



# Codes and Compliance: Demystifying the Door Opening

*A Guide to Door Opening Solutions for Life-Safety,  
Accessibility and Sustainability*

**ASSA ABLOY**



The global leader in  
door opening solutions



Doorways are a critical component to any building. They facilitate safe passage in and out—especially in emergency situations—and contribute to the overall health and well-being of the building’s occupants. Building codes are constantly evolving, and the volume of updates and revisions may at times seem daunting. This code resource guide provides you the latest information on current building codes and how they impact the application of total opening solutions.

Our team of expert door and hardware professionals are well versed in code requirements and are available to answer any related questions. And rest assured, when you use one of ASSA ABLOY Group brand products, it was designed to meet the most stringent code and safety requirements in effect today.



Table of Contents

Accessibility . . . . . 4

Acoustics . . . . . 6

Blast Resistance . . . . . 8

Egress. . . . . 10

Electromagnetic Locking . . . . . 12

Fire Protection. . . . . 14

Radio Frequency (RF) Shielding. . . . . 16

Sustainability. . . . . 18

Windstorm . . . . . 20

Services & Training . . . . . 22

ASSA ABLOY Group Brands

ARCHITECTURAL DOOR ACCESSORIES™  
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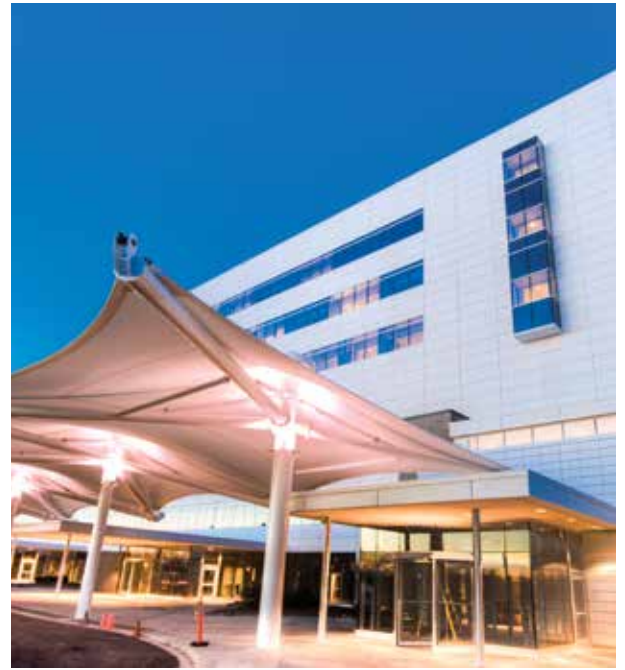
## A History of Building Codes

Building and fire codes have been developed and applied for hundreds of years to enhance the safety of occupants within the built environment.

Over time, codes and standards have evolved to ensure accessibility for people with disabilities, provide sustainable construction products and practices, strengthen buildings against severe windstorm events, blast forces, and many other essential needs.

While these requirements encompass a broad and very diverse spectrum, ASSA ABLOY remains the global leader in door opening solutions, providing building owners and occupants with the assurance of code compliant openings.

Since building code adoption and enforcement varies across the country, we encourage you to consult your local Authority Having Jurisdiction for requirements related to any specific project or building.





# Accessibility

The origin of accessibility guidelines, standards and laws date to the early 1990s, when provisions were created to facilitate equal access to places of public accommodation, commercial facilities, and state and local government facilities. Today there are multiple standards and laws that regulate architectural design, form and function to ensure accessibility for all, regardless of physical, visual or hearing impairment.

## Resources

ADA Standards for Accessible Design – 2010

ICC A117.1 – Accessible and Usable Buildings and Facilities – 2009

## Quick Reference — Requirements

### ADA 404.2.3 Clear Width

Door openings shall provide a clear width of 32 inches (815 mm) minimum. Clear openings of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees. Openings more than 24 inches (610 mm) deep shall provide a clear opening of 36 inches (915 mm) minimum. There shall be no projections into the required clear opening width lower than 34 inches (865 mm) above the finish floor or ground. Projections into the clear opening width between 34 inches (865 mm) and 80 inches (2030 mm) above the finish floor or ground shall not exceed 4 inches (100 mm).

### ADA 404.2.5 Thresholds

Thresholds, if provided at doorways, shall be ½ inch (13 mm) high maximum.

### ICC A117.1 - 404.2.6 Door Hardware

Handles, pulls, latches, locks, and other operable parts on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, pinching, or twisting of the wrist to operate. Operable parts of such hardware shall be 34 inches (865 mm) minimum and 48 inches (1220 mm) maximum above the floor. Where sliding doors are in the fully open position, operating hardware shall be exposed and usable from both sides.

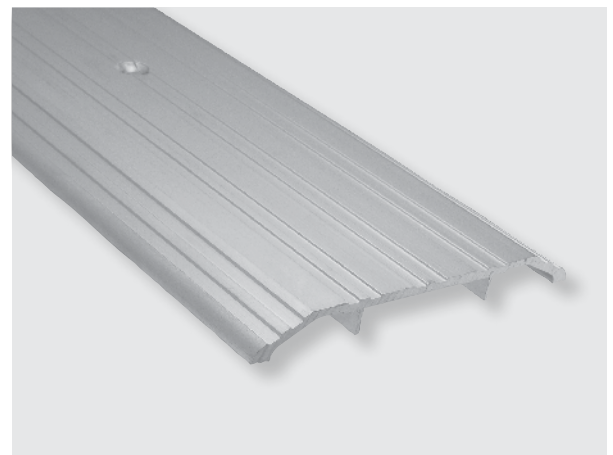
### ADA 404.2.8.1 Door Closers and Gate Closers

Door closers and gate closers shall be adjusted so that from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.



## Understanding Opening Force

In order to ensure ease of access for those with physical disabilities, the law regulates the amount of force required to push or pull a door to the full open position. A maximum force of five pounds is permitted for door or gate operation after the latching hardware is retracted.



*Pemko thresholds meet height requirements per ADA section 404.2.5*

### ADA 404.2.8.2 Spring Hinges

Door and gate spring hinges shall be adjusted so that from the open position of 70 degrees, the door or gate shall move to the closed position in 1.5 seconds minimum.

