



Architectural Hardware: ADA Compliance, Standards, & Codes

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Architectural Hardware: ADA Compliance, Standards, & Codes

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Purpose and Learning Objectives

Purpose:

The Americans with Disabilities Act (ADA) applies to all state and local government agencies, commercial facilities, and public entities that have “places of public accommodation.” Presented in this course are the fundamentals of what accessibility means in terms of architectural door hardware specification. Topics include available hardware technology, the criteria for interior and perimeter access, and the codes and guidelines pertaining to the ADA requirements that affect door hardware selection.

Learning Objectives:

At the end of this program, participants will be able to:

- discuss the reasons why a building owner or facility operator should comply with the ADA
- define the six components required to ensure an opening is ADA compliant
- state the four key criteria for ADA compliance that must be met, covering both perimeter access and interior access of a building, and
- explain the requirements for compliance with ICC/ANSI A117.1, the ADAAG, and the ADA.

Contents

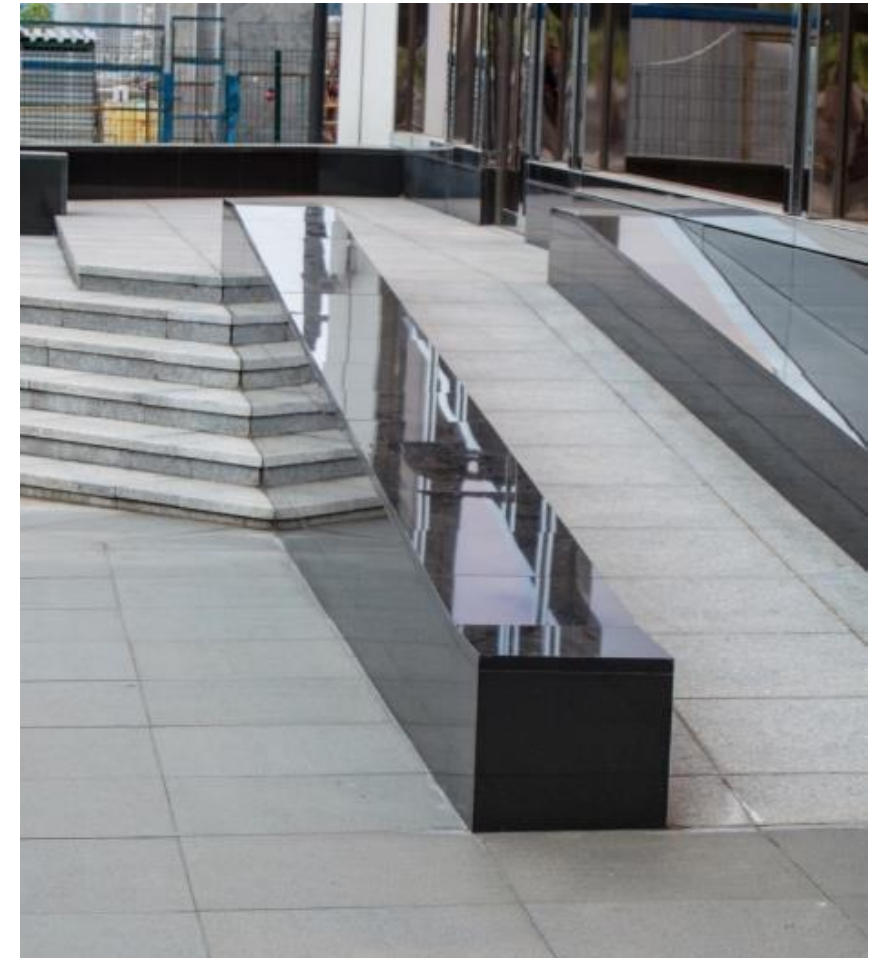
Introduction to the Americans with Disabilities Act (ADA)

ADA Law: Criteria for Interior & Perimeter Access

ADA Compliance: Door Hardware

Meeting Code Requirements

Summary





Introduction to the Americans with Disabilities Act (ADA)

What Is the ADA?

The ADA defines disability as a physical or mental impairment that substantially limits one or more major life activities.

The Americans with Disabilities Act (ADA) was signed into law in July 1990 by President George H.W. Bush. It is one of America's most comprehensive pieces of civil rights legislation, as it prohibits discrimination and ensures that people with disabilities have the same opportunities as everyone else to participate in the mainstream of American life. This includes access to employment opportunities, to purchase goods and services, and to participate in state and local government programs and services. The ADA is a civil rights law, enforceable by civil action (lawsuits).

In September 2010, the Department of Justice published final regulations revising the Department's ADA regulations, including the adoption of updated 2010 ADA Standards for Accessible Design. The final rules went into effect on March 15, 2011.



Who Does the ADA Affect?

The ADA standards apply to all state and local government agencies, commercial facilities, and public entities that have “places of public accommodation.”

- Commercial facilities include privately owned office buildings, warehouses, factories, etc.
- Places of public accommodation refer to businesses that are typically open to the public, and they fall into one of 12 categories specified in the ADA. Some examples include restaurants, film theaters, schools, doctors’ offices, recreation facilities, and daycares.

The ADA affects:

- Americans with disabilities
- private employers with 15 or more employees, and
- businesses operating for the benefit of the public.



Disability Issues

Below are some common issues voiced by those who have disabilities. These include typical activities that those without disabilities may take for granted.

It is considered discrimination when a disabled person cannot gain access into a public building and is unable to take part in typical activities associated with a building.

Common Complaints

“I can’t eat at that restaurant...because the door is too heavy.”

“I can’t see a movie at that theater... because there isn’t a place for my wheelchair.”

“I can’t check into that hotel...because there isn’t a ramp into the foyer.”

“I can’t shop at that store...because the door won’t stay open long enough for me to enter.”

“I can’t use that restroom...because I’ll trip on that threshold with my crutches.”

“I can’t take that cruise...because the door to the cabin is too narrow for my wheelchair.”

“I can’t take classes at that school...because I don’t have the strength to open the door.”

Why Comply?

There are several important reasons why businesses need to be ADA compliant:

- It enables an owner to meet the needs of all people who occupy or visit the facility, both patrons and employees. Being ADA compliant is good business practice.
- It enables an owner to keep the building compliant with current standards pertaining to those with disabilities.
- There can be serious risks to a business if a facility is not ADA accessible. ADA compliance helps an owner to avoid lawsuits brought as a result of noncompliance. Businesses and building professionals need to be aware of the rules and regulations of ADA compliance. Some think that ignorance is an excuse that will avoid costly litigation. That is not true. Furthermore, it is a misconception that a warning must be given and an allowance period of “getting up to code” is allowed before litigation is possible. Again, not true. Businesses can be sued at any time whether it is their first offense or complaint or one of many.

“Businesses have had 13 years to meet the ADA’s requirements. There’s no longer an excuse for violations at this time.”

- National Organization on Disability (NOD),
President Alan A. Reich

Why Comply?

There has been an increase in the number of lawsuits filed on the basis of the ADA regulations.

As mentioned, noncompliance could end up costing a business thousands of dollars, anywhere from \$10,000 to \$100,000 or more. In some areas, settlements average \$45,000+. Why risk that exposure?

Also, along with cost comes negative publicity associated with lawsuits of noncompliance, which can tarnish the reputation of any business.

In August 2000, the U.S. Equal Employment Opportunity Commission (EEOC) settled an ADA lawsuit for \$220,000 against a major Arkansas auto dealership.

<https://www.eeoc.gov/eeoc/newsroom/release/8-31-00.cfm>

“Justices side with disabled in lawsuit issue”

http://www.nbcnews.com/id/4997814/ns/us_news/t/justices-side-disabled-lawsuit-issue/#.XIF_cVhYblU

“Disabled win victory in ruling over access to government buildings”

<http://www.cnn.com/2004/LAW/05/17/scotus.disabled/>

“Several local business owners could end up closing their restaurants or pay out hundreds of thousands of dollars to make repairs and settle with a wheelchair-bound man who calls himself ‘The Sheriff.’”

“‘The Sheriff’ strikes again. The wheelchair-bound man suing hundreds of businesses in California for not being compliant with the Americans with Disabilities Act (ADA) has now served dozens of lawsuits to business owners in one Central Coast town.”

“A Florida-advocacy group for disabled persons has filed three lawsuits against businesses in two Maryland cities for alleged noncompliance with the Americans with Disabilities Act.”

Aging Population

Knowing the sheer number of people with disabilities helps us to recognize the value and importance of ADA regulations.

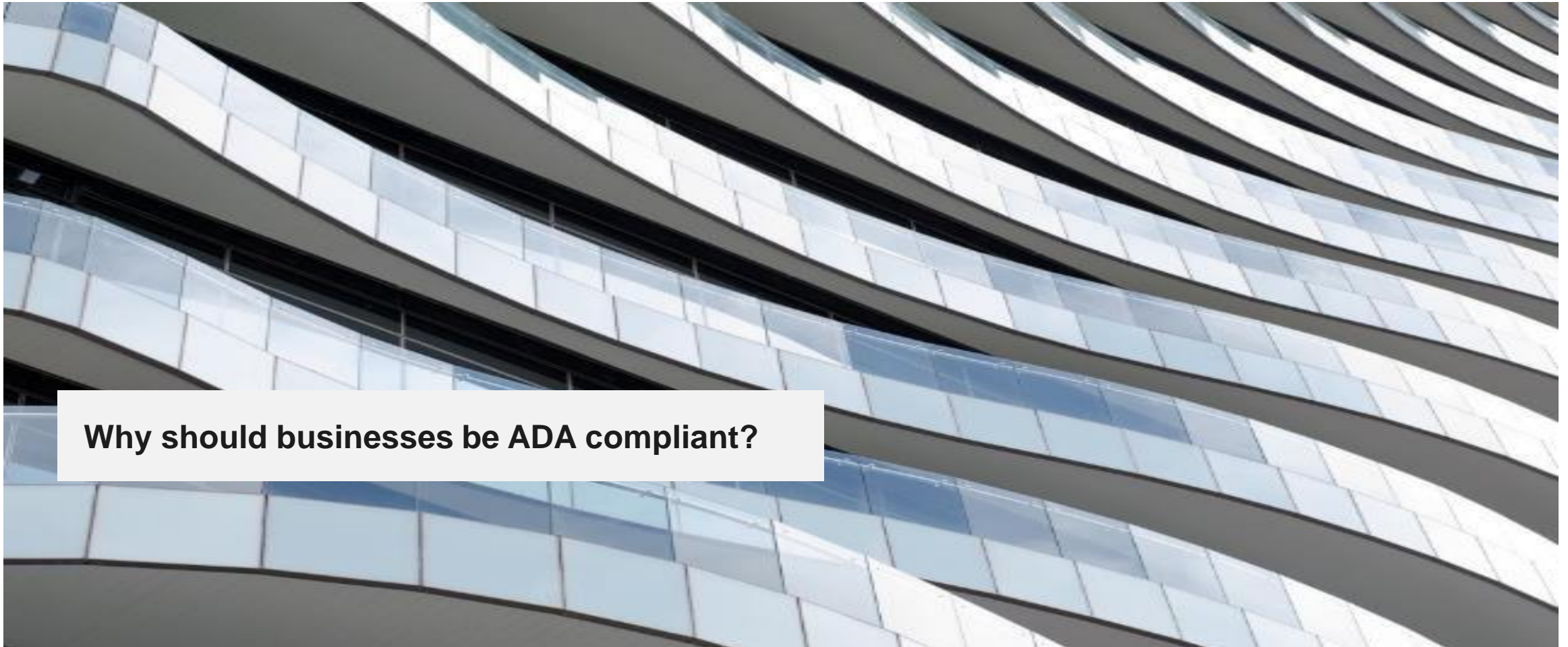
It is estimated that over 54 million Americans have disabilities, translating to 20% of the American population, and that figure is expected to rise with the aging population. According to the Aging States Project study, within 27 years, the portion of the population aged 65+ years will increase 60%+, meaning one in five adults will be 65+ years of age.

In global terms, the United Nations estimates that 15% of the population worldwide, or approximately 1 billion people, live with one or more disabling conditions.

Looking forward, the trends in aging populations combined with the higher risk of disability in older people are likely to lead to further increases in the population affected by disability.



Review Question



Why should businesses be ADA compliant?

Answer

Why should businesses be ADA compliant?

It is good business practice. It enables an owner to meet the needs of all people who occupy or visit their facility.

It enables an owner to keep the building compliant with current standards pertaining to those with disabilities.

It helps an owner to avoid lawsuits brought as a result of noncompliance.





ADA Law: Criteria for Interior & Perimeter Access

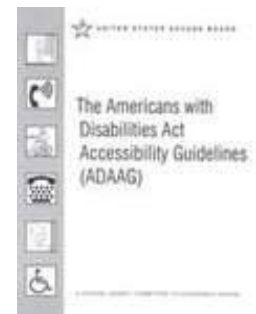
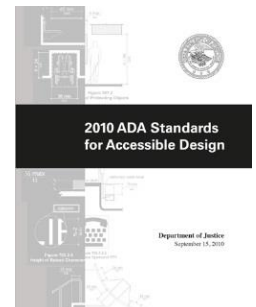
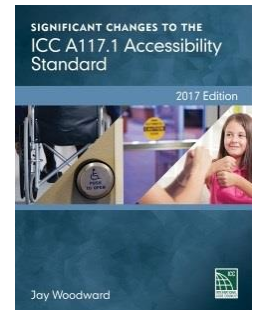
ANSI A117.1

Accessibility standards are referenced by local accessibility codes and the *International Building Code (IBC)* under:

- ANSI A117
- 2010 ADA Standards for Accessible Design, and
- Americans with Disabilities Act Accessibility Guidelines (ADAAG).

