Overview

This presentation will provide an overview of the requirements for the design, construction and installation of doors, hardware, locks and locking systems used as part of the means of egress in buildings. Topics will include door operations, delayed egress, access-controlled electromagnetic locks, stairway doors, panic and fire exit hardware.

Agenda

New & existing doors
Hardware
Accessibility
Fire doors
ITM
Regulatory Documents

Effective October 1, 2016

Egress Doors & Locking Arrangements

Regulatory Documents

Effective October 1, 2016

Egress Doors & Locking Arrangements
Means of egress doors shall meet the requirements of this section. Doors serving a means of egress system shall meet the requirements of this section and Section 1020.2.

Doors provided for egress purposes in numbers greater than required by this code shall meet the requirements of this section.

- Swing
- Size
- Opening forces
- Latching
- Locking
**Basics**

*Means of egress* doors shall be readily distinguishable from the adjacent construction and finishes such that the doors are easily recognizable as doors.

Mirrors or similar reflecting materials shall not be used on means of egress doors.

*Means of egress* doors shall not be concealed by curtains, drapes, decorations or similar materials.

**Hidden/Secret**

![Hidden/Secret Image]
Impediments

Egress Doors & Locking Arrangements
Impediments

Egress Doors & Locking Arrangements

Impediments

Egress Doors & Locking Arrangements
Means of Egress Doors & Special Locking
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Impediments

![Image of doors and netting]

Reliability

![Images of egress doors and locking arrangements]
Mirrors

Door Leaf Width - maximum
Door Width - minimum

- New > 32” CW
- Existing ≥ 28” DW
- Lesser permitted
- Wider required

Door Width - measurement

[Image of a person measuring door width]
Door Width - minimum

# of Persons using door x 0.2” per person
Door Width

Pair – single opening

Door Width

Pair – multiple openings
Door Width

Pair – multiple openings

Wider Doors

I-2 Healthcare

> 41 ½”
Narrower Doors

I-3 Detention

> 28”

Storage closets

< 10 sq. ft.

No minimum
Narrower Doors

Interior doors in units not required to be accessible
Other than R-1
> 31 3/4"

B & B
> 28”
> 24” bathrooms

Means of Egress v. Escape
Projections

Figure 1008.1.1(1)
TYPICAL DOOR OPENING CLEARANCE

FIGURE A.7.2.1.2.1(a) Minimum Clear Width.

Projections

FIGURE C404.2.2(a)
TYPICAL DOOR OPENING CLEARANCE
Projections

Figure 1006.1.1(2)
TYPICAL DOOR OPENING CLEARANCE WITH PANIC HARDWARE

Figure A.7.2.1.2(b) Minimum Clear Width with Permitted Obstructions.

Figure A.7.2.1.2(b) Door Width — Egress Capacity with Permitted Obstructions.
**Headroom**

80” new  
78” w/in residential  
76” exterior residential  
(non-exit)  
72” existing w/ padding

**Door Swing Direction**

**Direction of egress travel**

- > 50 people  
- Exit stair enclosure – other than living units  
- High hazard  
- Horizontal exit
**Door Leaf Encroachment**

"X" = minimum required width

\[
\frac{1}{2}(X) \quad \text{(X-7 in.)} \quad \text{(X-7 in.)}
\]

\[
x
\]

\[
\frac{1}{2} \text{ required width}
\]

7” Max

Egress Doors & Locking Arrangements
Opening Forces

- Release latch < 15 lbs
- Set door in motion < 30 lbs
- Fully open door < 15 lbs
  (< 50 lbs for existing doors)
- Breakaway door < 50 lbs

Opening Forces

- Interior swinging
- Non-fire doors
- < 5 lbs
Opening Forces
Floor Level

MIN. LANDING DIMENSION
PER SECTION 1008.1.6

DOOR

QUARRY TILE
FLOOR SURFACE

½" Max

RESIUIENT VINYL
FLOOR SURFACE

SECTION

Figure 1008.1.5
DOOR LANDINGS

Floor Level - landings

Egress Doors & Locking Arrangements
Floor Level - landings

- Existing
- OL < 50
- Top of stair only
- Direction of travel

Thresholds

Figure 1008.1.7(h)
DOOR THRESHOLD HEIGHT LIMITATIONS

For SI: 1 inch = 25.4 mm.

Figure 1008.1.7(f)
VERTICAL CHANGES IN LEVEL

For SI: 1 inch = 25.4 mm.

Figure 1008.1.5
DOOR LANDINGS

For SI: 1 inch = 25.4 mm.
Means of Egress Doors & Special Locking
ODEM Spring 2017 Career Development Series

Doors in Series

For SI: 1 foot = 304.8 mm.