### ADA 404.2.9 Door and Gate Opening Force

Fire doors shall have a minimum opening force allowable by the appropriate administrative authority. The force for pushing or pulling open a door or gate other than fire doors shall be as follows:

1. Interior hinged doors and gates: 5 pounds (22.2 N) maximum.
2. Sliding or folding doors: 5 pounds (22.2 N) maximum.

These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door or gate in a closed position.

### ADA Advisory 404.2.9 Door and Gate Opening Force

The maximum force pertains to the continuous application of force necessary to fully open a door, not the initial force needed to overcome the inertia of the door. It does not apply to the force required to retract bolts or to disengage other devices used to keep the door in a closed position.

## Door Surfaces

### ADA 404.2.10 Door and Gate Surfaces

Swinging door and gate surfaces within 10 inches (255 mm) of the finish floor or ground measured vertically shall have a smooth surface on the push side extending the full width of the door or gate. Parts creating horizontal or vertical joints in these surfaces shall be within  $\frac{1}{16}$  inch (1.6 mm) of the same plane as the other. Cavities created by added kick plates shall be capped.

## Vision Lights

### ADA 404.2.11 Vision Lights

Doors, gates, and side lights adjacent to doors or gates, containing one or more glazing panels that permit viewing through the panels shall have the bottom of at least one glazed panel located 43 inches (1090 mm) maximum above the finish floor.

Exception:

Vision lights with the lowest part more than 66 inches (1675 mm) from the finish floor or ground shall not be required to comply with 404.2.11.

## Automatic and Power Assisted Doors

### ADA 404.3 Automatic and Power-Assisted Doors and Gates

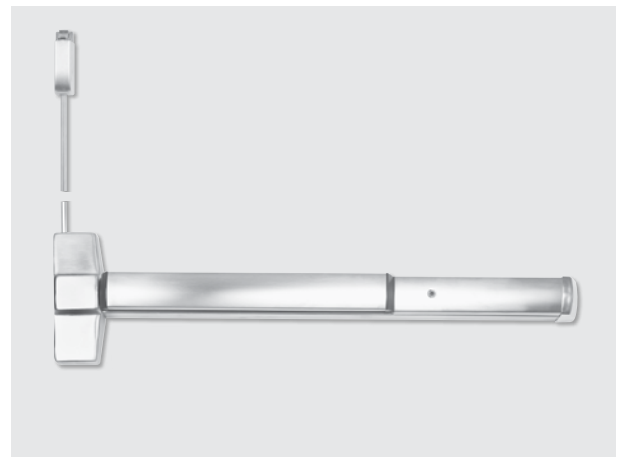
Automatic doors and automatic gates shall comply with 404.3.

Full-powered automatic doors shall comply with ANSI/BHMA A156.10.

Low-energy and power-assisted doors shall comply with ANSI/BHMA A156.19 (1997 or 2002 edition).

### ADA 404.3.1 Clear Width

Doorways shall provide a clear opening of 32 inches (815 mm) minimum in power-on and power-off mode. The minimum clear width for automatic door systems in a doorway shall be based on the clear opening provided by all leaves in the open position.



CORBIN RUSSWIN less bottom rod (shown) or concealed vertical rod exit devices comply with ADA section 404.2.10



CORBIN RUSSWIN and SARGENT push/pull trim offer an aesthetic solution to ADA section 404.2.6



NORTON SafeZone™ closer/holder senses movement in the door opening and stops the door from closing, surpassing the requirements of ADA section 404.2.8.1

# Acoustics

Dating back to the late 1960s, multiple legislative actions with regard to noise control have been taken. Concern grew for people's exposure to non-occupational noise, resulting in hearing loss over time. Today, many building codes contain requirements for the acoustic performance of walls, doors, windows, ceilings and other architectural elements. These are in place to protect occupants in a building from external noises as well as sounds generated within the building. Applications such as theaters, classrooms, and patient rooms rely on these codes to ensure their occupants are not distracted or subjected to noise outside the specific space they occupy.

## Resources

- ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements – 2009
- ASTM E413 – Classification for Rating Sound Insulation – 2010
- ASTM E1332-10a – Standard Classification for Rating Outdoor-Indoor Sound Attenuation – 2010
- ASTM E2235 – Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods – 2012
- ANSI S12.60 – Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools – 2010
- ASHRAE 189.1 – Standard for the Design of High-Performance Green Buildings – 2011

## Quick Reference — Requirements

### ASTM E90

Test for airborne sound transmission loss for various building partitions (i.e. walls, operable partitions, roofs, windows, floor-ceiling assemblies, doors, panels, and other “walls” which can divide a space).

### ASTM E413

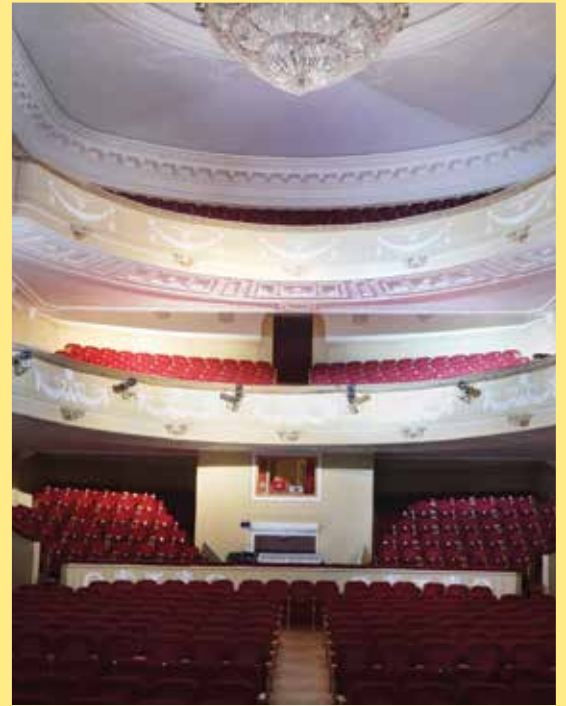
Identifies the method for which single-number acoustical ratings are calculated for measuring sound attenuation when using one-third octave bands.

### ASTM E1332

Assesses a building's ability to isolate any outdoor sound, like air transportation or outdoor ground noise. This is done by evaluating the building's facade (including doors, walls, windows, or any of these in any combination).