With regard to the selection of door hardware, the resource document for accessibility is ANSI A117.1, published by the International Code Council (ICC). A117.1 is a standard that is referenced by many building codes. This code, derived from the Public Accommodations title, requires business owners to make reasonable attempts to remove barriers and provide disabled people with access equal, or similar, to that of the general population.

It is important to know that within A117.1 there are specific guidelines that, if followed, will also achieve the intent of the ADA.



ANSI A117.1

Before we go further, it may be helpful to know some of the nomenclature of the door industry. The glossary of terms in the A117.1 includes new definitions that only appear in the ADAAG document. These terms relate to the selection of hardware that conforms to this accessibility document. Listed below are a few examples that will be referenced in the course.

Accessible:

“Describes a site, building, facility, or portion thereof that complies with this standard” (and can be approached, entered, and used by persons with physical disabilities).

Automatic Door:

“A door operated with power mechanisms and controls.”

Power Assisted Door:

“A door used for human passage, with a mechanism that helps to open the door, or to relieve the opening resistance of the door.”

Tactile:

“Describes an object that can be perceived using the sense of touch.”

ADA Law

The Attorney General publishes regulations to implement the requirements of ADA law. These regulations are codified in the Code of Federal Regulations (CFR) under five categories or titles.

- Title I – Employment
- Title II – Public Service (state and local government services)
- Title III – Public Accommodations and Commercial Facilities
- Title IV – Telecommunications
- Title V – Miscellaneous

Of the five titles in ADA law, Title II and Title III are the primary concerns when dealing with building design and facility accessibility. The majority of requirements fall under Title III, which essentially mandates that people with disabilities have access to certain buildings that is equal to, or similar to, that which is available to the general public.

In subsequent slides, we will review the criteria for perimeter and interior access.

Title III: Criteria for Perimeter Access

When designing a building with ADA compliance in mind, four key criteria must be met covering both perimeter access and interior access.

1. Getting to the building

Refers to access to parking, ground surfaces, curb ramps, and accessible routes to entry of the building. Accessible handicapped parking must be located on the shortest accessible route to the accessible entrance.

2. Getting into the building

Covers the potential obstacles that are presented at the building entrance such as the doors, the hardware, the threshold, and the force it takes to open the doors.

Accessible Elements and Spaces - Perimeter Access



Getting to the building

- Parking
- Ground surfaces
- Curb ramps
- Accessible routes



Getting into the building

- Exterior openings
- Opening hardware
- Opening dimensions
- Threshold surfaces
- Opening forces

Title III: Criteria for Interior Access

3. Moving around the building

Are there accessible paths once the person gains access into the building?
Are there accessible restrooms?
Options other than stairs to access multiple levels?

4. Using the building elements

Can the phone, water fountains, and all elements in a restroom be accessed?

Accessible Elements and Spaces - Interior Access



Moving around the building

- Stairs
- Ramps
- Elevators
- Building elements
- Chair lifts
- Personal care areas
- Interior openings
- Allowable space

Using the building elements

- Telephones
- Mirrors
- Seating
- Signage
- Windows
- Toilets / urinals
- Hand rails / grab bars
- Lavatory fixtures
- Water coolers / fountains
- Sinks / showers / tubs



ADA Compliance: Door Hardware

Compliance Components

In this section of the course, we will review each of the following components that require consideration to ensure that an opening is ADA compliant, beginning with latch requirements.

ADA Compliance Components, ANSI A117.1	
Component 1	Latch requirements for an opening
Component 2	Clear opening requirements
Component 3	Opening force requirements/obstacles for a manual door closer
Component 4	Closing speed requirements for a door
Component 5	Identifying the need for an automated opening
Component 6	Minimum speed requirements for an auto operator door

Component 1: Latch Requirements



ADA-Compliant Latch Requirements

- Operable parts shall be operable with one hand
- Shall not require tight grasping or pinching, or twisting of the wrist
- Levers and U-shaped handles are acceptable



Non-ADA Compliant

- Knobs, turn bolts, and thumb turns

Latch requirements focus on the mechanism used to open the door. Listed below are the requirements for ADA compliance.

- Operable parts (handles, pulls, latches, locks, etc.) on accessible doors must have a shape that is easy to grasp and operate with one hand and does not require tight grasping, tight pinching, or twisting of the wrist. Acceptable designs include push-type and lever-operated mechanisms, and U-shaped handles. Knobs, turn bolts, and thumb turns are not ADA compliant.
- Hardware must be mounted between 34 inches and 48 inches above finished floor (AFF). For some jurisdictions, the maximum height is 44 inches above the finished floor.
- Note that some jurisdictions require full return of the lever to the door.

Component 1: Latch Requirements

Sliding Doors

To be ADA compliant, hardware on sliding doors must be exposed and useable from both sides of the door when the door is fully open.

Latches that retract into a pocket and are retrieved by a hidden finger pull are not considered usable for someone with a disability.



Non-ADA Compliant

- Latches that retract into a pocket

ADA-Compliant Latch Requirements, Sliding Doors

- Must be exposed and useable from both sides

Component 1: Latch Requirements

Cabinets

To be ADA compliant, latching hardware for accessible storage facilities must be located 34–48 inches maximum above the finished floor.

Touch latches and U-shaped pulls are acceptable.



Exposed Pulls



ADA Flush Pulls



Touch Latches

Component 2: Clear Opening Requirements

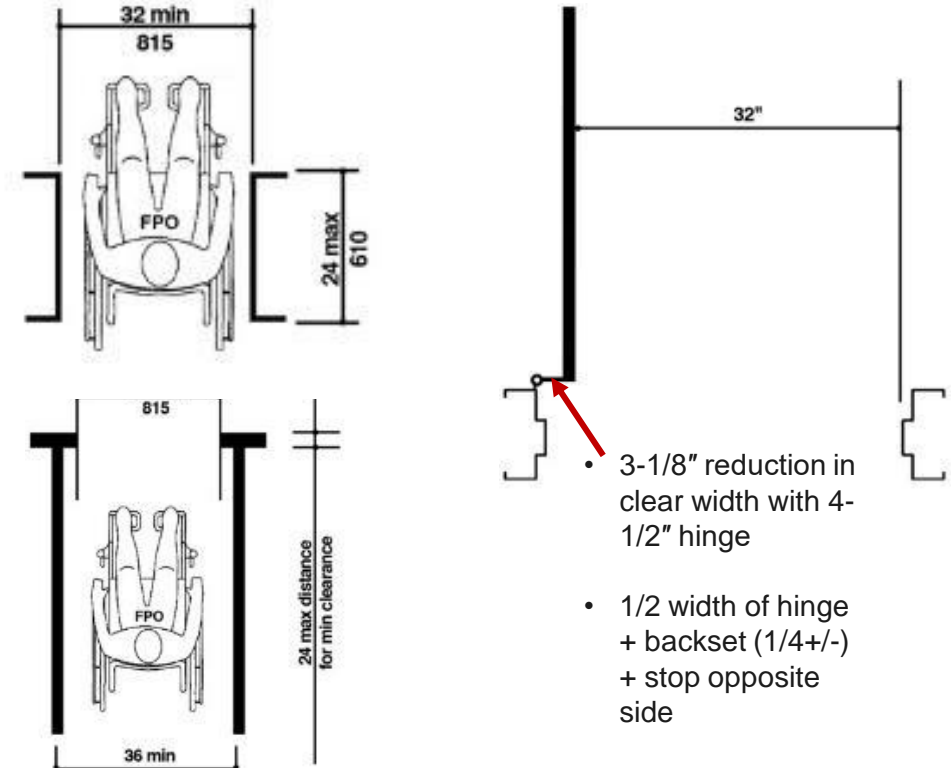
Next, we look at clear opening requirements. A clear opening is an opening that meets ADA standards on height, width, and threshold measurements.

By ADA standards, a door must be at least 80 inches in height.

As per ANSI A117, 404.2.2, door widths shall have a clear opening width of 32 inches minimum. Clear opening width of doorways with swinging doors should be measured from the face of the door to the face of the frame stop with the door open 90 degrees. Openings more than 24 inches in depth at doors and doorways without doors shall provide a clear opening width of 36 inches minimum.

EXCEPTION:

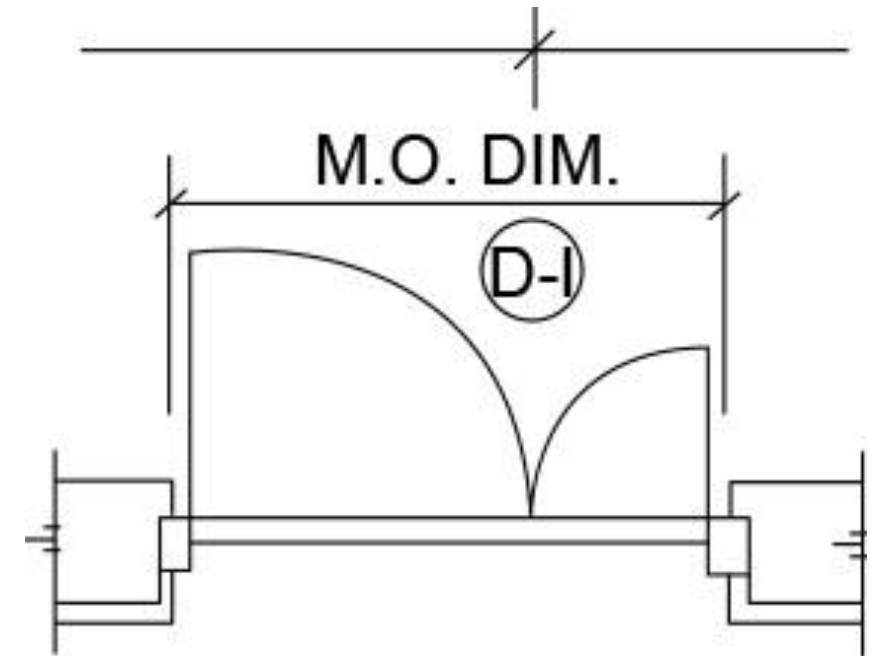
- 20-inch minimum at doors not requiring full user passage (i.e., shallow closet).



Component 2: Clear Opening Requirements

Clear Width Pair

Occasionally, pairs of doors are designed in projects with a 36-inch active leaf and a 24-inch inactive leaf. This is acceptable if both leaves can be independently operated and at least one door has a 32-inch clear opening.



Scale: 1/4"=1'-0"

Component 2: Clear Opening Requirements

Maneuvering Clearances: Swinging Doors & Gates

Maneuvering clearances for manual swinging doors and gates are addressed in Table 404.2.3.2.

The clearances change from push to pull side and vary from approach direction, so it is important to refer to the chart when designing ADA-compliant projects.

TABLE 404.2.3.2—MANEUVERING CLEARANCES AT MANUAL SWINGING DOORS

TYPE OF USE		MANEUVERING CLEARANCES AT MANUAL SWINGING DOORS	
Approach Direction	Door or Gate Side	Perpendicular to Doorway	Parallel to Doorway (beyond latch unless noted)
From front	Pull	60 inches (1525 mm)	18 inches (455 mm)
From front	Push	52 inches (1320 mm) ⁴	0 inches (0 mm)
From hinge side	Pull	60 inches (1525 mm)	36 inches (915 mm)
From hinge side	Push	54 inches (1370 mm)	42 inches (1065 mm)
From latch side	Pull	48 inches (1220 mm) ²	24 inches (610 mm)
From latch side	Push	42 inches (1065 mm) ²	24 inches (610 mm)

¹Add 6 inches (150 mm) if closer and latch provided.

²Add 6 inches (150 mm) if closer provided.

³Beyond hinge side.

⁴In existing buildings and facilities, the dimension perpendicular to the door or gate for the front direction on the push side shall be 48 inches (1220 mm)

Component 2: Clear Opening Requirements

Maneuvering Clearances: Sliding & Folding Doors

Maneuvering clearances for sliding and folding doors are addressed in Table 404.2.3.3, shown at right.

Similar to swinging doors and gates, the clearances for sliding and folding doors change from push to pull side and vary from approach direction.

TABLE 404.2.3.3—MANEUVERING CLEARANCES AT SLIDING AND FOLDING DOORS

Approach Direction	MINIMUM MANEUVERING CLEARANCES	
	Perpendicular to Doorway	Parallel to Doorway (beyond stop or latch side unless noted)
From front	52 inches (1320 mm) ²	0 inches (0 mm)
From nonlatch side	42 inches (1065 mm)	22 inches (560 mm) ¹
From latch side	42 inches (1065 mm)	24 inches (610 mm)

¹Beyond pocket or hinge side.

²In existing buildings and facilities, the dimension perpendicular to the door for the front direction shall be 48 inches (1220 mm) minimum.

Component 2: Clear Opening Requirements

Doors or Gates in a Series

Distance between two hinged or pivoted doors or gates in a series shall be 48 inches minimum plus the width of any door or gate swinging into the space. The space between the doors and gates shall provide a turning space.

