in.= D-H-W-90	Not Permitted	1 1/2	Not Permitted	W-90
Enclosures for shafts, interior exit stairways and interior exit ramps.	2	1 1/2	100 sq. in.[c]	≤ 100 sq. in. = D-H-90 > 100 sq. in.= D-H-T-W-90	Not Permitted	2	Not Permitted	W-120
Horizontal exits	4	3	100 sq. in.	≤ 100 sq. in. = D-H-180 > 100 sq. in.= D-H-W-240	Not Permitted	4	Not Permitted	W-240

11

Opening Protectives - NFPA 101

Table: NFPA 101

Table 8.3.3.2.2 Minimum Fire Ratings for Opening Protectives in Fire Resistance–Rated Assemblies and Fire-Rated Glazing Markings

Component	Walls and Partitions (hr)	Fire Door Assemblies (hr)	Door Vision Panel Maximum Size (in.[2])	Fire-Rated Glazing Marking Door Vision Panel	Minimum Side Light/ Transom Assembly Rating (hr)		Fire-Rated Glazing Marking Side Light/ Transom Panel		Minimum Fire-Rated Windows Rating[a,b] (hr)		Fire-Rated Window Marking	
					Fire protection	Fire resistance	Fire protection	Fire resistance	Fire protection	Fire resistance	Fire protection	Fire resistance
Elevator hoistways	2	1½	155 in.[2,c]	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	2	NP	W-120
	1	1	155 in.[2,c]	D-H-60 or D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
	½	½	85 in.[2,d]	D-20 or D-W-20	½	½	D-H-20	D-W-20	½	½	OH-20	W-30
Elevator lobby (per 7.2.13.4)	1	1	100 in.[2,e]	≤100 in.[2], D-H-T-60 or D-H-W-60 >100 in.[2], D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
Vertical shafts (including stairways, exits, and refuse chutes	2	1½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	2	NP	W-120
	1	1	Maximum size tested	D-H-60 or D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
Replacement panels in existing vertical	½	½	Maximum size tested	D-20 or D-W-20	½	½	D-H-20	D-W-20	½	½	OH-20	W-30

12

Means of Egress

- A continuous and unobstructed way of travel from any point in a building or structure to a public way
  - Not every door is an egress door.
  - Not every egress door has an exit sign.

Decoded 3 – Egress and Life Safety Requirements for Swinging Doors

13

14

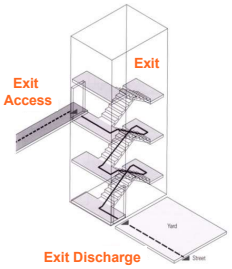
15

Means of Egress

Exit Access – leads from occupied portion to an exit

Exit – separated by fire-resistance-rated construction and opening protectives to provide a protected path of egress travel

Exit Discharge – between termination of an exit and a public way

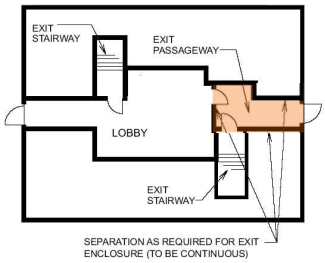


Graphic: NFPA 101 Handbook

16

Exit Passageway

EXIT PASSAGEWAY: An exit component that is separated from other interior spaces of a building or structure by fire-resistance-rated construction and opening protectives and provides for a protected path of egress travel in a horizontal direction to an *exit* or to the *exit discharge*.



Graphic: NFPA 101 Handbook

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Exit Passageway or Exit Access?