### ASTM E2235

Measures rate of decay of sound in a room, as well as calculates sound absorption.



## Understanding Sound

Sound is the oscillation of pressure, or vibrations, moving through the air. The oscillation pressure is measured in decibels (dB) indicating the intensity of sound. With the use of acoustic products, sound can be absorbed, dampened, insulated, or isolated. The effectiveness of these products are designated by STC ratings, with a higher value indicating greater reduction of unwanted sound.



*Pemko PDB automatic door bottom utilizes a unique dropping mechanism and seal to aid with acoustic performance*

**ANSI S12.60**  
Identifies acoustical performance criteria required in core learning spaces and classrooms for permanent schools (part 1) and relocatable classrooms (part 2).

Where Required: LEED v2009 for Schools

**ASHRAE 189.3.3.2**  
Interior wall assemblies that separate interior rooms and spaces must be designed to meet these requirements:

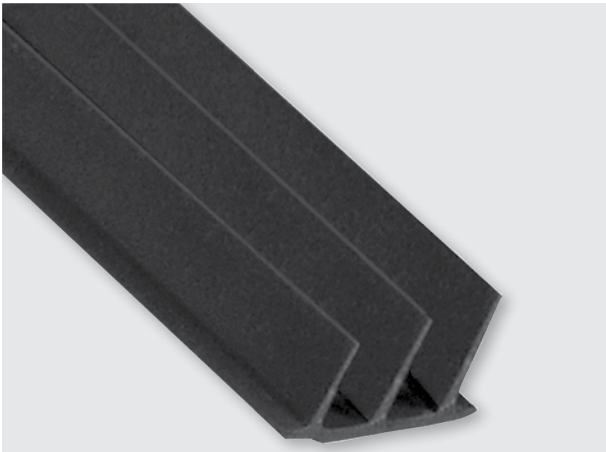
- An STC rating of 45 or higher is required for patient rooms in nursing homes and hospitals as well as hotel and motel rooms
- An STC rating of 50 or higher is required for separating adjacent dwelling units, dwelling units and public spaces, adjacent tenant spaces, tenant spaces and public spaces and adjacent classrooms
- An STC rating of 53 or higher is required when separating classrooms from restrooms and/or showers
- An STC rating of 60 or higher is required when separating classrooms from cafeteria, gymnasium, indoor swimming pools, music rooms and/or mechanical rooms
- All STC ratings are determined in accordance with ASTM E90 and ASTM E413

Where Required: LEED v4, v2009

**Sound Transmission Class (STC):**

In a sound test, an assembly will be tested for two STC ratings. The first is called the “sealed-in-place” rating. This is an assembly where a door is placed within a frame and acoustic putty is then applied to the four sides of the door (top, jambs, and bottom). It is then placed into a test chamber between the source room and receiving room and is subjected to 17 one-third octave bands between 125 and 5000 hertz. The resulting “score” is the best possible STC rating the opening can achieve. The next rating is called the “operable” rating. This same assembly is used in the next application but without the acoustic putty. Instead, perimeter gaskets, door bottoms, and sills are used to block the transmission of sound.

STC	What Sounds Can Be Heard
25	Normal speech can be understood quite easily and distinctly through wall
30	Loud speech can be understood fairly well, normal speech heard but not understood
35	Loud speech audible but not intelligible
40	Loud speech audible as a murmur
45	Loud speech not audible; 90% of statistical population not annoyed
50	Very loud sounds such as musical instruments or a stereo can be faintly heard; 99% of population not annoyed
60+	Superior soundproofing; most sounds inaudible



*Pemko S773 acoustic smoke seal provides a seal between the door and frame to inhibit sound transmission around the door*



*Sound rated doors available from CECO DOOR and CURRIES*



# Blast Resistance

Standards in this category of protective opening were developed to mitigate injury to occupants from explosive devices of terrorists as well as the accidental explosions caused by industrial chemicals and gases. Many requirements highlight glazing standards because there is substantial evidence to support that careful selection can greatly reduce injury sustained from glass fragments. As such, construction standards and test methods detail the expected performance outcome for both new construction and retrofit/remodeling work. It is important to note that a blast resistant opening is the summation of a door, frame, latching hardware, anchor points and glazing; A true system with different levels of performance.

## Resources

DoD UFC 4-010-01 – Unified Facilities Criteria (UFC). DoD Minimum Anti-Terrorism Standards for Buildings – 2013

GSA TS01 – US General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings – 2003

Petroleum and Chemical Processing Industry Technology Cooperative (PIPITC)

ASTM F2247 – Standard Test Method for Metal Doors Used in Blast Resistant Applications – 2011

ASTM F1642 – Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings – 2012

ASTM F2927 – Standard Test Method for Door Systems Subject to Airblast Loadings – 2012

ASTM F2248 – Standard Practice for Specifying an Equivalent 3-Second Duration Design Loading for Blast Resistant Glazing Fabricated with Laminated Glass – 2012

## Quick Reference — Requirements

### DoD UFC 04-010-01

Protection levels are linked to potential personal injury and damage to the building in general and to door and glazing systems in particular. The distance between the building and the source of the explosion is a major factor in calculating the protective properties for a given amount of explosive energy. Complementary standards referenced are ASTM F 1642 and ASTM F 2247.

Level of Protection	Potential Building Damage	Potential Door & Glazing Hazard	Potential Injury
Below Standard	Severe	High	Fatalities
Very Low	Heavy	Low Hazard	Serious
Low	Moderate	Very Low	Minor to Moderate
Medium	Minor	Minimal	Minor to Moderate
High	Minimal	No Hazard	Superficial



## Understanding Blast Resistance

Blast resistant openings are used to protect occupants by ensuring the door, hardware and glazing system remain in place and absorb the pressure wave caused by the blast incident. The blast resistant properties of an opening are expressed in terms of the amount of energy and length of exposure they can withstand.



CORBIN RUSSWIN, SARGENT and YALE mortise locks are rated for blast resistance



## GSA TSO1

In a manner similar to related standards, GSA/ISC parameters categorize performance levels for the glass system for the many buildings under their jurisdiction (ie. court houses, post offices, data processing centers, etc.).

PIPITC is a joint industry research program which provides guidelines on various methods available for the structural design of blast resistant buildings in petroleum and chemical process plants.