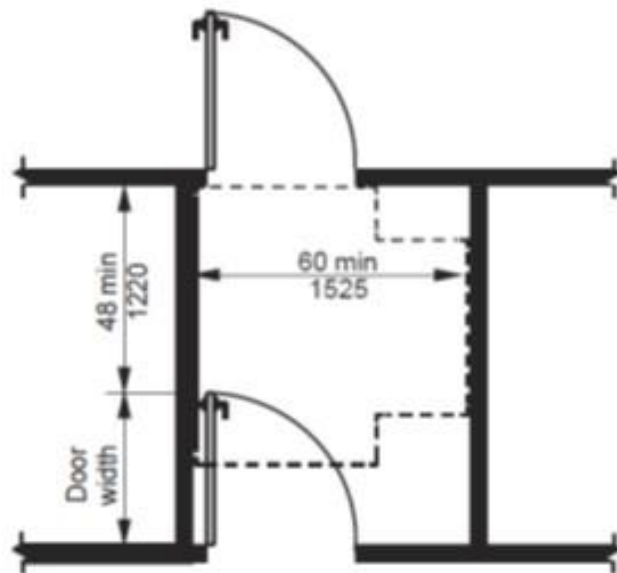


Figure 404.2.5(C)
Two doors or gates in a series – new buildings

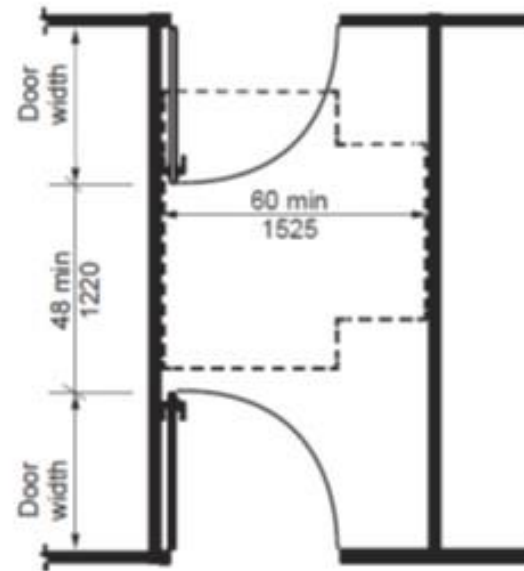


Figure 404.2.5(B)
Two doors or gates in a series – new buildings

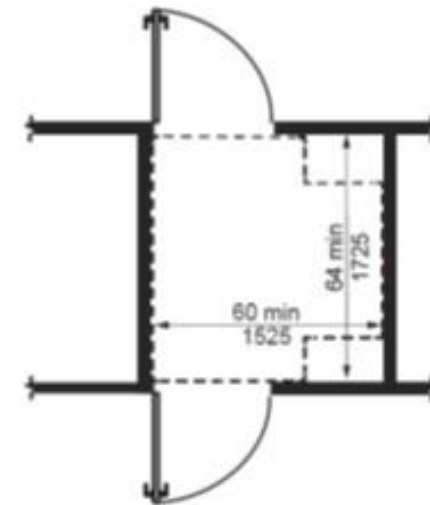


Figure 404.2.5(A)
Two doors or gates in a series – new buildings

Component 2: Clear Opening Requirements

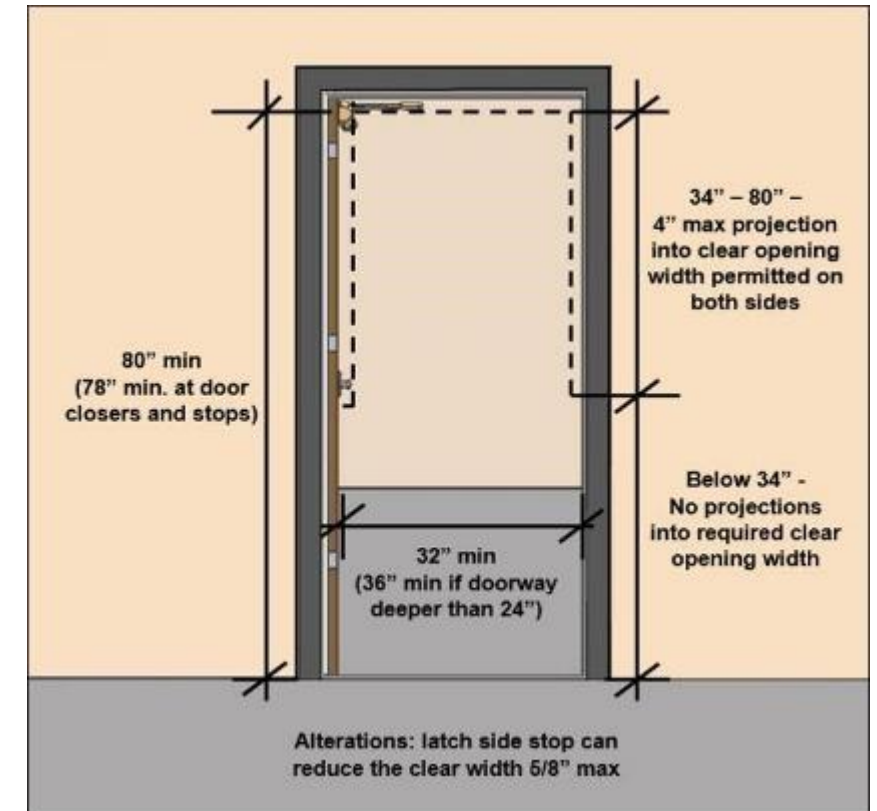
ADA Accessible Hardware

Below are the ADA clear opening requirements for hardware.

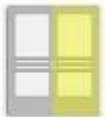
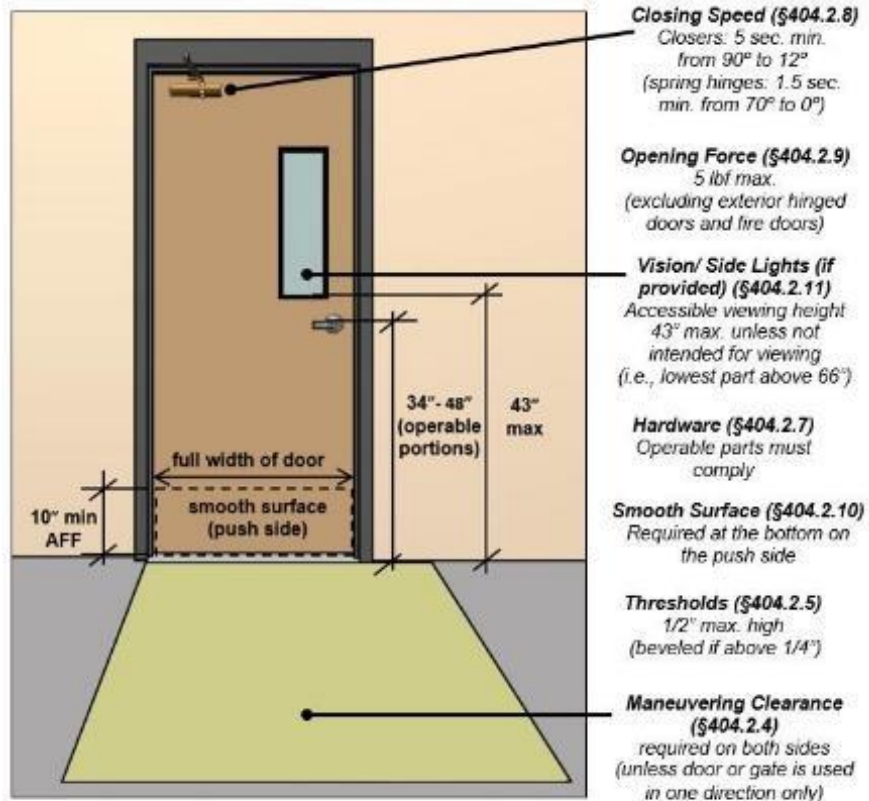
- Projection into the clear opening width between 34 inches up to 80 inches AFF shall not exceed 4 inches.
- Door surfaces within 10 inches of the floor measured vertically are required to be smooth.
- A kickplate may be added to a narrow bottom rail, but any cavity created by the addition must be capped.

EXCEPTIONS:

- 5/8-inch projection maximum is permitted at latch side stop on alterations.
- Door closers and stops permitted at 78 inches minimum AFF.



Component 2: Clear Opening Requirements



Double-Leaf Doors (§404.2.2)

One active leaf of double-leaf doors is required to meet criteria for clear width and maneuvering clearance. Other door requirements apply to both leaves.

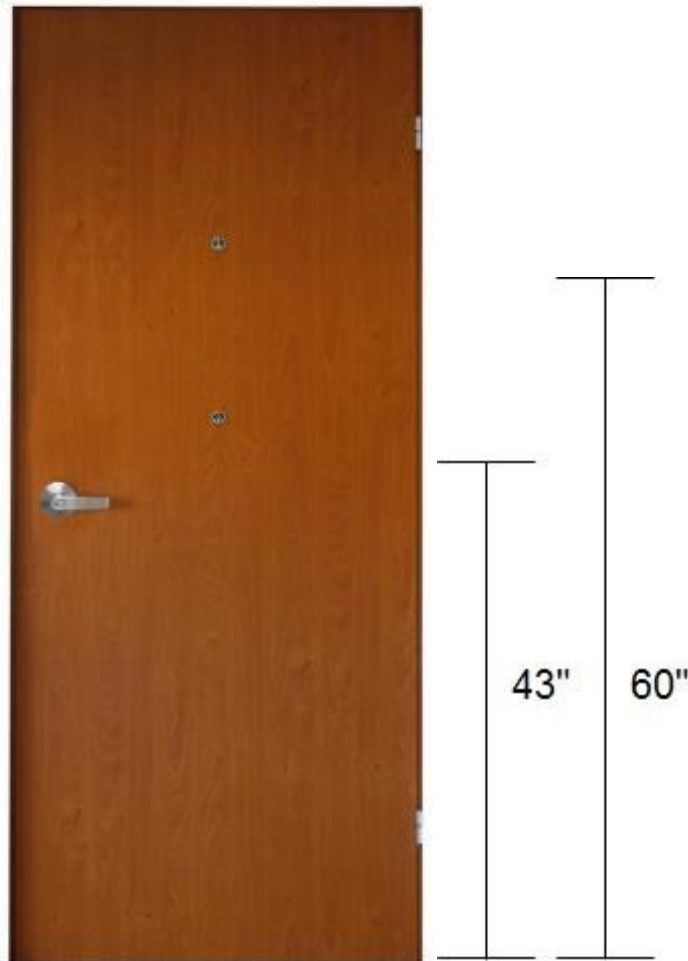
ADA-Compliant Vision Lites & Viewers

Doors, gates, and side lites adjacent to doors or gates having one or more glazing panels shall have the bottom of at least one glazed panel located 43 inches AFF. This ensures that the lite permits viewing for all building occupants, including those using wheelchairs.

EXCEPTION:

Vision lites with the lowest part greater than 66 inches above the floor are not required to comply as they are typically used for aesthetic or light transmission purposes and not for viewing.

Component 2: Clear Opening Requirements



ADA-Compliant Vision Lites & Viewers

A vision lite is not required in each door opening on an accessible route. If viewers are provided for viewing purposes in doors, two viewers are recommended for ADA accessibility.

The mounting location of viewers is not specifically stated in the accessibility standards, although some local codes do include required mounting heights. For example, in Massachusetts, entrance doors to some dwelling units are required to have a viewer mounted 60 inches above the floor with an additional viewer/lite at 43 inches AFF. Often, residential units will have two viewers at two different locations to accommodate all building occupants.

It is recommended to check the state and local codes for requirements pertaining to viewers.

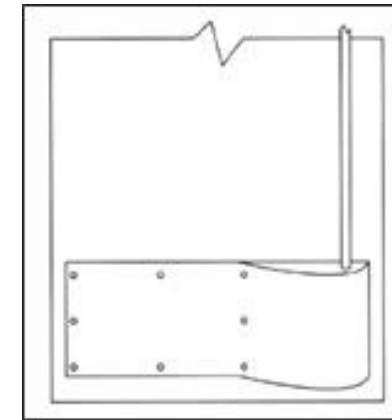
Component 2: Clear Opening Requirements

ADA-Compliant Door Surfaces

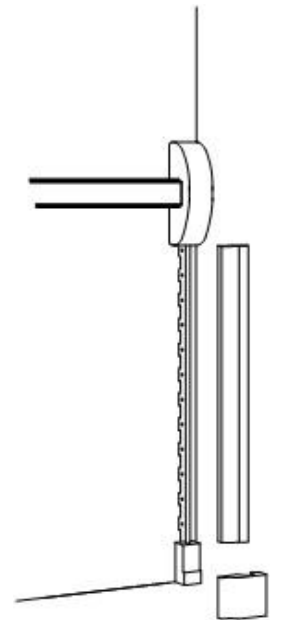
Door surface requirements are included in ANSI A117.1 This standard requires the bottom 10 inches of doors to have a smooth and uninterrupted surface to allow the door to be opened by a wheelchair footrest. This is an issue for bottom rods of surface vertical rod panic devices and surface bolts, which project from the door face. In these cases, protective plates are available. Specifiers are also listing vertical rod devices, less bottom rod or concealed in the door, for applications where security is not a concern. This avoids the appearance and additional cost of rod and latch guards. Note that horizontal and vertical joints must be within 1/16 inch of the same plane, and all cavities created by kick plates must be capped.

EXCEPTIONS:

- Sliding doors.
- Tempered glass doors without stiles must have a tapered bottom with 60° slope minimum.
- Doors that do not extend within 10 inches of the ground.



Protective Plate



Closer Rod Armor

Component 2: Clear Opening Requirements

ADA-Compliant Thresholds, Elevation & Maneuvering Area

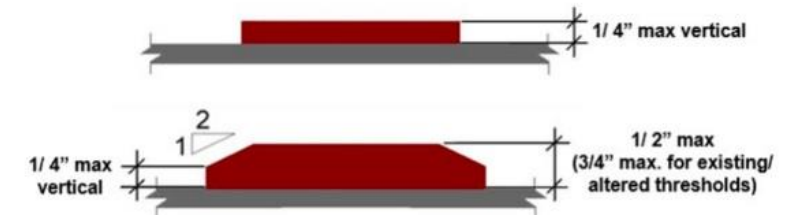
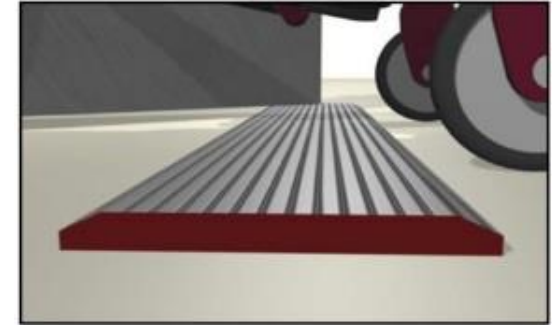
Thresholds, if provided at a doorway, must not exceed 1/2 inch for most types of doors. In Type A Units, thresholds must not exceed 3/4 inch in height for exterior sliding doors. The elevation must extend out equal to the door width.