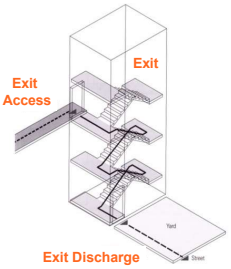
18

Means of Egress

Exit Access – leads from occupied portion to an exit

Exit – separated by fire-resistance-rated construction and opening protectives to provide a protected path of egress travel

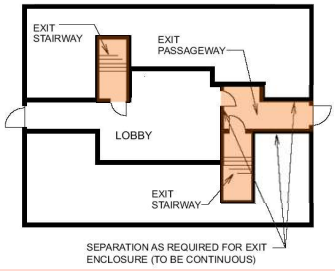
Exit Discharge – between termination of an exit and a public way



Graphic: NFPA 101 Handbook

19

Exit / Exit Enclosure

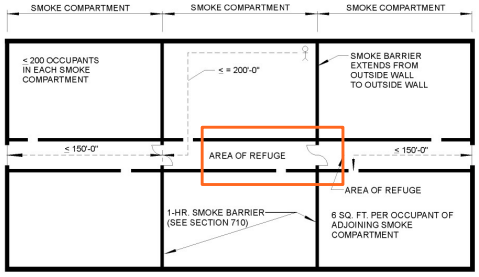


Graphic: NFPA 101 Handbook

20

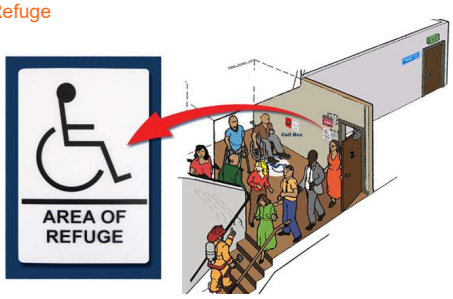
Horizontal Exit

Graphic: NFPA 101 Handbook



21

Area of Refuge



Graphic: Rath Signs

22

7.6 Travel Distance to Exits

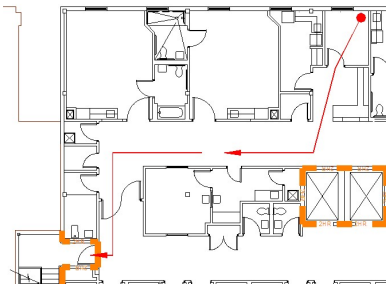
Measured on the floor or other walking surface as follows:

Along centerline of the natural path of travel, starting from the most remote point subject to occupancy	Curving around any corners or obstructions, with a 12-inch clearance therefrom	Terminating at one of the following: A. Center of the doorway B. Other point at which the exit begins C. Smoke barrier in an existing detention & correctional occupancy as provided in Chapter 23

Travel distance may end at the beginning of an exit, at an exit discharge, or at a horizontal exit.

23

Travel Distance



Graphic: NFPA 101 Handbook

24

Example from New Educational Chapter

14.2.6 Travel Distance to Exits. Travel distance shall comply with 14.2.6.1 through 14.2.6.3.

14.2.6.1 Travel distance shall be measured in accordance with Section 7.6.

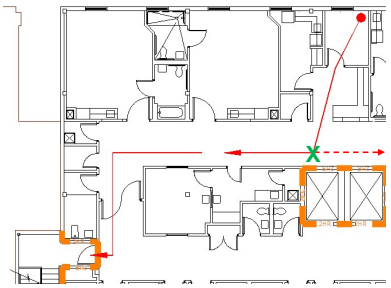
14.2.6.2 Travel distance to an exit shall not exceed 150 ft (46 m) from any point in a building, unless otherwise provided in 14.2.6.3. *(See also Section 7.6.)*

14.2.6.3 Travel distance shall not exceed 200 ft (61 m) in educational occupancies protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 9.7.

25

Common Path of Travel

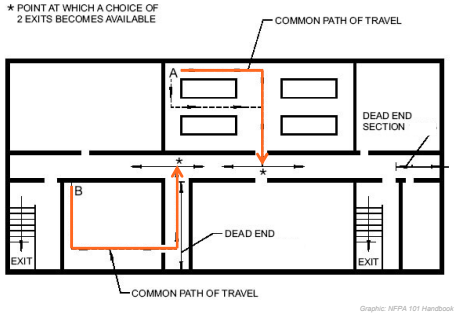
COMMON PATH OF TRAVEL: The portion of exit access that must be traversed before two separate and distinct paths of travel to two exits are available.