Performance Condition	Protection Level	Hazard Level
1	Safe	None
2	Very High	None
3A	High	Very Low
3B	High	Low
4	Medium	Medium
5	Low	High

## ASTM F2247

This test method covers the structural performance of metal doors and frames and their restraining hardware (such as latches and hinges) used as a blast resistant barrier. This method involves applying an equivalent static pressure based on the characteristics of the specified blast pressure and structural properties of the door panel design.

## ASTM F1642

Applicable when glass is incorporated into the opening, there are several performance ratings described. Each one essentially details the size and type of glass fragments as observed following the test. A complete description is detailed in the following sections of the standard:

Section	Rating
7.1.1	No Break
7.1.2	No Hazard
7.1.3	Minimal Hazard
7.1.4	Very Low Hazard
7.1.5	Low Hazard
7.1.6	High Hazard

## ASTM F2927

Referenced when air blast test results are required to certify that a door opening assembly meets the required blast rating and the related performance level.

## ASTM F2248

Referenced when engineering calculations are required for an opening with glazing to certify that the assemblies meet a specified blast rating.



Testing conducted for Blast Resistant Door openings from CECO DOOR and CURRIES



Blast resistant doors and frame systems from CECO DOOR and CURRIES meet or exceed the stringent manufacturing and performance requirements of the Department of Defense, Department of State, Department of Homeland Security and other regulatory groups



# Egress

The Triangle Shirtwaist Factory fire of 1911 caused a public outrage when 146 workers perished as a result of locked exit doors and blocked fire escapes. Building codes with specific egress provisions came into existence by 1913, and the requirement for safe egress from buildings remains a fundamental concept of today's codes.

## Code Resources

International Building Code (IBC) – 2012

## Quick Reference — Requirements

### IBC 403.5.3 Stairway Door Operation

Stairway doors other than the exit discharge doors shall be permitted to be locked from the stairway side. Stairway doors that are locked from the stairway side shall be capable of being unlocked simultaneously without unlatching upon a signal from the fire command center.

### IBC 1008.1.9.11 Stairway Doors

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

Exceptions:

1. Stairway discharge doors shall be openable from the egress side and shall only be locked from the opposite side.
2. This section shall not apply to doors arranged in accordance with Section 401.5.3.
3. In stairways serving not more than four stories, doors are permitted to be locked from the side opposite the egress side, provided they are openable from the egress side and 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.
4. Stairway exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group B, F, M and S occupancies where the only interior access to the tenant space is from a single exit stair where permitted in Section 1021.2.
5. Stairway exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group R-2 occupancies where the only interior access to the dwelling unit is from a single exit stair where permitted in Section 1021.2.



## Understanding Egress

A means of egress is a continuous path of travel from any portion of a building to a public way. This includes the exit access which is the portion of a building that leads to an exit; the exit which provides a protected area leading to the exit discharge (i.e. stair doors); and the exit discharge which is the area that brings a person from the exit to the public way (i.e. street).



*Electrified locks or electrified trim of exit devices from CORBIN RUSSWIN, SARGENT and YALE allow automatic unlocking in emergency situations (CORBIN RUSSWIN ML20900 shown)*



#### IBC 1008.1.9.4 Bolt Locks

Manually operated flush bolts or surface bolts are not permitted.

Exceptions:

1. On doors not required for egress in individual dwelling units or sleeping units.
2. Where a pair of doors serves a storage or equipment room, manually operated edge-or surface-mounted bolts are permitted on the inactive leaf.
3. Where a pair of doors serves an occupant load of less than 50 persons in a Group B, F, or S occupancy, manually operated edge-or surface-mounted bolts are permitted on the inactive leaf. The inactive leaf shall contain no doorknobs, panic bars or similar operating hardware.
4. Where a pair of doors serves a Group B, F or S occupancy, manually operated edge-or surface-mounted bolts are permitted on the inactive leaf provided such inactive leaf is not needed to meet egress width requirements and the building is equipped throughout with an automatic sprinkler system in accordance with the Section 903.3.1.1. The inactive leaf shall contain no doorknobs, panic bars or similar operating hardware.
5. Stairway exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group R-2 occupancies where the only interior access to the dwelling unit is from a single exit stair where permitted in Section 1021.2.



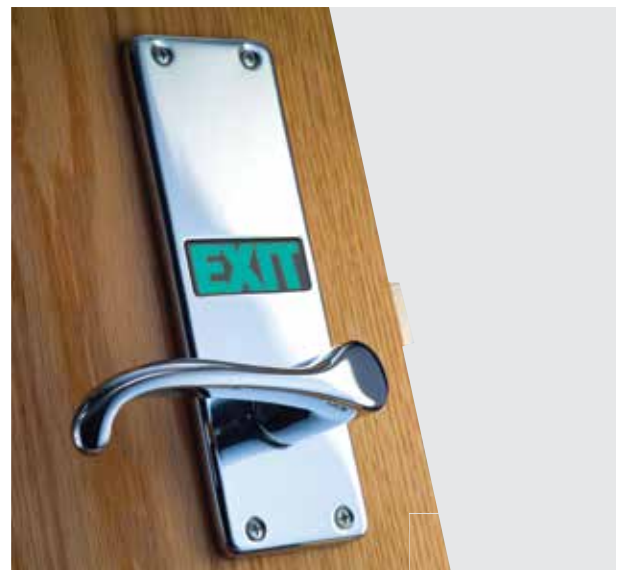
*SARGENT Harmony® 7000 Series features two latching points with concealed vertical rods providing added protection for exterior or interior double doors*

#### IBC 1008.1.10 Panic and Fire Exit Hardware

Doors serving a high-hazard occupancy and doors serving rooms or spaces with an occupant load of 50 or more in assembly or educational occupancies shall not be provided with a latch or lock unless it is panic hardware or fire exit hardware.

**Exception:** A main exit of a Group A occupancy in compliance with Section 1008.1.9.3. Item 2.

Electrical rooms with equipment rated 1,200 amperes or more and over 6 feet (1829 mm) wide that contain over-current devices, switching devices or 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.