- Changes in level up to 1/4 inch can be vertical and do not need an edge treatment.
- Changes in level between 1/4 inch and 1/2 inch must have a beveled slope equaling 1:2.
- If the changes in level are greater than 1/2 inch, the threshold must be equipped with a ramp.

The floor or ground surface within the maneuvering clearances at the doorway must not have a slope steeper than 1:48.

EXCEPTION:

- Altered or existing thresholds 3/4 inch maximum that have a beveled edge each side with slope not steeper than 1:2.



Note: vertical edge must be located below bevel, not above

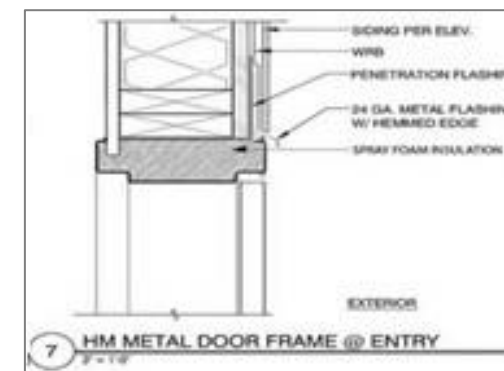
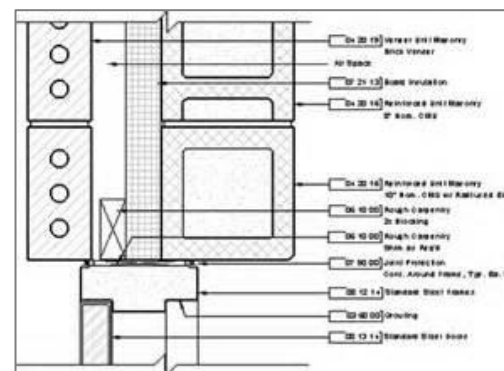
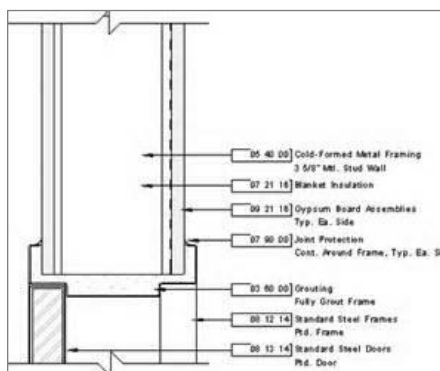
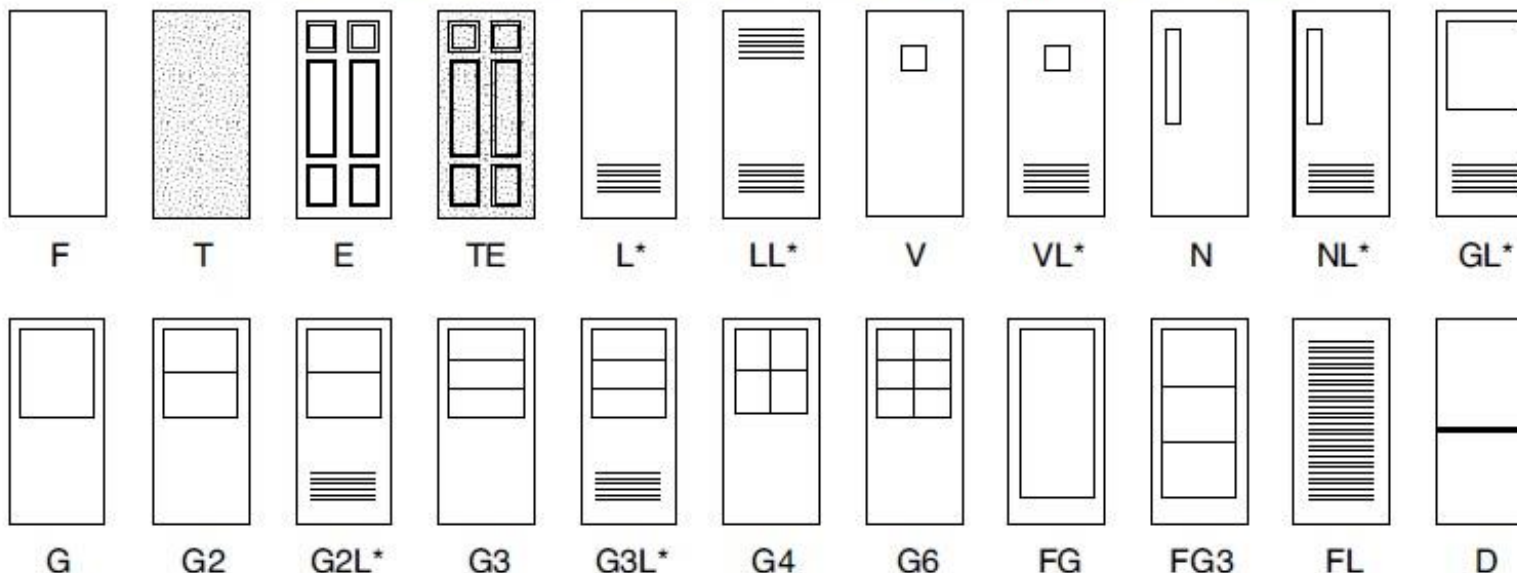
Elevations & Frame Details

Door and frame elevations affect the application of door hardware.

For example:

- Narrow stile doors
- Lite kits
- Wood molding on frames
- 1-inch face frames
- Closer mounting brackets on narrow top rails
- Overhead stops where frame is inset in frame

Steel Door Institute Standard Steel Door Design Nomenclature



Component 3: Opening Force Requirements



ADA-Compliant Manual Door Closers

The next component for discussion is the opening force requirement of a door, which is critical to ensure that an opening is ADA compliant. ADA law does not list instructions on how to measure the force of a door. The particulars can be found in ANSI A156.4-4.3, the standards for door closers.

Many disabled people have diminished strength; however, most can exert at least 5 lbf (pound force) in both pushing and pulling from a stationary position.

The requirements of using a manual door closer to meet ADA requirements include:

- Interior swinging and sliding doors: 5 lb or less*
- Exterior doors: the compliant opening force is determined by the local authorities. This flexibility exists as environmental factors, such as wind and pressure differences, vary greatly by location. Some jurisdictions call for specific forces on exterior doors, e.g., 5 lb (California), 8.5 lb (Chicago).
- Fire doors: minimum allowable by authority having jurisdiction (AHJ)

* Forces do not apply to force needed to retract latch bolt and disengage other devices that hold the door closed.

Component 3: Opening Force Requirements

ADA-Compliant Manual Door Closers

The greatest obstacle to meeting opening force requirements is balancing efficiency and accessibility. Five pounds of opening force is equal to only three pounds of closing force (ANSI 156.4 states that all Grade 1 door closers must meet a 60% efficiency rating). So sometimes when a door opens with less than 5 pounds and you have any of the conditions listed at right, the door may not close with sufficient power to latch the door. Essentially, if a door is easy to open, it is easy to keep open. In many cases, the closer is blamed for closing problems. Most of the time, however, wind conditions, the door frame, and installation are to blame. If adjusted properly, mechanical closers can meet ADA requirements.



Conditions that Impact ADA Requirements:

- Weather-stripping
- Stack pressures
- Windy conditions
- Door and frame misalignment
- Hinge bind
- Threshold rub
- Latch bolt alignment

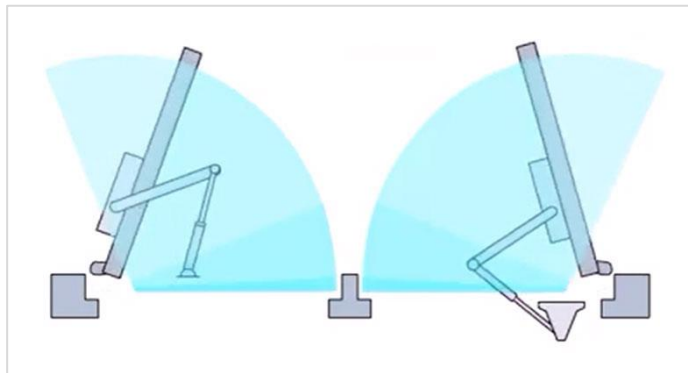
Component 4: Closing Speed Requirements – Closers

The next topic for review is closing speed requirements.

Although delayed action is not an ADA requirement, doors with delayed action features allow the individuals more time to maneuver.

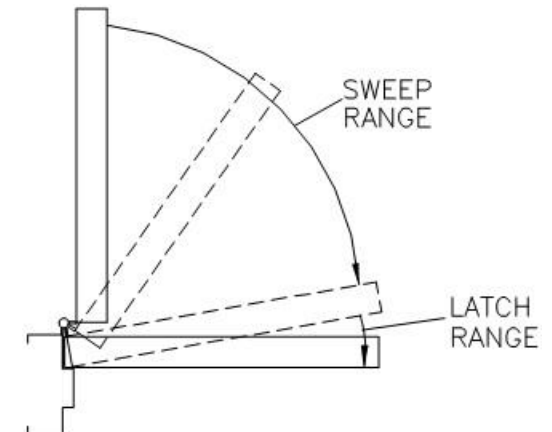
If a door has a closer, then the closing speed as determined by ADA guidelines requires a minimum sweep period of three seconds from an open position of 70 degrees to a point three inches from the latch (measured to the leading edge of the door). While this feature is not mandatory by law, it helps to accommodate those with disabilities. Delayed action features are particularly useful for frequently used interior doors, such as entrances to restrooms.

Click on the link below to view the phases of a single-delayed action closer.



Example of single-delayed action closer.

Click on the image to view the video on YouTube (no audio).



Component 4: Closing Speed Requirements - Closer & Spring Hinge

Shown here are a closer (left) and a spring hinge (right).



Closers move from open position 90 degrees to 12 degrees in 5 seconds (minimum).



Spring hinges are not recommended for most applications as they move from open position 70 degrees to closed position in 1.5 seconds minimum.

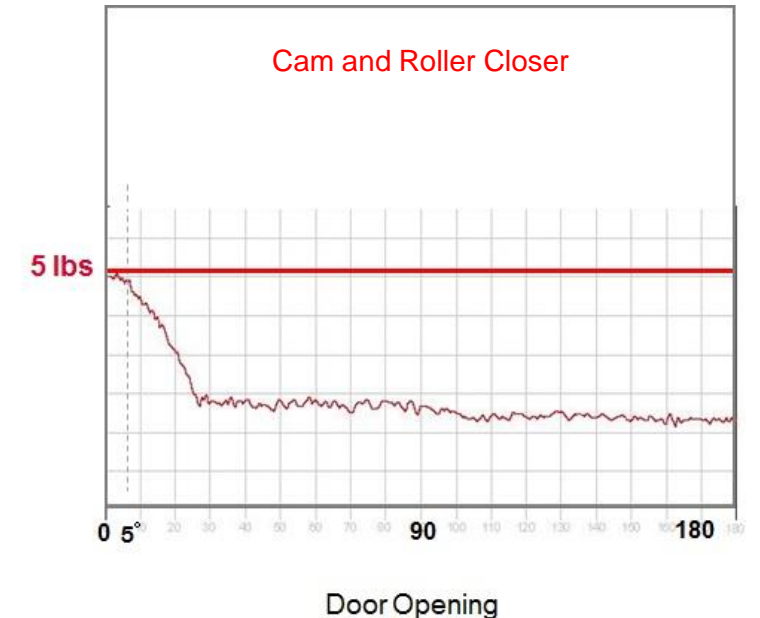
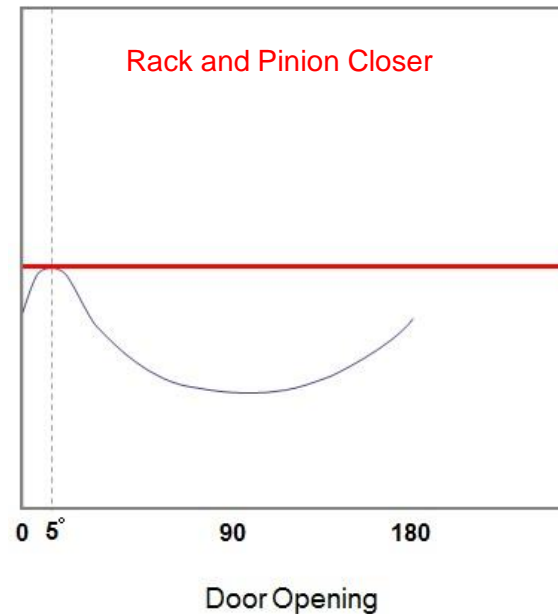
Component 4: Closing Speed Requirements – Manual Doors

Types of Manual Door Closers

There are two types of manual door closer designs: rack and pinion, and cam and roller.

Cam and roller technology allows for the most efficient and best door control, while maintaining the power to close doors. In doing so, it allows the door to remain secure where it is most important to do so—at the latch.

The opening force requirements of a rack and pinion closer and a cam and roller closer achieve the same goal, but arrive at that conclusion in different ways. A cam and roller system has a smoother, more linear response.



Component 5: Identify the Need for Automatic Opening

The next component for review is identifying the need for an automatic opening.

For those with disabilities, doors are looked at as obstacles or barriers to overcome. Think of how difficult it would be to manually open a door while seated in a wheelchair.