Figure 1008.1.6(1)
SPACING OF DOORS IN SERIES

Doors in Series

FIGURE C404.2.5(a)
DOORS IN A SERIES—STRAIGHT

Egress Doors & Locking Arrangements
Maneuvering Clearances

(a) Front Approach, Pull Side

(b) Front Approach, Push Side

(c) Hinge Approach, Pull Side

(d) Hinge Approach, Pull Side

Maneuvering Clearances

(a) Front Approach, Pull Side

24” min
Door Surface

FIGURE C404.2.9(e)
DOOR SURFACE OBSTRUCTION

Doors in Series

Egress Doors & Locking Arrangements
**Doors in Series**

**Man-Trap**

**Door Locking**

- Doors readily opened from egress side when space occupied
- Locks not require key, tool, special knowledge or effort
Obvious Method of Release

Egress Doors & Locking Arrangements

Obvious Method of Release

Egress Doors & Locking Arrangements
Tight Grasping

...tight grasping, pinching, or twisting of the wrist

Key-Operated

A (OL ≤ 300), B, F, M, S, & religious worship
Releasing Operations

Inside Residential units & existing conditions (OL ≤ 3)

Panic/Fire Exit Hardware

A & E w/ OL ≥ 50
A, E, & DC OL> 100
Group H
UL 305 panic
UL 305 & UL 10C – fire exit hardware
Panic/Fire Exit Hardware

Egress Doors & Locking Arrangements

Panic/Fire Exit Hardware

Egress Doors & Locking Arrangements
Fire Exit Hardware

Panic/Fire Exit Hardware
Delayed Egress

Prohibited in A, E, & H

Alarmed Egress
Access Controlled

A, B, E, I-2, M, R-1, & R-2

Electromagnetically locked

A, B, E, I-2, M, R-1, & R-2
Patient Room Doors

- Locks prohibited, unless
  - Corridor side
  - Staff has keys
  - Occupant can egress

Correctional Facilities

New
- Manual means
- And one other method
  - Remote unlocking
  - Sprinklers
  - Manual alarm box
Clinical or Security Needs

I-1 & I-2

- Remote unlocking
- Smoke detection
- Sprinklers
- Fail-safe electric locks
- Staff carry keys, codes, etc.
- Emergency plan

Stairwell Re-entry

STAIR A | FLOOR 5
No Re-entry on this Floor, Nearest Re-entry on the 4th and 8th Floors
Door Swing Alternatives

B, F, M, & S

Horizontal Sliding Door
Door Swing Alternatives

Manual sliding
Door Swing Alternatives

Revolving Door
Door Swing Alternatives

Healthcare

Powered Doors
Door Swing Alternatives

**Turnstiles**

[Image of turnstiles]

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Door Swing Alternatives

**Turnstiles**

[Image of turnstiles]
### Opening Protection

**TABLE 716.5** OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

<table>
<thead>
<tr>
<th>TYPE OF ASSEMBLY</th>
<th>REQUIRED WALL ASSEMBLY RATING (hours)</th>
<th>MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)</th>
<th>DOOR VISION PANEL SIZE</th>
<th>FIRE RATED GLAZING MARKING DOOR VISION PANEL*</th>
<th>MINIMUM Sidelight/ Transom ASSEMBLY RATING (hours)</th>
<th>FIRE-RATED GLAZING MARKING SIDELIGHT/TRANSOM PANEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fire protection</td>
<td>Fire resistance</td>
<td>Fire protection</td>
</tr>
<tr>
<td>Fire walls and fire barriers having a required fire resistance rating greater than 1 hour</td>
<td>4</td>
<td>3</td>
<td>Not Permitted</td>
<td>Not Permitted</td>
<td>Not Permitted</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>Not Permitted</td>
<td>Not Permitted</td>
<td>Not Permitted</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1½</td>
<td>100 sq. in.*</td>
<td>Not Permitted</td>
<td>≤100 sq. in. = D-H-90</td>
<td>Not Permitted</td>
</tr>
<tr>
<td></td>
<td>1½</td>
<td>1½</td>
<td>100 sq. in.*</td>
<td>Not Permitted</td>
<td>≤100 sq. in. = D-H-90</td>
<td>Not Permitted</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1½</td>
<td>100 sq. in.*</td>
<td>Not Permitted</td>
<td>≤100 sq. in. = D-H-90</td>
<td>Not Permitted</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>100 sq. in.*</td>
<td>≤100 sq. in. = D-H-60</td>
<td>Not Permitted</td>
<td>1</td>
</tr>
</tbody>
</table>