*The 8200 mortise lock with SARGuide™ has integrated electroluminescent EXIT signage that facilitates egress in low-visibility conditions*

##### IBC 1008.1.10.1 Installation

Where panic or fire exit hardware is installed, it shall comply with the following: Panic hardware shall be listed in accordance with UL 305; fire exit hardware shall be listed in accordance with UL 10C and UL 305; the actuating portion of the releasing device shall extend at least one-half of the door leaf width; and the maximum unlatching force shall not exceed 15 pounds (67 N).



*The TL- SARGuide Electroluminescent exit device increases visibility of exit locations in dark or smoke-filled passages, supplementing existing code requirements for egress lighting*

# Electromagnetic Locking

Found in all years of the International Building Code (IBC), Access Controlled Egress Doors is a carry-over from the legacy codes of the 80s and 90s. Because of its security tie-in with the fire alarm system, and its sensor unlocking of doors when people are near, it limited an electromagnetically locked door from providing security and protection. Also, due to its non-specific wording regarding the type of lock it referenced, it has led to creative and sometimes expensive interpretation.

## Resources

International Building Code (IBC) – 2012

UL 294 – Access Control System Units – 2009

## Quick Reference — Requirements

### IBC 1008.1.9.9 Electromagnetically Locked Egress Doors

Doors in the means of egress in buildings with an occupancy in Group A, B, E, M, R-1 or R-2 and doors to tenant spaces in Group A, B, E, M, R-1 or R-2 shall be permitted to be electromagnetically locked if equipped with listed hardware that incorporates a built-in switch and meet the requirements below:

1. The listed hardware that is affixed to the door has an obvious method of operation that is readily operated under all lighting conditions.
2. The listed hardware is capable of being operated with one hand.
3. Operation of the listed hardware directly interrupts the power to the electromagnetic lock and unlocks the door immediately.
4. Loss of power to the listed hardware automatically unlocks the door.
5. Where panic or fire exit hardware is required by section 1008.1.10, operation of the listed panic or fire exit hardware also releases the electromagnetic lock.

### UL 294

The access control standard requirements apply to the construction, performance, and operation of physical access control equipment and systems intended to regulate or control entry into and/or exit from a controlled area, protected area or a restricted area. The extent of control of entry/exit may include the reporting and recording of related access and egress activity.



## Understanding Electromagnetic Locking

An electromagnetic lock is a surface mounted lock with no moving parts. It is always fail-safe and has no interlocking mechanisms and cannot bind or lock when power is removed. Electromagnetic locks require additional devices to release it by removing power. Additional devices include panic bars with switches, non-latching bars with switches, and button/timer/motion detector combinations, depending on the applicable model code and local supplements.



*The Securitron iMXDA delayed egress Magnalock® is offered in both Chicago and California versions for local code compliance*



### IBC 1008.1.9.8 Access-Controlled Egress Doors

The entrance doors in a means of egress in buildings with an occupancy in Group A, B, E, I-2, M, R-1 or R-2 and entrance doors to tenant spaces in occupancies in Groups A, B, E, I-2, R-1 or R-2 are permitted to be equipped with an approved entrance and egress access control system which shall be installed in accordance with all of the following criteria:

1. A sensor shall be provided on the egress side arranged to detect an occupant approaching the doors. The doors shall be arranged to unlock by a signal from or loss of power to the sensor.
2. Loss of power to that part of the access control system which unlocks the doors shall automatically unlock the doors.
3. The doors shall be arranged to unlock from a manual unlocking device located 40 inches to 48 inches (1016mm to 1219mm) vertically above the floor and within 5 feet (1524mm) of the secured doors. Ready access shall be provided to the manual unlocking device and the device shall be clearly identified by a sign that reads "PUSH TO EXIT." When operated, the manual unlocking device shall result in direct interruption of power to the lock—independent of the access control system electronics—and the doors shall remain unlocked for a minimum of 30 seconds.
4. Activation of the building fire alarm system, if provided, shall automatically unlock the doors, and the doors shall remain unlocked until the fire alarm system has been reset.
5. Activation of the building automatic sprinkler or fire detection system, if provided, shall automatically unlock the doors. The doors shall remain unlocked until the fire alarm system has been reset.
6. Entrance doors in buildings with an occupancy in Group A, B, E or M shall not be secured from the egress side during periods that the building is open to the general public.



*The Securitron DSB Dual Sense Bar with touch and mechanical release delivers two independent redundant switch circuits for releasing the magnetic lock*



*ASSA ABLOY Electronic Security Hardware's Securitron products offer devices that remove power to electromagnetic locks such as motion sensors and exit buttons in accordance with UL 294*



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*Securitron M380 (shown) and M680 Magnalocks integrate with the request to exit in the lock body*

# Fire Protection

In the early 1900's the United States experienced multiple fires resulting in large loss of life. The Iroquois Theater fire in 1903 brought focus to the need for more stringent fire and life safety codes. Underwriters Laboratories and the National Fire Protection Association were instrumental in the creation of codes to guide fire safety in the built environment. Today, ASSA ABLOY and these organizations remain engaged in creating safer environments through the ongoing development of codes and standards.

## Resources

International Building Code (IBC) – 2012

International Fire Code (IFC) – 2012

NFPA 101 Life Safety Code – 2012

NFPA 80 – Fire Doors and Other Opening Protectives – 2013

NFPA 105 – Standard for Smoke Door Assemblies and Other Opening Protectives – 2013

## Quick Reference — Requirements

### IBC 706.8 Openings

Each opening through a fire wall shall be protected in accordance with Section 716.5 and shall not exceed 156 square feet (15 m<sup>2</sup>). The aggregate width of openings at any floor level shall not exceed 25 percent of the length of the wall.

### IBC 716.5.3 Door Assemblies in Corridors and Smoke Barriers

Fire door assemblies required to have a minimum fire protection rating of 20 minutes where located in corridor walls or smoke barrier walls having a fire-resistance rating in accordance with Table 716.5 shall be tested in accordance with NFPA 252 or UL 10C without the hose stream test.

### IBC 716.5.3.1 Smoke and Draft Control

Fire door assemblies shall also meet the requirements for a smoke and draft control door assembly tested in accordance with UL 1784.



## Understanding Fire-Rated Openings

Fire protection and fire resistance rated opening assemblies are engineered for specific applications. Fire protection assemblies restrict the passage of smoke and fire for their classification period, up to and including 3-hour rated assemblies. Fire resistance rated assemblies provide additional protection by insulating the opening against radiant heat transfer.