Mostly used for exterior openings, automatic openings help to meet accessibility requirements when additional help/power is needed to close and latch a door. Although automated openings are NOT required by the ADA, they can be used to facilitate accessibility for the disabled, making it much easier for the disabled to use the restrooms and to enter and exit a building.

The 2021 International Building Code (IBC) does have a requirement for at least one exterior door on the accessible route to have an auto operator for Assembly, Business, Mercantile, and Hotels of certain occupant loads (300 for Assembly and 500 for the others).



Component 6: Minimum Speed Requirements

Low-Energy Automatic Door Operators

There are two types of automatic doors operators: low energy and high energy.

A low-energy door operates slowly with minimal force, does not require safety devices, is operated with a push button, and strives for barrier-free accessibility. It must comply with ANSI 156.19 and must remain fully open for a period of five seconds before closing.

Low-energy doors cannot open any faster than three seconds to 80 degrees and four seconds to 90 degrees. They require no more than 15 pounds of force to stop moving; therefore, low-energy doors do not require guard rails, safety mats, or canceling scanners since a low-energy operator will not knock someone down if the door hits them.



Component 6: Minimum Speed Requirements

High-Energy Automatic Door Operators

A high-energy door operates quickly and 100% of the time, targeting all pedestrians. All high-energy doors must comply with ANSI/BHMA A156.10.

High-energy doors can swing as fast as 1.5 seconds to 80 degrees and may require up to 40 pounds of force to stop moving. As a result, high-energy doors need safety devices, such as guard rails, safety mats, and/or canceling scanners to prevent injuries from occurring. Otherwise, people could get hurt if they were standing on the swinging side of the door.



Component 6: Minimum Speed Requirements

Comparison of Low-Energy & High-Energy Automatic Door Operators

It is extremely important to understand the differences between high-energy and low-energy operators as they each fall under two different sets of guidelines. A summary of their differences is presented below.

Low-Energy Operator	High-Energy Operator
3 seconds to back check*, 4 seconds to full open	1.5 seconds to back check, no specified time to full open
No more than 15 lb of force to stop the door movement	No more than 40 lb of force to stop the door movement
Does not require guard rails, safety mats, canceling scanners	Requires guard rails, safety mats, cancelling scanners
Must comply with ANSI/BHMA A156.19	Must comply with ANSI/BHMA A156.10

*Back check refers to the last 5–15 degrees before the door is completely open

Location of Operator Actuators



When installing an operator, the switch should preferably be located within one to five feet of the door, but never more than 12 feet, and it should remain accessible from the swing side when the door is opened.

Do not locate the switch in a position where the user would be in the path of the moving door. It should be mounted so the user is in full sight of the door when activating the switch. If an appropriate wall is not available to meet these requirements, a bollard may be required.

Some jurisdictions are requiring switches at two locations. The lowest being no more than 8 inches centerline above the floor and the highest located between 30 inches and 44 inches above the finished floor. This can be simplified by using a full-height switch with the bottom located a maximum of 5 inches above the finished floor and the top is 35 inches minimum above the finished floor. The bar must be a minimum of 2 inches wide and shall display the International Symbol of Accessibility.

Locking Devices

Let's move on to discuss the options that are available to protect spaces via electronic entrances. There are various devices on the market, but before we review them, it is important to understand the difference between fail-safe and fail-secure locking systems.

With a fail-safe lock, the default state is actually unlocked. Power is applied to keep it locked during regular business hours. The door will automatically unlock should the power be interrupted or fail, providing egress for the building occupants. A fail-safe lock is typically used for a main entry point, such as an office door or lobby access door. Mag locks are a popular type of fail-safe lock.

Conversely, with a fail-secure lock, the default state is locked, and a fail-secure lock will remain locked if the power is interrupted or fails. It is often used for a fire door or staircase door, and in sensitive areas, such as IT rooms. Since the door remains locked in emergencies, a mechanical override, such as a key, will typically be used in conjunction with a fail-secure lock.

Locking Devices

Shown below are a variety of locking devices, including electromagnetic locks, electrified exit devices, electrified mortise locks, and electrified strikes.



Electromagnetic locks: An electromagnetic lock, magnetic lock, or maglock is a fail-safe locking device that consists of an electromagnet and an armature plate. Generally, the electromagnetic portion of the lock is attached to the door frame.



Electrified exit devices: These latches are a fail-secure option that utilize a powerful solenoid or electric motor to retract the latch or latches of an exit device. Pairs of doors may be latched top and bottom with electrified exit devices.



Electrified mortise locks can be set up to be either fail-safe or fail-secure. They feature a power cable connecting the lock to the power supply. As a result, electrified door hinges or on-wall cabling is required to make them operate.



Electrified strikes: With this type of device, the door remains locked while only authorized users can be granted access, using a buzzer, keypad, fob reader, or key card. They may be used as a fail-safe and fail-secure measure.

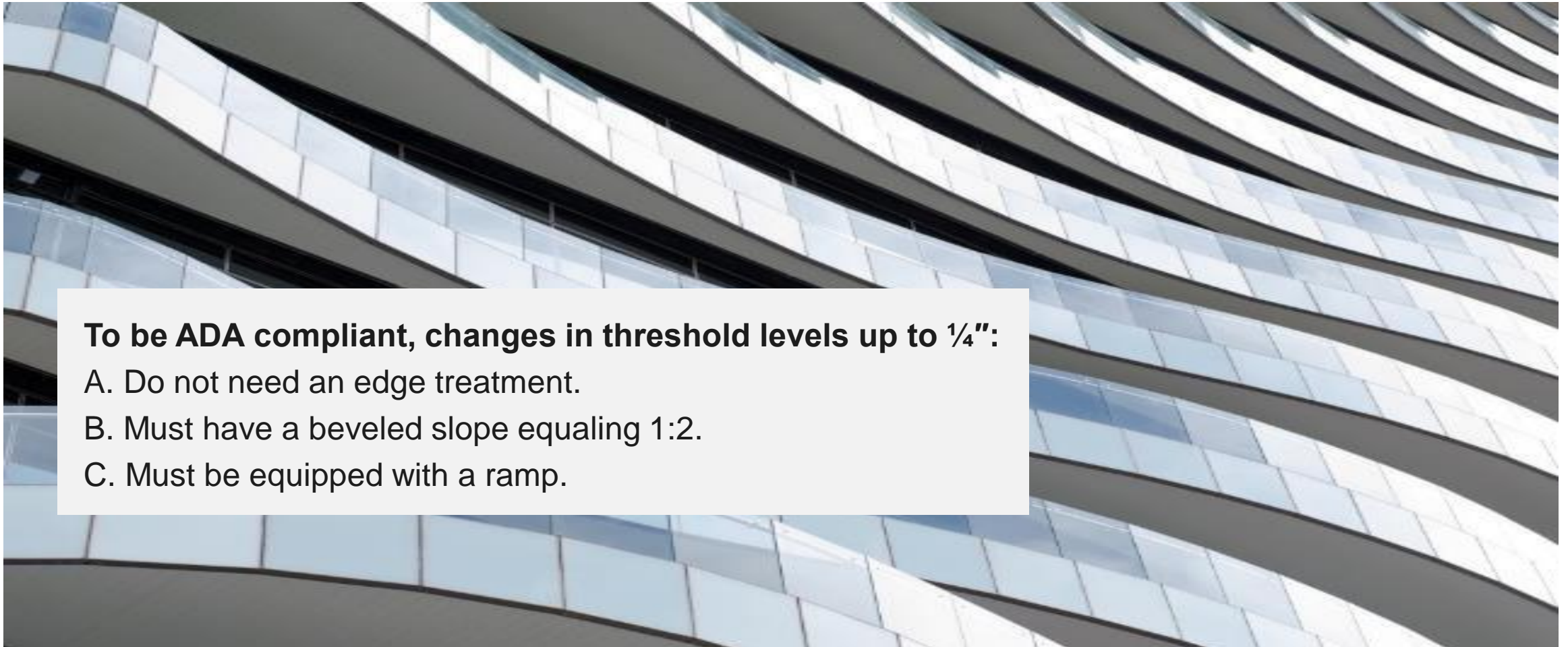
Four Key Design Considerations

This section of the course concludes with a summary of the four key points that are crucial to the design of ADA-compliant buildings: accessibility, compliance, security, and safety.

- **Accessibility** and public accommodation are key to meeting the needs of the disabled.
- **Compliance** is met by following applicable laws and codes.
- **Security** requires controlled access and accountability.
- **Safety** is achieved when proper hardware is installed on each opening and doors and hardware work as intended.



Review Question



To be ADA compliant, changes in threshold levels up to ¼”:

- A. Do not need an edge treatment.
- B. Must have a beveled slope equaling 1:2.
- C. Must be equipped with a ramp.

Answer

To be ADA compliant, changes in threshold levels up to $\frac{1}{4}$ ":

- A. Do not need an edge treatment.**
- B. Must have a beveled slope equaling 1:2.
- C. Must be equipped with a ramp.

Changes in level up to 1/4 inch can be vertical and do not need an edge treatment.





Meeting Code Requirements

Meeting Code Requirements: Introduction

Listed below are the codes and requirements that affect door hardware selection.

- IBC/Local Codes – as applicable
 - Fire and Smoke: NFPA 80/105
 - Testing: NFPA 252 OR UL 10C
 - NFPA 101[®]: Life Safety Code[®]
 - NFPA 5000[®]: Building Construction and Safety Code[®]
- Accessibility: ANSI A117.1 – ADA Standards
- Door Function: Door and Hardware Institute (DHI) manuals
- Security: NFPA 730 – Guide for Premises Security
- Energy: ASHRAE 90.1

An exploration of these topics is presented in this section of the course.



What Is Required from the Architect/Engineer?

- Fire and life safety plans / Occupancy and egress plan
- Floor plans, door schedule, and door/frame details
- Special security requirements
- Card reader locations, door position switches/request to exit, standalone or hardwired access control
- ADA operators and wall switches
- Accessibility requirements
- Design criteria / Finishes

First, it is important to outline the requirements necessary to begin the specification process that include the items listed to the left (life safety plan, current floor plans, door schedule, etc.).

Review should include the following security requirements that impact fire and life safety:

- Credential reader locations
- Door position switches/request to exit
- Standalone card or code locks
- ADA operators and switches

Hardware Consultant Process

Listed below are the problems frequently encountered in plan review:

- Occupant load calculation not shown or building occupancy type not reflected for mixed used facilities
- Door widths and heights that do not meet egress requirements
- Fire and smoke classification not reflected on drawings
- Door swings that impede the path of egress
- Doors lock from egress (wrong) side for security concerns

Fire and life safety plans along with floor plans, door schedule, and door details assist in defining the following:

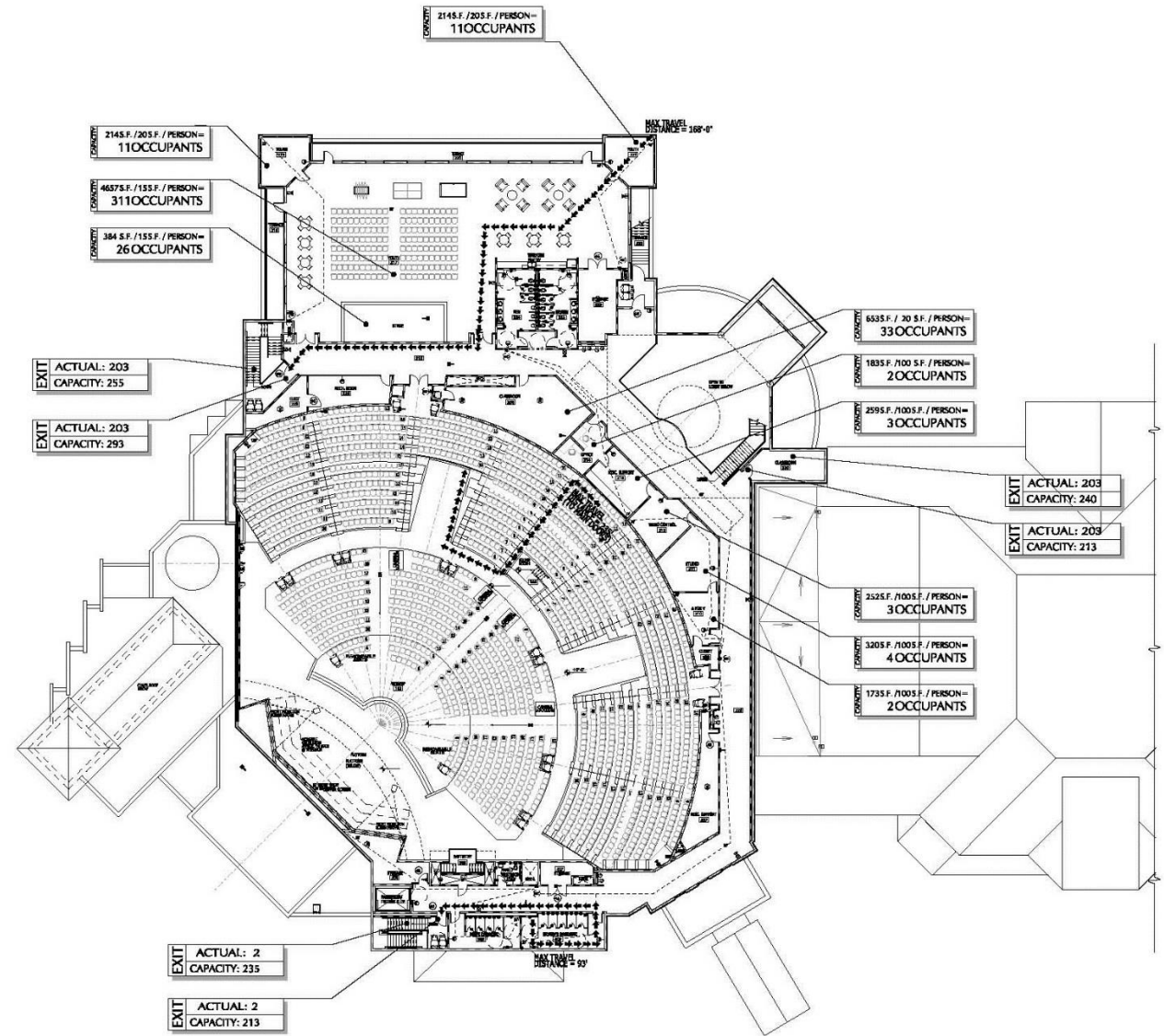
- Classification of occupancy, occupant load
- Unobstructed paths of egress
- Location of fire doors, smoke door separations, and compartments to include held-open fire and smoke doors
- Security device requirements that conflict with fire and life safety
- Door/frame widths, heights, thickness, and material
- Stile and rail dimensions, frame configurations

Life Safety Plan

A fire and life safety plan should also reflect occupancy loads and paths of egress.