Graphic: NFPA 101 Handbook

26

Common Path of Travel



Graphic: NFPA 101 Handbook

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Common Path of Travel
Example from Existing Educational Chapter

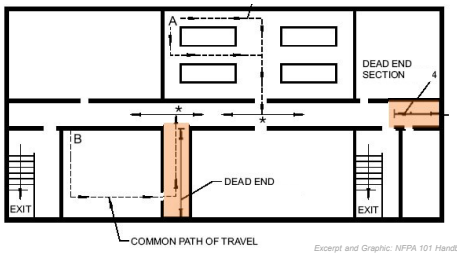
Not to Exceed 100 Feet	Not to Exceed 75 Feet
15.2.5.3.1 When building **IS** protected by approved, supervised automatic sprinkler	15.2.5.3.2 When building **IS NOT** protected by approved, supervised automatic sprinkler

Excerpt: NFPA 101

28

Dead End Corridors

Ex: 12.2.5.1.3 Dead-end corridors shall not exceed 20 ft



Excerpt and Graphic: NFPA 101 Handbook

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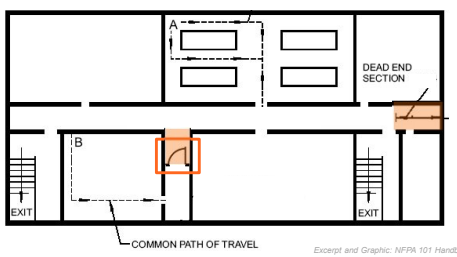
Dead End Corridors

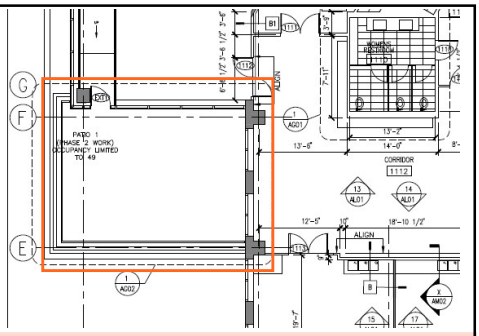
Ex: 12.2.5.1.3 Dead-end corridors shall not exceed 20 ft



Excerpt and Graphic: NFPA 101 Handbook

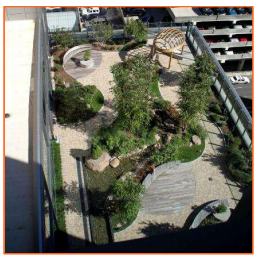
30

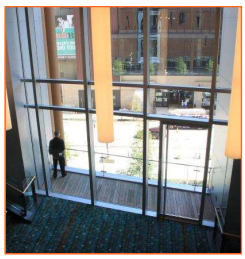
Courtyards, Terraces, and Roofs



31

Courtyards, Terraces, and Roofs





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Courtyards, Terraces, and Roofs

33

Egress from Exterior Spaces

- 2021 IBC
- Exterior spaces with egress route through interior of building
- Applies to exterior spaces that are not egress courts
- Max occupant load 300 people
- Approved locking device is allowed – readily distinguishable as locked

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Egress from Exterior Spaces

- At least one weatherproof telephone or two-way communication system with instructional signage
- Signage - THIS DOOR TO REMAIN UNLOCKED WHEN THE OUTDOOR AREA IS OCCUPIED
- Clear window or glazed opening, at least 5 square feet in area at each exit access door

35

Egress from Exterior Spaces

- Balconies, decks, or exterior spaces may be locked on the outside when serving:
  - Individual dwelling/sleeping units
  - Private office space – exterior space 250 square feet, maximum
- Telephone, etc. not required

36

Readily Distinguishable

- Means of egress doors must be visible.
  - No mirrors
  - No drapes
  - No decorations
- No invisible egress doors!