These assemblies have been designed, tested and listed with third-party certification agencies so that the Authority Having Jurisdiction (AHJ) may ensure the proper application.



### **IBC 716.5.5 Doors in Interior Exit Stairways and Ramps and Exit Passageways**

Fire door assemblies in interior exit stairways and ramps and exit passageways shall have a maximum transmitted temperature rise of not more than 450°F (250°C) above ambient at the end of 30 minutes of standard fire test exposure.

### **IBC 716.5.7.4 Fire Door Frame Labeling Requirements**

Fire door frames shall be labeled showing the names of the manufacturer and the third-party inspection agency.

### **IBC 710.5.2.3 Self- or Automatic-Closing Doors**

Where required elsewhere in the code, doors in smoke partitions shall be self- or automatic-closing by smoke detection in accordance with Section 716.5.9.3.

### **IBC 1008.1.10 Panic and Fire Exit Hardware**

Doors serving a Group H occupancy and doors serving rooms or spaces with an occupant load of 50 or more in a Group A or E occupancy shall not be provided with a latch or lock unless it is panic hardware or fire exit hardware.

### **NFPA 101 7.1.3.2.1 Exits**

Where this Code requires an exit to be separated from other parts of the building, the separating construction shall meet the requirements of Section 8.2 and the following:

(8) Openings in the separation shall be protected by fire door assemblies equipped with door closers complying with 7.2.1.8.

### **NFPA 101 7.2.1.15.2 Inspection of Door Openings**

Fire-rated door assemblies shall be inspected and tested in accordance with NFPA 80, Standard for Fire Doors and Other Opening Protectives. Smoke door assemblies shall be inspected and tested in accordance with NFPA 105, Standard for Smoke Door Assemblies and Other Opening Protectives.

### **NFPA 80**

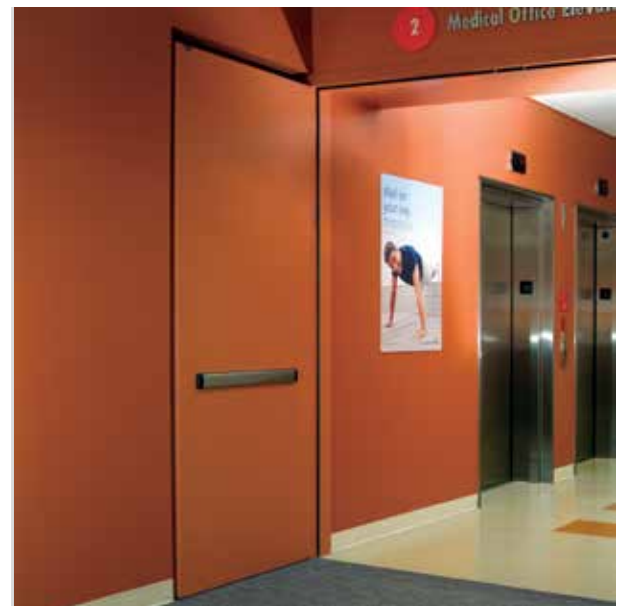
The fire door and opening protective standard defines the installation and maintenance requirements as well as allowances for field modification of fire doors. It also defines the annual inspection and testing requirements for fire doors and related hardware.

### **NFPA 105**

The standard for smoke control doors defines the testing, labeling, installation and maintenance of doors required by the codes to be smoke control openings.



*Rixson 997 Electromagnetic Door Holder/Release conforms to devices outlined in National Fire Protection Association Standards Nos. 80 and 101*



*The RITE Door® includes pre-installed recessed hardware to meet the most stringent codes for clear openings. The integrated fire and smoke doors are not only code compliant, but also blend beautifully into any building's design*



*Fire-rated hollow metal and wood doors offered by CECO DOOR and CURRIES*

# Radio Frequency Shielding

All electronic means of transmitting information radiate frequencies of magnetic and radio waves, allowing confidentiality to be breached without the proper door opening solution. Today there is global demand for areas within buildings that dampen the transmission of electronic and magnetic fields from one space to another. Specifically, many commercial and government facilities mandate RF shielded solutions to minimize the risk of interference or unauthorized surveillance of sensitive electronic data. In addition to blocking RF frequencies, these openings can also be rated for sound transmission applications.

## Resources

IEEE 299 – Standard Method for Measuring the Effectiveness of Electromagnetic Shielding Enclosures – 2006

ASTM E90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements – 2009

ASTM E1851 – Standard Test Method for Electromagnetic Shielding Effectiveness of Durable Rigid Wall Relocatable Structures – 2009

ASTM D4935 – Standard Test Method for Measuring the Electromagnetic Shielding Effectiveness of Planar Materials – 2010

## Quick Reference — Requirements

### IEEE 299

This standard provides a test method to determine the shielding effectiveness of enclosures for groups of equipment, vehicles, computing systems and other items susceptible to interference or being intercepted by other sources. This Standard supersedes the previous requirements found in MIL-STD-285.

### ASTM E90

Test for airborne sound transmission loss for various building partitions (i.e. walls, operable partitions, roofs, windows, floor-ceiling assemblies, doors, panels, and other “walls” which can divide a space).



## Understanding RF Shielding

RF Shielded openings block the transmission of specific frequencies of electromagnetic radiation, to ensure the integrity of sensitive data within healthcare, commercial and government buildings. RF shielding also prevents interference with sensitive equipment and processes from similar equipment in adjacent spaces within a facility.



*To help ensure sensitive and confidential information is contained, RF Shielding Solutions from CECO DOOR, and CURRIES are third-party certified and designed to provide RFI/EMI shielding of 40db at 10khz-10ghz per ASTM E1851 and IEEE 299 (Conductive perimeter seals, Pemko threshold and caulk are included with each assembly)*

**ASTM E1851**

The intended application of this test method is for shielded enclosures vacant of equipment, racks, etc. prior to interior finish work being completed. The test method is for use in the following frequency ranges; 140 - 160kHz, 14 - 16kHz, 300 - 500MHz, 900 - 1000MHz, and 8.5 - 10.5GHz. This standard determine the electromagnetic shielding effectiveness of durable rigid wall enclosures.