It is a basic concept of the NFPA that the means of egress system be sized to accommodate all people occupying a building.

Sizing is accomplished by matching the occupant load of a floor with the calculated egress capacity of the egress components serving the floor.

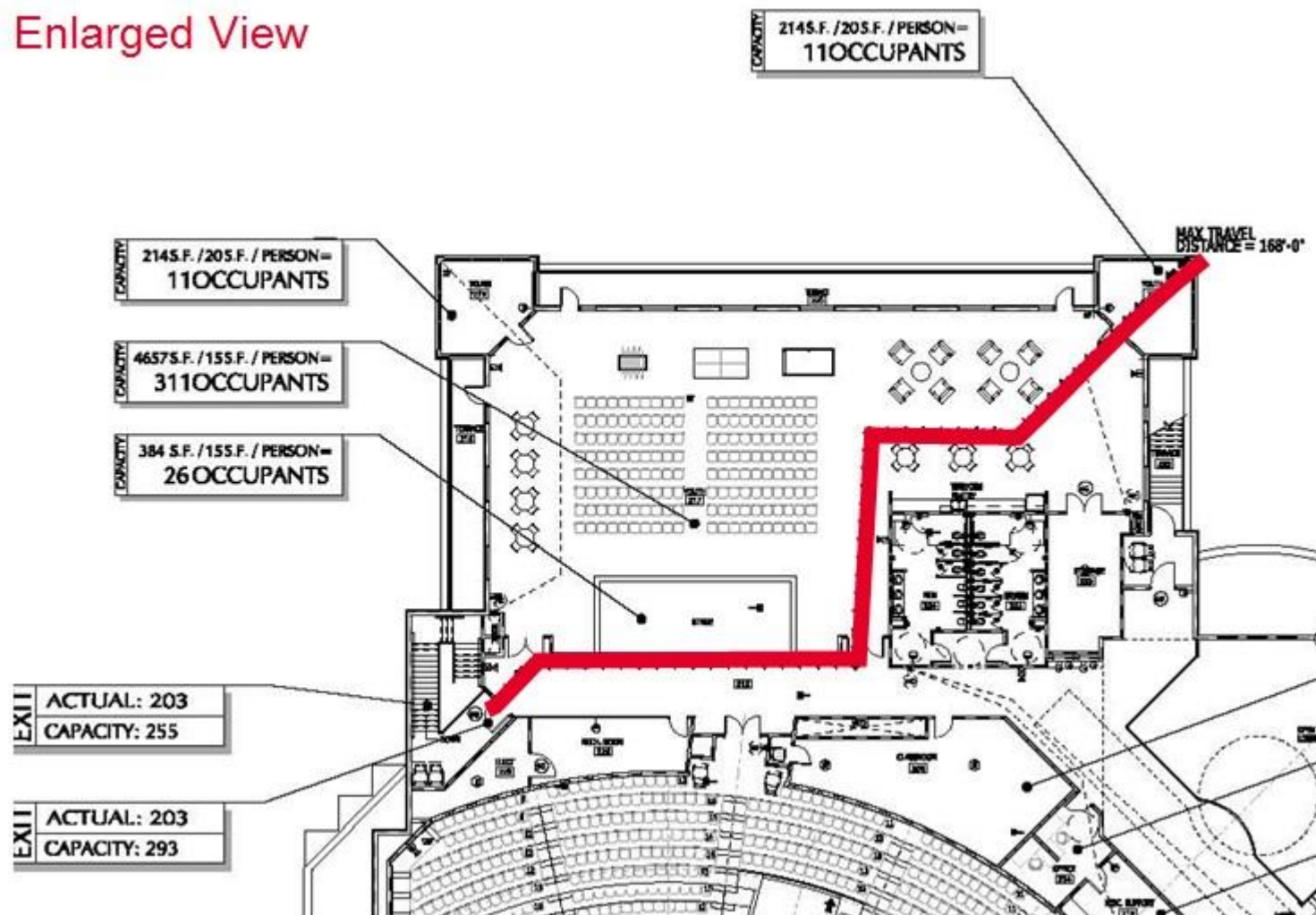


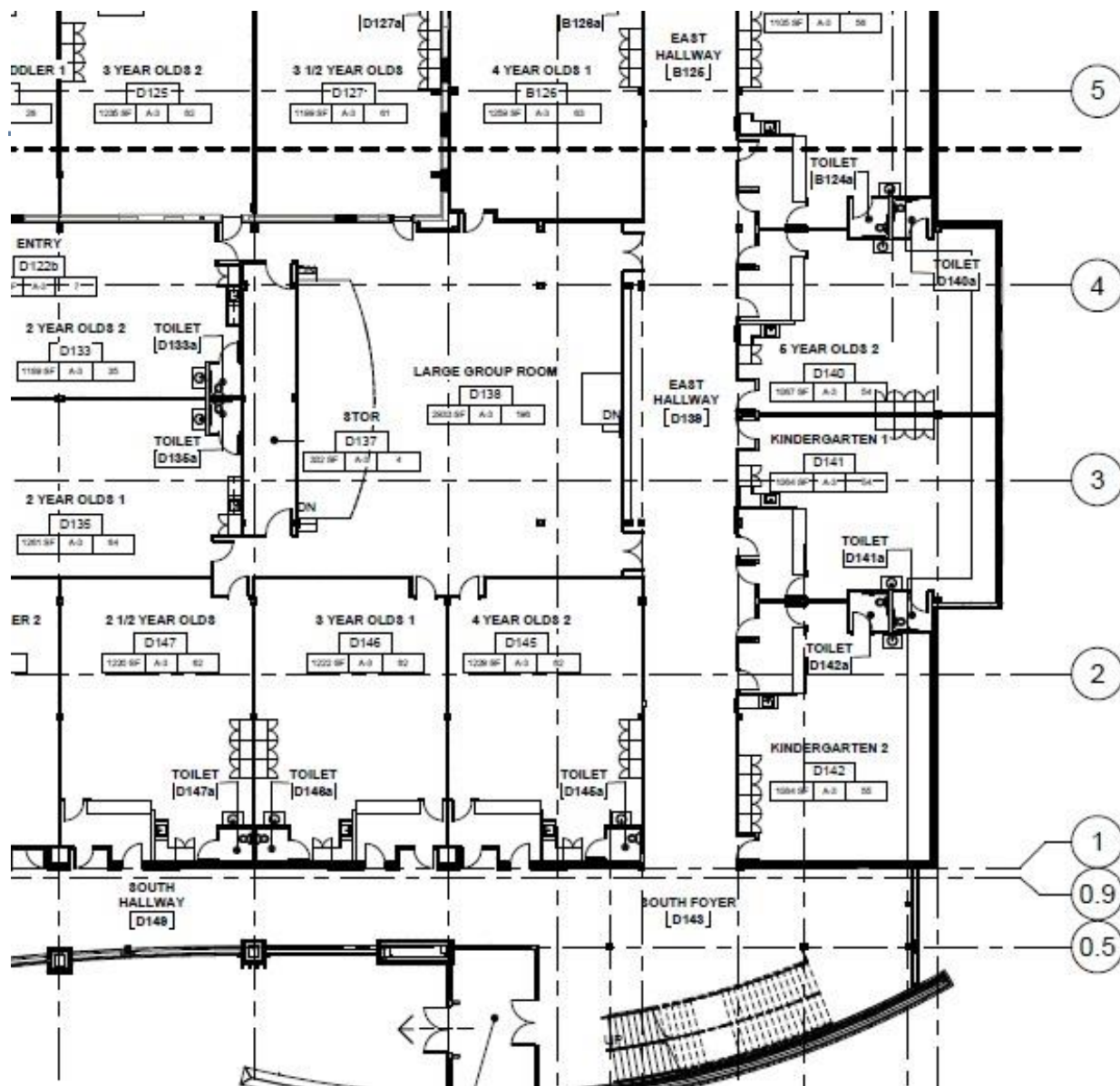
Life Safety Plan

This enlarged view of the same space indicates the path of egress (in red).

Presented in the subsequent slide is a life safety review that illustrates how to determine use of exit devices.

Enlarged View





LIFE SAFETY REVIEW

2008 Indiana Building Code (675 IAC 12-4-1.1)

Occupancy Types:
 Business B, Office Area (Section 304)
 Assembly A-3, Places of religious worship (Section 303)

Type of Construction: I-B with Automatic Sprinkler System (Table 503)

Actual Gross Floor Area of Building with Additions: 131,737 S.F.

Allowable Building Area/Height:			
Type I-B	Group A-3	Group B	
Tabular Area:	Unlimited	23,000 S.F.	(507.6) (Table 503)
Frontage Increase		5,750 S.F.	(506.2)
Sprinkler Increase		46,000 S.F.	(506.3)
Allowable Area	Unlimited	74,750 S.F.	

Max Fire Areas-Existing	88,523 S.F.	7,297 S.F.	
Max Fire Areas-Addition	35,917 S.F.	0 S.F.	
Total Max Fire Areas	124,440 S.F.	7,297 S.F.	

Fire Resistance Rating Requirements for Building Elements: (rating in hours) (Table 501)

Building Element: Type I-B	Rating	Remarks
Structural Frame	2	
Bearing Walls, Exterior	2	
Bearing Walls, Interior	2	
Nonbearing Walls, Interior	0	
Nonbearing Walls, Exterior	0	Table 502
Floor Construction	2	
Roof Construction	1	

Fire Resistance Rating Requirements for Incidental Uses: (rating in hours) (Table 508.2)

Building Element:	Rating	Remarks
Laundry over 100 Sq. Ft.	0	* Sprinklers provided
Storage over 100 Sq. Ft.	0	* Sprinklers provided
Exit Stairs	0	1020.1, Exception 9
Shaft Enclosure (elevator)	1	707.4

Fire Barriers: (705)
 Fire-resistance rating as indicated by incidental use or single-occupancy fire areas.
 Continuity: Extend from the top of the floor assembly below to the underside of the roof deck above and shall be securely attached thereto. Fire barriers shall be continuous through concealed spaces, such as the space above a suspended ceiling. Hollow vertical spaces within a fire barrier shall be fireblocked.
 Openings: Openings shall be protected. Doors in 2HR fire barrier shall be rated at 1 1/2HR. Doors in 1HR fire barrier shall be rated at 3/4HR. (Table 715.4)








Penetrations and Joints in Fire Barrier:
 Penetrations: (712) Installed as tested in an approved fire-resistance rated assembly. In concrete or masonry walls where penetrating item is a maximum 6-inch nominal diameter and the area of the opening through the wall does not exceed 144 square inches, concrete, grout or mortar is permitted where it is installed the full thickness of the wall or the thickness required to maintain the fire-resistance rating. All other through penetrations shall be protected by an approved penetration firestop system.
 Fire-Resistant Joint Systems: (713) Joints in or between fire-rated assemblies shall be protected by an approved fire-resistant joint system designed to resist the passage of fire for a time period of not less than the required fire-resistance rating of the assembly in which it is installed. Fire-resistant joint systems shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the passage of fire and hot gases. Fire-resistant joint systems shall be tested in accordance with ASTM E1966 or UL 2079.

Sprinkler System: Approved Automatic Supervised Sprinkler System installed throughout building in accordance with Section 903.2.5. The sprinkler system shall be designed and installed in accordance with Section 903.3.1.1 (NFPA 13). Group I-1 area is permitted to have sprinkler system installed in accordance with 903.3.1.2 (NFPA 13R). All valves controlling the water supply and water-flow switches on the sprinkler system shall be electronically supervised in accordance with Section 903.4.

Basic Fire Door Classifications

Here are the fire door rating classifications and the typical location and use of each classification.

Table 1 – Fire door openings

Opening	Wall Rating	Door and Frame Rating	Description and Use
	4 Hour	3 Hour (180 minutes)	These openings are in walls that separate buildings or divide a single building into designated fire areas.
	2 Hour	1-1/2 Hour (90 minute)	Openings of this type are used in enclosures of vertical communication or egress through buildings. Examples of these types of openings include stairwells and elevator shafts.
	1 Hour	1 Hour (60 minute)	These door and frame assemblies divide occupancies in a building.
	1 Hour	3/4 Hour (45 minute)	For use where there are openings in corridors or room partitions.
	2 Hour	1-1/2 Hour (90 minute)	This opening is in a wall where there is the potential for severe fire exposure from the exterior of the building.
	1 Hour	3/4 Hour (45 minute)	This opening is in an exterior wall that has the potential to be exposed to moderate to light fire from the exterior of the building.
	1 Hour	1/3 Hour (20 minute)	These openings are in corridors where smoke and draft control is required. The minimum wall rating is 1 hour.

Standards for Fire Doors & Other Opening Protectives

NFPA 80 is the standard that regulates the installation and maintenance of assemblies and devices used to protect openings in walls, floors, and ceilings against the spread of fire and smoke within, into, or out of buildings.