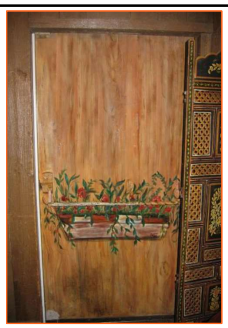


Photo: Zeke Wolfskehl

37

Photo: Chuck Noble

38

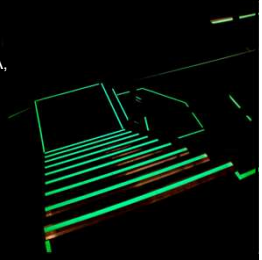
Photo: Chuck Noble

39

40

Luminous Egress Path Markings

- Not currently required by NFPA 101 occupancy chapters
- Required by IBC in high-rise buildings in Group A, B, E, M, & R-1
- Typically required on exit discharge doors – not on doors leading to the exit
- 1-inch stripe around frame
- Marking on or behind hardware
- "Exit" in bottom 18 inches of door
- Additional marking on stairs, walls, etc.



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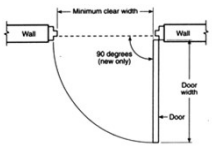
Size of Doors



- 32 inches clear width, minimum
  - Measured with door open to 90 degrees
  - Between the face of the door and the stop
  - At least one leaf of a pair must comply
- 41 ½ inches required for health care doors that facilitate the movement of beds
- 80 inches high nominal, minimum
- 78 inches to the closer arm or stop

Graphic: ADA

42

43

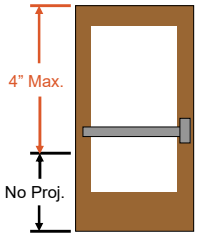
Swing Clear Hinges

- Enable more clearance on existing openings

44

Projections Into Clear Width (IBC)

- Projections into the clear opening width between 34 inches and 80 inches above the floor shall not exceed 4 inches.
- No projections into required clear opening width lower than 34 inches above the floor.



- NFPA 101 limits the 4-inch projections to 34 – 48 inches above the floor, hinge side only, specifically to address panic hardware.

45

Door Swing

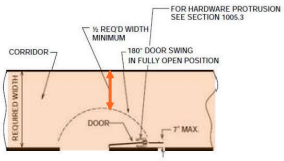
- Egress doors shall be side-hinged swinging
  - Exceptions – consult codes
- Swing in the direction of egress:
  - When serving occupant load of 50 or more
  - Group H occupancies
  - When swinging into an exit enclosure (NFPA 101)

46

Encroachment

Graphic: NFPA 101 Handbook

- Required egress width is calculated based on occupant load.
- Measurement Point 1: Must encroach no more than ½ of the required egress width at any point in door swing.

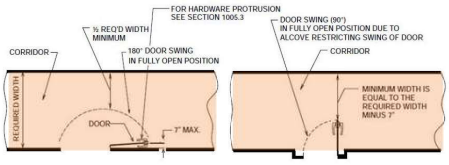


47

Encroachment

Graphic: NFPA 101 Handbook

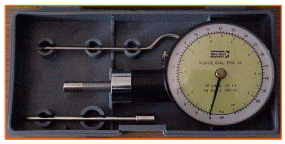
- Measurement Point 2: 7-inch maximum encroachment on required minimum egress width when door is fully open.
- Be careful of overhead stops & closers with integral stops.



48

Door Opening Force

- Interior swinging egress doors (non-fire-rated) – 5 pounds
- Other swinging doors + sliding and folding doors
  - 30 pounds to set the door in motion
  - 15 pounds to swing the door to the fully-open position



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Power-Operated Doors

- In the event of a power failure:
  - 50 pounds to set door in motion
  - 15 pounds to open to fully-open position
- Full-Power Operated - A156.10
- Power-Assist and Low Energy - A156.19
  - A156.19 limits force to 30 pounds to set the door in motion

50

Operable Hardware

- Easy to grasp
- Operable with one hand
- No tight grasping
- No tight pinching
- No twisting of the wrist

51

Hardware Height

- Operating Devices
  - 34 inches minimum AFF
  - 48 inches maximum AFF
  - Locks used only for security purposes – any height

Photo: David Sochaczevski

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Door Operation

- Readily openable
- No key or special knowledge or effort (with exceptions)

Photo: Ron Burgess Jr.