**ASTM D4935**

This test method is intended to measure the electromagnetic shielding effectiveness of a planar material for a plane, far-field, EM wave. The measurement method is valid over a frequency range of 30MHz to 1.5GHz.

Range	Frequency	Section
Low	9 - 16 kHz	5.6
	140 - 160 kHz	
	14 - 16 MHz	
Resonant	20 - 100 MHz	5.7
	100 - 300 MHz	
High	0.3 - 0.6 GHz	5.8
	0.6 - 1.0 GHz	
	1.0 - 2.0 GHz	
	2.0 - 4.0 GHz	
	4.0 - 8.0 GHz	
	8.0 - 18 GHz	

Source	Frequency
AM Radio Broadcast	1610 - 1710 kHz
Short Wave Broadcast	2.3 - 26.1 MHz
FM Radio Broadcast	87.5 to 108.0 MHz
TV Broadcast	54 and 806 MHz
Ultrasonic Welding	15 kHz - 70 kHz
Cordless Phones	Frequency bands to include 900 MHz (902 - 928 MHz), 1.9 GHz (1880 - 1900 MHz), 2.4 GHz & 5.8 GHz
Medical Frequency Bands	2400-2493.5 MHz



Markar full surface hinges and edge guards are available with a radiation shielding option to aid with dampening of magnetic and radio waves



Door closer covers from NORTON are available with a radiation shielding option to contain radio frequency bands and other ultrasonic waves



A radiation shielding option is available from SARGENT and CORBIN RUSSWIN on a selection of products for use where the dampening of magnetic and radio waves is needed



# Sustainability

Projections indicate that soon 50 percent of all non-residential construction will be designed to a green standard. As the built environment strives toward higher levels of sustainability, with special attention paid to energy efficiency and human health impacts, we will see more of what were once voluntary guidelines written into building code.

## Resources

ASHRAE Standard 189.1 – Standard for the Design of High-Performance Green Buildings – 2011

ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings – 2010

ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings – 2007

International Green Construction Code - 2012

## Quick Reference — Requirements

### Energy & Atmosphere

#### ASHRAE 189.1 (2011)

Opaque swinging doors used on exterior openings in climate zones 1, 2, 3, 4 must have a minimum U-Factor of 0.6, while those in climate zones 5, 6, 7, 8 must have a minimum U-Factor of 0.4. These doorways must also achieve air infiltration rates of 0.2 cfm/sf<sup>2</sup>, regardless of climate zone.

Where Required: State and Municipal Commercial Building Codes, 2012 International Green Construction Code (ASHRAE 189.1-2011)

#### ASHRAE 90.1 (2010)

Opaque swinging doors used on exterior openings in climate zones 1, 2, 3, 4, 5, 6 must have a minimum U-Factor of 0.7, while those in Climate Zones 7, 8 must have a minimum U-Factor of 0.5. These same doorways must also achieve Air Infiltration rates of 0.2 cfm/sf<sup>2</sup> regardless of climate zone.

Where Required: State and Federal Commercial Building Codes, LEED v4 (requires a 10% minimum performance beyond ASHRAE 90.1-2010)

#### ASHRAE 90.1 (2007)

Opaque swinging doors used on exterior openings in climate zones 1, 2, 3, 4, 5, 6 must have a minimum U-Factor of 0.7, while those in Climate Zones 7, 8 must have a minimum U-Factor of 0.5. These same doorways must also achieve Air Infiltration rates of 0.4 cfm/sf<sup>2</sup> regardless of climate zone.

Where Required: State Commercial Building Codes, LEED v2009 (requires a 10% minimum improvement beyond ASHRAE 90.1-2007)



## Understanding Sustainability

As the built environment strives to be as energy efficient and sustainable as possible, high performance commercial doors and hardware play a larger supporting role. Assemblies with high insulating and low air-leakage values contribute to the desired performance requirements of the building envelop.



*High performance doors, frames, gasketing and hardware at NREL in Golden, CO assisted the building envelope in achieving net-zero energy*

## Energy & Atmosphere (Continued)

Energy & atmosphere credits promote better building energy performance through innovative strategies.

Credit Category	Where Required
Minimum Energy Performance	LEED v4, v2009
Optimize Energy Performance	LEED v4, v2009
Enhanced Commissioning – Building Envelop	LEED v4, v2009

## Materials & Resources

Materials & resources credits encourage using sustainable building materials and reducing waste.

Credit Category	Where Required
Building Lifecycle Impact Reduction – Materials Re-use	LEED v4, v2009
Building Disclosure & Optimization <ul style="list-style-type: none"><li>-Environmental Product Declarations</li><li>-Health Product Declarations</li><li>-Extended Producer Responsibility</li></ul>	LEED v4
Recycled Content	LEED v4, v2009
Regional Materials	LEED v4, v2009
Bio-based Materials	LEED v4, v2009
FSC Certified Wood	LEED v4, v2009

## Indoor Environmental Quality

Indoor environmental quality credits promote better indoor air quality and access to daylight and views.

Credit Category	Where Required
Environmental Tobacco Smoke Control	LEED v4, v2009
Indoor Air Quality Assessment	LEED v4, v2009
Low-Emitting Materials – <ul style="list-style-type: none"><li>-Adhesives, Sealants, Paints &amp; Coatings</li><li>-Composite Wood Products</li><li>-Ceiling &amp; Wall Systems</li></ul>	LEED v4, v2009, IGCC
Interior Cross-Contamination Prevention	LEED v4, v2009
Daylight & Views	LEED v4, v2009
Acoustics	LEED v4, v2009, IGCC



*The Kohler Environmental Center at Choate Rosemary Hall in Wallingford, CT features energy efficient openings that allow daylight and views into the interior of this LEED Platinum building*



*Integrated Power over Ethernet locks, available from CORBIN RUSSWIN and SARGENT offer the most sustainable solution for access control by using existing infrastructure, reducing components and minimizing energy consumption, drawing 90% less power in standby mode than traditional access control solutions*



*Widespread use of sustainable construction practices and building products from ASSA ABLOY Group brands helped the Fairmont Hotel in Pittsburgh, PA earn LEED Gold Certification. FSC certified wood, bio-based material, recycled content and GREENGUARD certification were all factors in achieving this certification*

# Windstorm Solutions

Windstorm rated door opening solutions originated from the requirements of the South Florida Building Code following the devastation of Hurricane Andrew in 1994. Today, the Florida Building Code and the International Building Code have provisions that address property protection and life safety from hurricane and tornado force winds and the resulting debris impacts caused by these storms.