Fire door assemblies and shutters shall be installed in accordance with NFPA 80.

Code / Standard	Year	Reference	Title
IBC	2012	716.5	Fire Door and Shutter Assemblies
IBC	2015	716.5	Fire Door and Shutter Assemblies
IBC	2018	716.1	General
IBC	2021	716.1	General

Standards for Fire Doors & Other Opening Protectives

Fire door assemblies with side-hinged and pivoted swinging doors shall be tested in accordance with NFPA 252 or UL 10C.

- NFPA 252 is the Standard Methods of Fire Tests of Door Assemblies. It outlines methods of fire testing door assemblies for determining assembly suitability when fire resistance of a specific duration is required.
- UL 10C is the Standard for Positive Pressure Fire Tests of Door Assemblies.

Code / Standard	Year	Reference	Title
IBC	2012	716.5.1	Side-Hinged or Pivoted Swinging Doors
IBC	2015	716.5.1	Side-Hinged or Pivoted Swinging Doors
IBC	2018	716.2.2	Performance Requirements
IBC	2021	716.2.2	Performance Requirements

Standards for Fire Doors & Other Opening Protectives

Smoke is the leading cause of death in destructive fires.

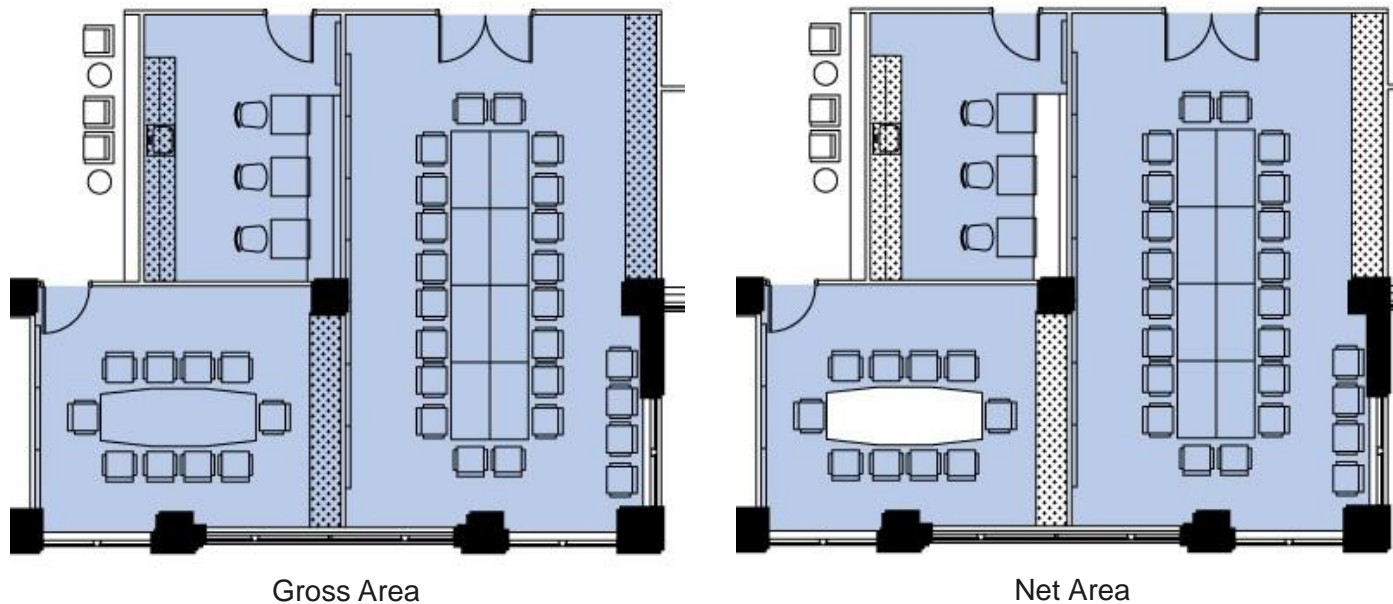
NFPA 105 Standard for Smoke Door Assemblies and Other Opening Protectives presents comprehensive requirements for the performance of smoke door assemblies and other opening protectives, such as smoke dampers that are intended to limit the spread of smoke.

The requirements of NFPA 105 are intended to restrict the movement of smoke through door assemblies to maintain a tenable environment, providing life safety and protecting property from smoke. The standard addresses smoke door assemblies that inhibit the passage of smoke at temperatures up to 400 degrees Fahrenheit.

Smoke doors must comply with NFPA 105. Fire doors that are also smoke doors must comply with NFPA 80 as well as NFPA 105. Smoke door assemblies (including fire doors that are also smoke doors) shall have an air leakage rating not greater than 3 cubic feet/minute/square foot ($0.9 \text{ m}^3/\text{min}/\text{m}^2$) of door opening when tested in accordance with ANSI/UL 1784, Air Leakage Tests of Door Assemblies. The door shall bear an “S” label indicating compliance with this requirement. Smoke doors must be self-closing, or may be automatic-closing doors that close upon actuation of the smoke detection system. The clearance between the bottom of the door and the threshold or flooring is not required to have a seal. Louvers shall not be installed in smoke door assemblies unless otherwise tested and listed.

Area Calculations to Determine Swing Path

Area calculations are critical to determine the direction of swing and the number of exits required from spaces. Note that fixed equipment deducts from the total area of the room, and this may affect the occupancy total. Movable equipment does not change area calculations.



Code / Standard	Year	Reference	Title
IBC	2012	Table 1004.1.2	Occupant Load Factors
IBC	2015	Table 1004.1.2	Occupant Load Factors
IBC	2018	Table 1004.5	Occupant Load Factors
IBC	2021	Table 1004.5	Occupant Load Factors

Review Question



It is a basic concept of the NFPA that the means of egress system be sized to accommodate all people occupying a building. How is sizing accomplished?

Answer

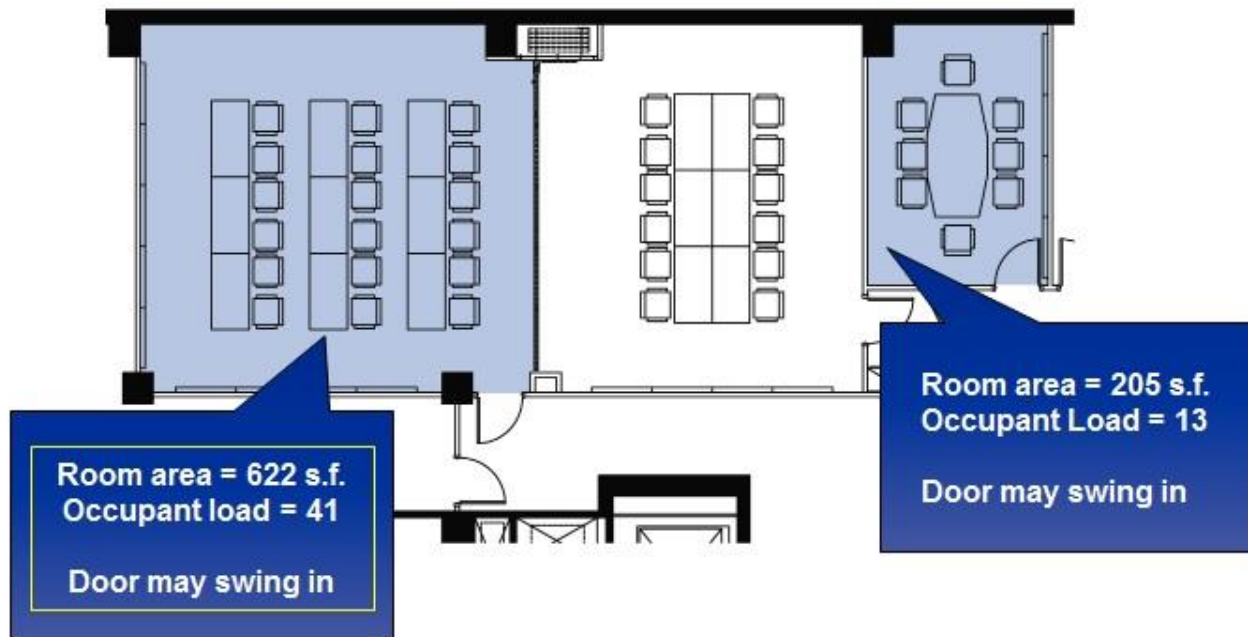
It is a basic concept of the NFPA that the means of egress system be sized to accommodate all people occupying a building. How is sizing accomplished?

Sizing is achieved by matching the occupant load of a floor with the calculated egress capacity of the egress components serving the floor.



Direction of Egress Door Swing: Occupant Load ≤ 49

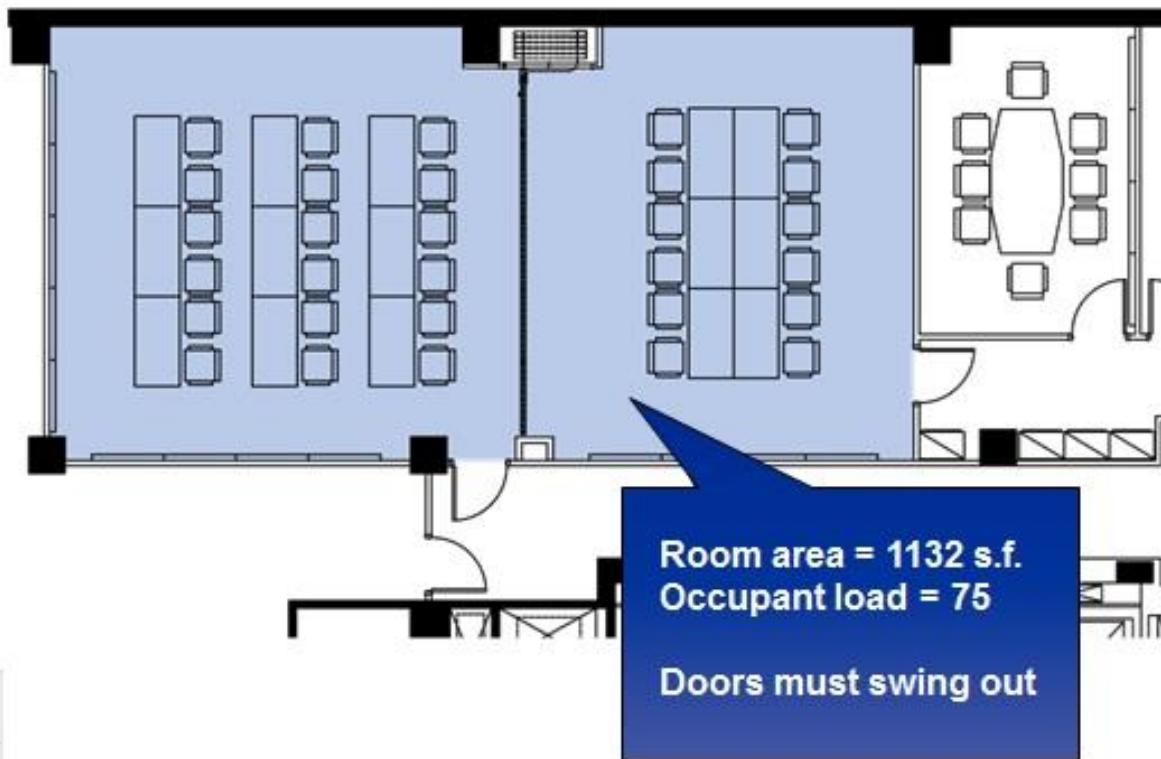
It is important to know that the occupant load helps to determine the swing of the door. Shown here are the directions of door swing where serving an occupant load of 49 people or less.



Code / Standard	Year	Reference	Title
IBC	2012	1008.1.2	Direction of Swing
IBC	2015	1010.1.2.1	Direction of Swing
IBC	2018	1010.1.2.1	Direction of Swing
IBC	2021	1010.1.2.1	Direction of Swing
NFPA 101	2012	Table 7.3.1.2	Direction of Swing
NFPA 101	2015	Table 7.3.1.2	Direction of Swing
NFPA 101	2018	Table 7.3.1.2	Direction of Swing

Direction of Egress Door Swing: Occupant Load ≥ 50

Doors shall swing in the direction of egress travel where serving a room or area containing an occupant load of 50 or more persons or a Group H occupancy.



Code / Standard	Year	Reference	Title
IBC	2012	1008.1.2	Door Swing
IBC	2015	1010.1.2	Door Swing
IBC	2018	1010.1.2	Door Swing
IBC	2021	1010.1.2	Door Swing
NFPA 101	2012	7.2.1.4.2	Door Swing
NFPA 101	2015	7.2.1.4.2	Door Swing
NFPA 101	2018	7.2.1.4.2	Door Swing

Egress Doors

Egress doors shall be readily openable from the egress side without the use of a key, special knowledge, or effort.



Code / Standard	Year	Reference	Title
IBC	2012	1008.1.9	Door Operation
IBC	2015	1010.1.9	Door Operation
IBC	2018	1010.1.9	Door Operation
IBC	2021	1010.2	Door Operation
NFPA 101	2012	7.2.1.5	Locks, Latches, and Alarm Devices
NFPA 101	2015	7.2.1.5	Locks, Latches, and Alarm Devices
NFPA 101	2018	7.2.1.5	Locks, Latches, and Alarm Devices

Door Operation

As per NFPA 101 and IBC Chapter 10, the unlatching of any door or leaf shall not require more than one operation.