Other fire barriers

<table>
<thead>
<tr>
<th>TYPE OF ASSEMBLY</th>
<th>REQUIRED WALL ASSEMBLY RATING (hours)</th>
<th>MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)</th>
<th>DOOR VISION PANEL SIZE</th>
<th>FIRE RATED GLAZING MARKING DOOR VISION PANEL*</th>
<th>MINIMUM Sidelight/ Transom ASSEMBLY RATING (hours)</th>
<th>FIRE-RATED GLAZING MARKING SIDELIGHT/TRANSOM PANEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fire protection</td>
<td>Fire resistance</td>
<td>Fire protection</td>
</tr>
<tr>
<td>Fire partitions: Corridor walls</td>
<td>1</td>
<td>½</td>
<td>Maximum size tested</td>
<td>D-H-NT-45</td>
<td>½</td>
<td>D-H-NT-45</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>½</td>
<td>Maximum size tested</td>
<td>D-20</td>
<td>½</td>
<td>D-H-0H-45</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>½</td>
<td>Maximum size tested</td>
<td>D-20</td>
<td>½</td>
<td>D-H-0H-20</td>
</tr>
<tr>
<td>Other fire partitions</td>
<td>1</td>
<td>½</td>
<td>Maximum size tested</td>
<td>D-H-45</td>
<td>½</td>
<td>D-H-45</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>½</td>
<td>Maximum size tested</td>
<td>D-H-20</td>
<td>½</td>
<td>D-H-20</td>
</tr>
</tbody>
</table>
# Opening Protection

## Table 14-4.23

<table>
<thead>
<tr>
<th>TYPE OF ASSEMBLY</th>
<th>REQUIRED WALL ASSEMBLY RATING (HRS)</th>
<th>DOOR VIEW PANEL A 100 IN² OR LESS</th>
<th>DOOR VIEW PANEL A &gt; 100 IN²</th>
<th>SIDElite or Transom PANELS B &amp; C</th>
<th>WINDOW ASSEMBLY D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 hr</td>
<td>Not Permitted</td>
<td>Not Permitted</td>
<td>W-180²</td>
<td>W-180²</td>
</tr>
<tr>
<td></td>
<td>2 hr</td>
<td>[D-H-H]</td>
<td>[D-H-W-90]</td>
<td>W-120²</td>
<td>W-120²</td>
</tr>
<tr>
<td></td>
<td>1/hr</td>
<td>[D-H-H]</td>
<td>[D-H-W-90]</td>
<td>W-90²</td>
<td>W-90²</td>
</tr>
<tr>
<td>Fire barriers for enclosures of shafts, exit access stairways, exit access ramps, exit passageways and exit stairways and exit passageways walls</td>
<td>1 hr</td>
<td>[D-H-H]</td>
<td>[D-H-W-90] or [D-H-T-W-90]</td>
<td>W-60³</td>
<td>W-60³</td>
</tr>
<tr>
<td>Other fire barriers</td>
<td>1 hr</td>
<td>[D-H-N-T-45]</td>
<td>[D-H-N-T-45]</td>
<td>W-60³</td>
<td></td>
</tr>
<tr>
<td>Fire barriers – incidental use areas, narrow occupancy separations</td>
<td>1 hr</td>
<td>[D-H-N-T-45]</td>
<td>[D-H-N-T-45]</td>
<td>[D-H-45] or W-60³</td>
<td></td>
</tr>
<tr>
<td>Fire partitions: Corridor walls</td>
<td>1 hr</td>
<td>[D-20]</td>
<td>[D-20]</td>
<td>[D-H-OH-45] or [D-H-20]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.5 hr</td>
<td>[D-20]</td>
<td>[D-20]</td>
<td>[D-H-OH-20] or W-30³</td>
<td></td>
</tr>
<tr>
<td>Other fire partitions</td>
<td>1 hr</td>
<td>[D-H-45]</td>
<td>[D-H-45]</td>
<td>[D-H-45] or W-60³</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.5 hr</td>
<td>[D-H-45]</td>
<td>[D-H-45]</td>
<td>[D-H-45] or W-60³</td>
<td></td>
</tr>
<tr>
<td>Smoke barriers</td>
<td>1 hr</td>
<td>[D-H-20]</td>
<td>[D-H-20]</td>
<td>[D-H-OH-45] or [D-H-20]</td>
<td></td>
</tr>
<tr>
<td>Exterior walls¹</td>
<td>2 hr</td>
<td>[D-H-H]</td>
<td>[D-H-W-90]</td>
<td>W-120³</td>
<td>W-120³</td>
</tr>
<tr>
<td></td>
<td>1 hr</td>
<td>[D-H-N-T-45]</td>
<td>[D-H-N-T-45]</td>
<td>W-60³</td>
<td></td>
</tr>
</tbody>
</table>