53

54

55

Locks & Latches

- Permitted to prevent operation of doors where any of the following exists:
  - Places of detention or restraint
  - Use Group A w/ occupant load of 300 or less, Groups B, F, M, and S, and in churches
    - Main door(s)
    - Key-operated locking from egress side
    - Locking device readily distinguishable as locked
    - Signage on or adjacent to door
    - Revocable by the building official for cause

THIS DOOR TO REMAIN UNLOCKED
WHILE THIS SPACE IS OCCUPIED

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Unlatching

- Unlatching any leaf shall not require more than 1 motion

57

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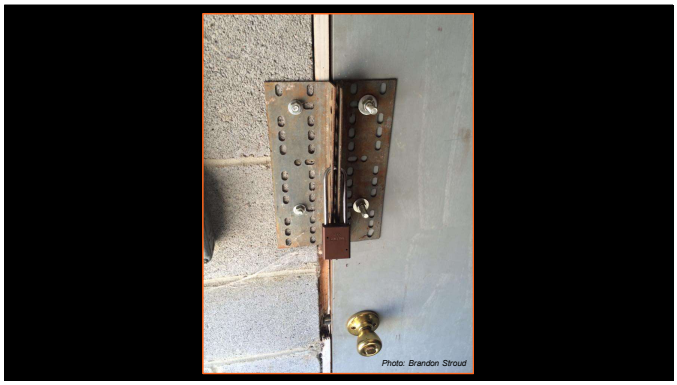

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Unlatching

- Unlatching any leaf shall not require more than 1 motion
- Exceptions:
  - Places of detention or restraint
  - Locations where manual flush bolts are allowed
  - Automatic flush bolts – no dummy trim
  - Individual dwelling units & guestrooms of Group R occupancies

60

Bolt Locks (IBC)

Manual flush bolts or surface bolts not permitted Exceptions:

- Doors not required for egress in dwelling units
- Storage or equipment rooms
- Group B, F, or S occupancy with an occupant load of less than 50
- Group B, F, or S occupancy where inactive leaf is not needed to meet egress width requirements & building is fully sprinklered
- Pairs at hospital patient rooms may have constant latching bolts
- No dummy hardware on inactive leaf

61

Dwelling Units

- Individual dwelling or sleeping units of Group R occupancies with an occupant load of 10 or less, **1** additional releasing operation (may vary by local code)
  - Nightlatch
  - Deadbolt
  - Security chain
  - No key or tool needed on egress side

62

NFPA 101-2018 - TIA 1436

- Tentative Interim Amendment modified the 2018 edition of NFPA 101
- Two non-simultaneous releasing operations are allowed for K-12 classroom doors
- All other requirements must be met (many barricade devices do not)
- Applies to jurisdictions that have adopted the 2018 edition of NFPA 101, or subsequent editions
- Intent is to allow a separate deadbolt

63

Classroom Security

- Dozens of classroom security "inventions" being used to secure doors.
- Most are not code-compliant, and the codes do not currently reduce life-safety requirements in an intruder situation.

64

Classroom Security

- Must not:
  - Violate code requirements for free egress - one operation to unlatch
  - Inhibit latching if the door is a fire door
  - Allow unauthorized locking which could encourage mischief and/or criminal behavior
- Must:
  - Be readily available and easy to lock if needed
  - Allow staff / first responder access from the ingress side

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IBC 2018 Code Change - BHMA

1010.1.4.4 Locking arrangements in educational occupancies. In Group E and Group B educational occupancies, egress doors from classrooms, offices and other occupied rooms shall be permitted to be provided with locking arrangements designed to keep intruders from entering the room where all of the following conditions are met:

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

1010.1.4.4.1 Remote operation of locks. Remote operation of locks complying with Section 1010.1.4.4 shall be permitted.

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Panic and Fire Exit Hardware

touchpad

recessed

crossbar

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Panic and Fire Exit Hardware

IBC 2006 and subsequent editions

- Educational and Assembly Occupancies with an occupant load of 50 or more
- All High Hazard Occupancies

IBC 2000, 2003

- Educational and Assembly Occupancies with an occupant load of 100 or more
- Some High Hazard Occupancies

NFPA 101 (all)

- Educational, Assembly, and Day Care Occupancies with an occupant load of 100 or more
- Some High Hazard Occupancies

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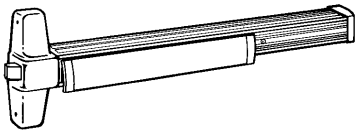
Panic and Fire Exit Hardware

- Requirement for panic hardware applies to means of egress doors in these occupancy types which latch or lock.



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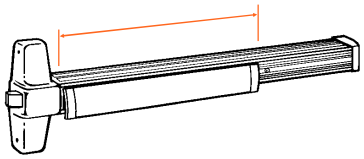
Panic and Fire Exit Hardware

- Where panic hardware is required, actuating portion of device (touch-pad or cross-bar) must be at least half the width of the door.



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Panic & Fire Exit Hardware

- 15 pounds of force maximum to actuate
- One operation to unlatch - no other locking/latching hardware

Photo: Pat Bond

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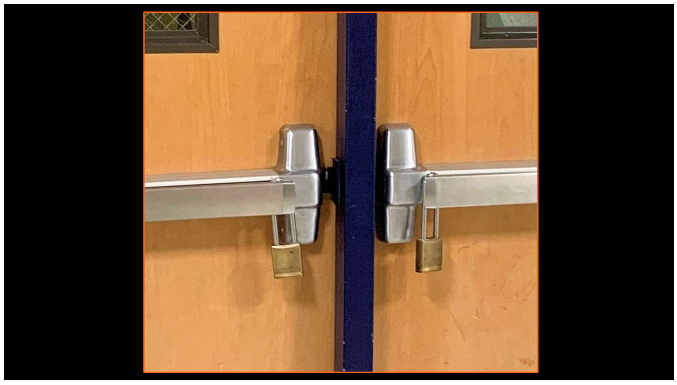

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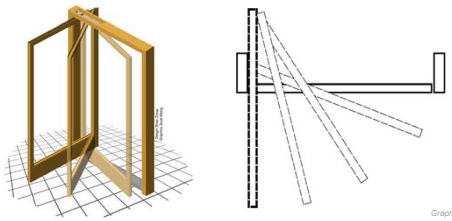
Panic and Fire Exit Hardware

- Panic hardware used on balanced doors must be touchpad style (not crossbar) and touchpad must **not** extend more than half the width of the door.



Graphic: Dawson Doors

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NFPA 70 National Electrical Code Requires panic hardware on:

- Rooms housing equipment of 1000 volts, nominal, or less, with equipment rated 800 amps or more that contains overcurrent devices, switching devices, or control devices
- Rooms housing equipment of more than 1000 volts, nominal
- Transformer Vaults
- Battery Rooms
- Energy Storage Systems (ESS Rooms)

- These requirements vary depending on the edition of NFPA 70.

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Glass and Glazing

- Glass in fire doors is no longer exempt from the impact requirements per the IBC.
- Traditional wired glass is extremely hazardous.
- Wired glass is available that meets the impact requirements for safety glazing.

Photos: Greg Abel & Anemostat

Egress & Life Safety

- IBC – NFPA 101 – IFC
- Occupancy Types – Use Groups
- Occupied vs. Unoccupied
- Opening Protectives
- Means of Egress
  - travel distance, common path of travel, dead end corridors
  - clear width, projections, & swing
  - opening force & auto operators
  - unlatching, bolts, hardware operation & height
  - panic hardware

For more information, visit iDigHardware.com