Code / Standard	Year	Reference	Title
IBC	2012	1008.1.9.5	Unlatching
IBC	2015	1010.1.9.5	Unlatching
IBC	2018	1010.1.9.6	Unlatching
IBC	2021	1010.2.1	Unlatching
NFPA 101	2012	7.2.1.5.10.2	Unlatching
NFPA 101	2015	7.2.1.5.10.2	Unlatching
NFPA 101	2018	7.2.1.5.10.2	Unlatching

Panic & Fire Exit Hardware

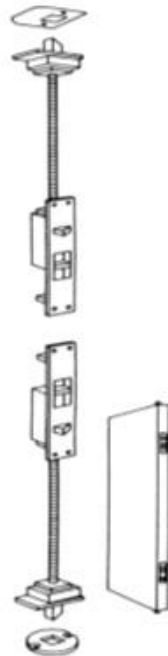
Each door in a means of egress from a Group A or E occupancy having an occupant load of 50 or more for IBC (100 or more for NFPA 101 in certain occupancy types) and any Group H occupancy shall NOT be provided with a latch or lock unless it is panic hardware or fire exit hardware. Note: There are differences between IBC and NFPA 101. The more stringent code applies.

The actuating portion of the releasing device shall extend at least one-half the door leaf width and the maximum unlatching force shall not exceed 15 pounds.

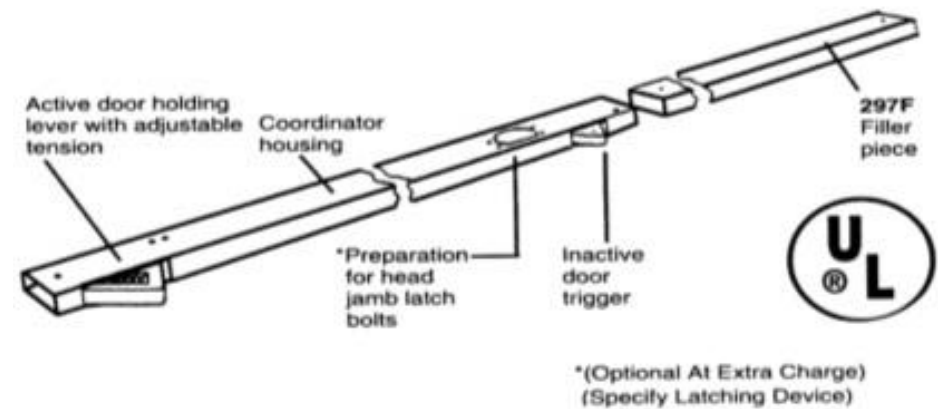
Code / Standard	Year	Reference	Title
IBC	2012	1008.1.10	Panic and Fire Exit Hardware
IBC	2015	1010.1.10	Panic and Fire Exit Hardware
IBC	2018	1010.1.10	Panic and Fire Exit Hardware
IBC	2021	1010.2.9	Panic and Fire Exit Hardware
NFPA 101	2012	7.2.1.7	Panic and Fire Exit Hardware
NFPA 101	2015	7.2.1.7	Panic and Fire Exit Hardware
NFPA 101	2018	7.2.1.7	Panic and Fire Exit Hardware

Locks & Latches

Where egress doors are used in pairs, approved automatic flushbolts shall be permitted to be used, provided that the door leaf having the automatic flushbolts has no door knob or surface-mounted hardware.



Code / Standard	Year	Reference	Title
IBC	2012	1008.1.9.3	Locks and Latches
IBC	2015	1010.1.9.3	Locks and Latches
IBC	2018	1010.1.9.4	Locks and Latches
IBC	2021	1010.2.4	Locks and Latches



Bolt Locks

Manually operated flushbolts or surface bolts are not permitted.



Code / Standard	Year	Reference	Title
IBC	2012	1008.1.9.4	Bolt Locks
IBC	2015	1010.1.9.4	Bolt Locks
IBC	2018	1010.1.9.5	Bolt Locks
IBC	2021	1010.2.5	Bolt Locks

Bolt Locks

Exceptions:

- On doors not required for egress in individual dwelling units or sleeping units
- Where a pair of doors serves a storage or equipment room
- Where a pair of doors serves an occupant load of less than 50 persons in Group B, F, or S occupancy. The inactive leaf shall contain no door knobs, panic bars, or similar operating hardware.
- Where a pair of doors serves a Group B, F, or S occupancy when the inactive leaf is not needed to meet egress width requirements and the building is equipped through-out with automatic sprinklers
- Where a pair of doors serves patient care rooms in Group I-2 occupancies self-latching edge or surface bolts are permitted on the inactive leaf provided that the inactive leaf is not needed to meet egress width requirements and the inactive leaf contains no door knob, panic bar, or similar operating hardware.

Interior Stairways

Interior stairway doors that are a means of egress shall be openable from both sides without the use of a key, special knowledge, or effort.

Doors may be locked on the stair side provided the doors unlock simultaneously by fire alarm, loss of power, or signal from the fire command center.

Allowable in B, F, M, S, R-2 where the only access to tenant/dwelling space is from a single exit stair where permitted in Section 1021.2.



Code / Standard	Year	Reference	Title
IBC	2012	1008.1.9.11, 911.1.5, 403.5.3	Interior Stairways
IBC	2015	1010.1.9.11, 911.1.6, 403.5.3	Interior Stairways
IBC	2018	1010.1.9.12, 911.1.6, 403.5.3	Interior Stairways
IBC	2021	1010.2.7, 911.1.6, 403.5.3	Interior Stairways

Interior Stairways

NFPA 101 allows for low-rise buildings to lock stairwell doors as long as the building is four floors or fewer and, depending on code referenced, with no more than 75 feet of elevation.

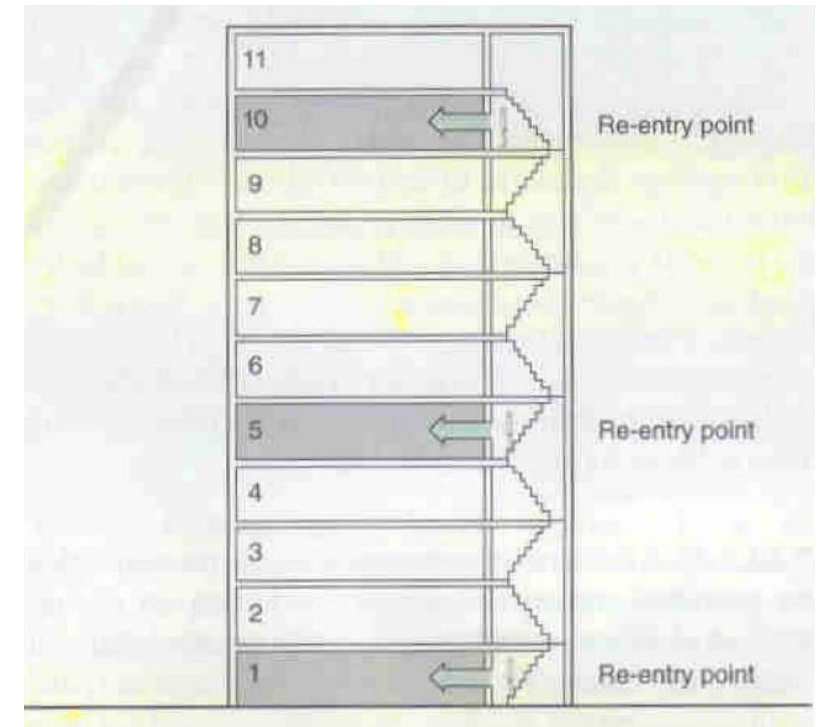
Stairway doors are allowed to lock from the side opposite egress, provided they are openable from the egress side. Additionally, they must be capable of being unlocked simultaneously without unlatching upon a signal from the fire command center, if present, or a signal by emergency personnel from a single location inside the main entrance to the building.

It is recommended to reference local code requirements concerning stairwell doors.



Please remember the **test password EGRESS**. You will be required to enter it in order to proceed with the online test.

Code / Standard	Year	Reference	Title
NFPA 101	2012	7.2.1.5.8	Interior Stairways
NFPA 101	2015	7.2.1.5.8	Interior Stairways
NFPA 101	2018	7.2.1.5.8	Interior Stairways



Electrical Rooms

Electrical rooms with equipment rated 1,200 amperes or more and over 6 feet wide that contain overcurrent devices, switching devices, control devices with exit, or exit access doors shall be equipped with panic hardware or fire exit hardware.*

The doors shall swing in the direction of egress travel.

Code / Standard	Year	Reference	Title
IBC	2012	1008.1.10	Electrical Rooms
IBC	2015	1010.1.10	Electrical Rooms
IBC	2018	1010.1.10	Electrical Rooms
IBC	2021	1010.2.9	Electrical Rooms

*Equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure



Door Closing

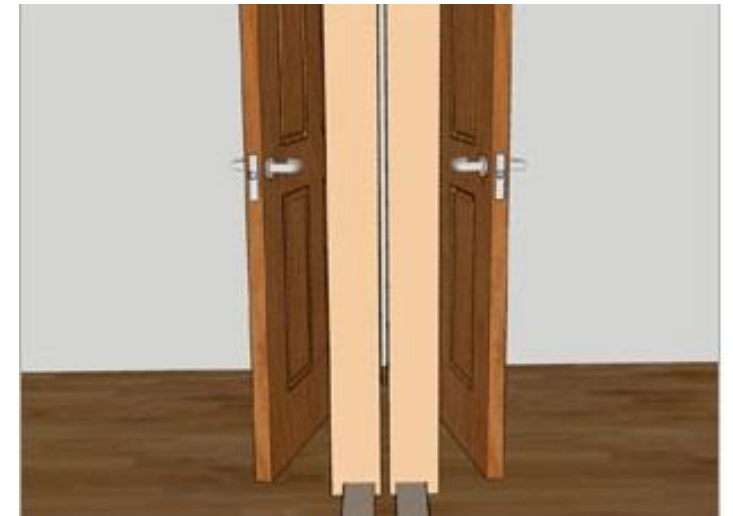
Fire doors shall be self-closing or automatic closing in accord with IBC.

Unless specifically permitted, single fire doors and both leaves of pairs of side-hinged swinging fire doors shall be provided with an inactive latch bolt that will secure the door when it is closed.

EXCEPTION:

Fire doors located in common walls separating sleeping units in Group R-1 shall be permitted without automatic or self-closing devices.

Code / Standard	Year	Reference	Title
IBC	2012	716.5.9	Door Closing
IBC	2015	716.5.9	Door Closing
IBC	2018	716.2.6	Fire Door Hardware & Closers
IBC	2021	716.2.6	Fire Door Hardware & Closers



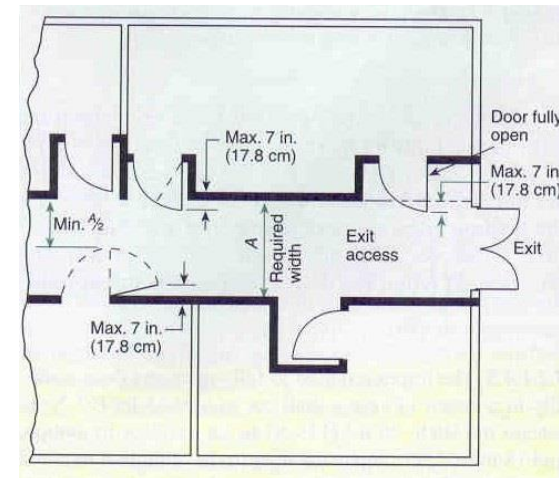
Door Encroachment

Doors, when fully open, shall not reduce the required width by more than seven inches.

Doors in any position shall not reduce the required width by more than one half.

- 7.2.1.4.2 Surface-mounted latch release hardware shall be exempt from inclusion in the 7-inch maximum encroachment where:
 - 1.1 The hardware is mounted to the side of the door facing away from the adjacent wall where the door is in the open position; and
 - 1.2 The hardware is mounted not less than 34 inches nor more than 48 inches above the finished floor.

Code / Standard	Year	Reference	Title
IBC	2012	1005.7.1	Door Encroachment
IBC	2015	1005.7.1	Door Encroachment
IBC	2018	1005.7.1	Door Encroachment
IBC	2021	1005.7.1	Door Encroachment
NFPA 101	2012	7.2.1.4.3	Door Encroachment
NFPA 101	2015	7.2.1.4.3	Door Encroachment
NFPA 101	2018	7.2.1.4.3	Door Encroachment





Summary

Important Points:

- The ADA affects Americans with disabilities, private employers with 15 or more employees, and businesses operating for the benefit of the public.
- There are several reasons why businesses should be ADA compliant. It is good business practice as it enables an owner to meet the needs of all people who occupy or visit the facility. It also enables the owner to keep the building compliant with current standards pertaining to those with disabilities. Additionally, it helps an owner to avoid lawsuits brought as a result of noncompliance.
- Accessibility standards are referenced by local accessibility codes and the *International Building Code (IBC)* under ANSI A117, 2010 ADA Standards for Accessible Design, and Americans with Disabilities Act Accessibility Guidelines (ADAAG). Within A117.1, there are specific guidelines that if followed will also achieve the intent of ADA.
- Four key criteria must be met covering both perimeter access and interior access: getting to the building, getting into the building, moving around the building, and using the building elements.

Important Points:

- There are six ADA compliance components to ensure that an opening is ADA compliant: requirements for latches, clear openings, opening force, closing speed, identifying the need for an automated opening, and minimum speed requirements for an auto operated door.
- It is important that architects outline the requirements necessary to begin the specification process that includes a fire and life safety plan that reflects occupancy loads and paths of egress.
- NFPA 80 is the standard that regulates the installation and maintenance of assemblies and devices used to protect openings in walls, floors, and ceilings against the spread of fire and smoke within, into, or out of buildings.
- Area calculations are critical to determine the direction of swing and the number of exits required from spaces.

References & Resources

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“Ageing and Disability.” *United Nations*, n.d., <https://www.un.org/development/desa/disabilities/disability-and-ageing.html>. Accessed March 2019.

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