1. Markings in brackets [ ] are the protection-rated glazing. Fire protection-rated glazing in doors, sidelights and transoms must NFPA 2252.
2. Fire protection-rated glazing meeting ASTM E 119 or ESL 235.
3. Glazing meeting both the standard for protection-rated glazing in doors (NFPA 2252) and the standard for fire resistance-rated glazing (ASTM E 119 or ESL 235).
4. Glazing requirements where protected openings are required by Table 705.8.
5. Only openings necessary for egress are allowed in exit access stairways and interior exit stairs.

---

**Opening Protection**

![Diagram of opening protection](image)

### Table 14-4.23

<table>
<thead>
<tr>
<th>TYPE OF ASSEMBLY</th>
<th>REQUIRED WALL ASSEMBLY RATING (HRS)</th>
<th>DOOR VIEW PANEL A 100 IN² OR LESS</th>
<th>DOOR VIEW PANEL A &gt; 100 IN²</th>
<th>SIDElite or Transom PANELS B &amp; C</th>
<th>WINDOW ASSEMBLY D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire partitions: Corridor walls</td>
<td>1 hr</td>
<td>[D-20]</td>
<td>[D-20]</td>
<td>[D-H-OH-45] or [D-H-20]</td>
<td>W-20²</td>
</tr>
<tr>
<td></td>
<td>0.5 hr</td>
<td>[D-20]</td>
<td>[D-20]</td>
<td>[D-H-OH-20] or [D-H-20]</td>
<td>W-30²</td>
</tr>
</tbody>
</table>
## Opening Protection

### Table 716.3

<table>
<thead>
<tr>
<th>Fire Test Standard</th>
<th>Marking</th>
<th>Definition of Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM E 119 or UL 263</td>
<td>W</td>
<td>Meets wall assembly criteria.</td>
</tr>
<tr>
<td>NFPA 257 or UL 9</td>
<td>OH</td>
<td>Meets fire window assembly criteria including the hose stream test.</td>
</tr>
<tr>
<td>NFPA 252 or UL 10B or UL 10C</td>
<td>D</td>
<td>Meets fire door assembly criteria.</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>Meets fire door assembly “Hose Stream” test.</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>Meets 45°F temperature rise criteria for 30 minutes</td>
</tr>
<tr>
<td>XXX</td>
<td></td>
<td>The time in minutes of the fire resistance or fire protection rating of the glazing assembly</td>
</tr>
</tbody>
</table>

---

## Opening Protection

(Amd) Table 8.3.4.2 Minimum fire protection ratings for opening protectives in fire-resistance-rating assemblies.

<table>
<thead>
<tr>
<th>Component</th>
<th>Walls and Partitions (hr)</th>
<th>Fire Door Assemblies (hr)</th>
<th>Fire Window Assemblies (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevator hoistways</td>
<td>2</td>
<td>1/2</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>NP</td>
</tr>
<tr>
<td>Vertical shafts (including stairways, exits, and refuse chutes)</td>
<td>2</td>
<td>1/2</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>1/3</td>
<td>1/3</td>
<td>NP</td>
</tr>
<tr>
<td>Fire barriers</td>
<td>2</td>
<td>1/2</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1/4</td>
<td>NP</td>
</tr>
<tr>
<td>Horizontal exits</td>
<td>2</td>
<td>1/2</td>
<td>NP</td>
</tr>
<tr>
<td>Exit access corridors¹</td>
<td>1</td>
<td>1/3</td>
<td>1/3</td>
</tr>
<tr>
<td></td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
</tr>
<tr>
<td>Smoke barriers¹</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
</tr>
</tbody>
</table>
Existing Stair Doors

Fire Door Basics
Fire Door Basics
NFPA 80

- Fabric fire safety curtains
- ITM dampers
- Door bottom clearance
- Floor fire doors
- Care & maintenance
- Glazing materials
- Fire shutters

Fire Doors

NFPA 80

- Visual & functional
- Annually
- Knowledgeable persons
- 11 specific items
- Written records
  - signed
  - kept for AHJ inspection
All Egress Doors

CFSC Part IV

- Visual & functional
- Occupancy driven
- Knowledgeable persons
- 11 specific items
- Written records
  - signed
  - kept for AHJ inspection

I Got Nothing
Questions or Comments

Thank You