## Resources

International Building Code (IBC) – 2012

Florida Building Code (FBC) – 2013

FEMA P-320 – Taking Shelter from the Storm – 2008

FEMA P-361 – Design and Construction Guidance for Community Safe Rooms – 2008

ICC 500 – Standard for the Design and Construction of Storm Shelters – 2008

## Quick Reference — Requirements

### IBC 423.1.1 Scope

This section applies to the construction of storm shelters constructed as separate detached buildings or constructed as safe rooms within buildings for the purpose of providing safe refuge from storms that produce high winds, such as tornados and hurricanes. Such structures shall be designated to be hurricane shelters, tornado shelters, or combined hurricane and tornado shelters.

### IBC 423.3 Group E Occupancies

In areas where the shelter design wind speed for tornadoes is 250 MPH per Figure 304.2(1) of ICC 500, all Group E Occupancies with an aggregate occupant load of 50 or more shall have a storm shelter constructed in accordance with ICC 500. The shelter shall be capable of housing the total occupant load of the Group E occupancy.

### IBC 423.3 Critical Emergency Operations

In areas where the shelter design wind speed for tornadoes per Figure 304.2(1) of ICC 500 is 250 MPH, 911 call stations, emergency operation centers and fire, rescue, ambulance and police stations shall have a storm shelter constructed in accordance with ICC 500.



## Understanding Windstorm Assemblies

Windstorm rated opening assemblies for tornado or hurricane resistance are engineered for specific applications. These assemblies have been designed, tested and listed with third-party certification agencies so that the Authority Having Jurisdiction (AHJ) may ensure the proper application. All assemblies used for these applications should bear a label detailing the specific standards to which they have been tested and the performance levels achieved.



*McKinney StormPro® Tornado Resistant Hinges are part of an overall solution along with CECO StormPro® 361 or CURRIES StormPro® 361 Doors*



#### **FBC 423.25.4 Structural standard for wind loads**

Openings shall withstand the impact of wind-borne debris missiles in accordance with the impact and cyclic loading criteria per ASTM E 1886 and ASTM E 1996 or SBC/SSTD 12.

#### **FEMA P320**

Regardless of where the safe room is built, it must be equipped with a door that has been tested and certified to the appropriate criteria and will resist the impact of wind-borne debris.

#### **FEMA P361 Openings and Opening Protectives in Tornado Safe Rooms**

The openings in the safe room envelope should be protected by doors complying with ICC-500, Section 306.3.1.

#### **ICC 500 - 501.5 Door Operation**

Means of egress doors shall be operable from the inside without the use of keys or special knowledge or effort.

#### **ICC 500 - 806.3.2.2 Door Assemblies with Glazing, Sidelights, or Transoms for Hurricane Shelters**

Door assemblies with glazing, sidelights, or transoms for hurricane shelters shall be static pressure proof tested away from the door stops to a pressure of at least 1.2 times the design wind pressure. Any required debris impact tests shall follow pressure proof testing. After impact tests the door assembly shall be subjected to cyclic pressure tests following procedures of ASTM E 1886.



*SARGENT, CORBIN RUSSWIN and YALE multi-point auto deadlocking devices are certified for use on FEMA 320, FEMA 361 and ICC 500 tornado shelters*



*The HES 1006 and HES 9600 electric strikes are designed with the strength and durability required to exceed the severe forces of ANSI Windstorm testing*



*CECO DOOR and CURRIES windstorm assemblies provide compliance with windstorm shelter requirements, as well as conformance to fire and egress codes*

# Bringing it all Together

From Springfield, IL to Milan, TN to New Haven, CT and Garland, TX, our manufacturing strength lies within our ability to combine products from trusted door and hardware brands to create optimized openings.

## ARCHITECTURAL DOOR ACCESSORIES™

Markar | McKinney | Pemko | Rockwood

Hinges, door seals, thresholds, sliding door hardware, door pulls, door stops, protection plates

## ELECTRONIC SECURITY HARDWARE

HES | Securitron

Electric strikes, electromagnetic locks, cabinet locks, keypads and readers, pushbuttons and egress devices, power supplies, power transfers, and specialty locks.

## ADAMS RITE

Integrated door assemblies, mechanical and electromechanical locking systems, electric strikes, and exit devices

## BARON

Custom and standard steel doors and frames

## CECO DOOR

Custom and standard steel doors and frames

## CORBIN RUSSWIN

Mortise, bored and auxiliary locks, exit devices, door closers, key systems, electromechanical and access control products

## CURRIES

Custom and standard steel doors and frames

## MEDECO

Locks and locking systems for security, safety and control

## NORTON

Mechanical and electromechanical door closers and low energy door operators

## RIXSON

Concealed closers, pivots and mechanical/electromechanical door holders

## SARGENT

Mortise, bored and auxiliary locks, exit devices, door closers, key systems, electromechanical and access control products

## YALE

Mortise, cylindrical and auxiliary locks, exit devices, door closers, electromechanical products and key systems



Connect with us online:

[www.assaabloydss.com](http://www.assaabloydss.com)



## Sales & Technical Support

With our strategically located sales offices, teams of specialists provide a full spectrum of services to help ensure you select the correct opening for any application.

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### Specification Consultants

Aside from providing a wealth of continuing education opportunities, our specification consultants can provide or assist in the development of a complete building specification, prepare door and hardware schedules and consult on compliance with building codes and rating systems.

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### Vertical Market Specialization

Focus is important. Local teams of vertical market specialists are dedicated to serving the needs of an assigned market from government and military to healthcare, K-12, and university and our national accounts team specializes in both retail and hospitality. By honing in on each market segment, we are able to develop market-specific new products and customize solutions based upon unique needs.

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### Integrated Solutions Specialists

Our Integrated Solutions Specialists are all certified by ASIS International as Physical Security Professionals (PSP). They can perform security audits, consultations and training on electronic access control integration.

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### Certified Key Systems Specialists

Highly trained and certified Key Systems Specialists are available nationwide to design or assist in the development of secure factory-masterkeyed systems.

## Distributors and Service Centers

Facilitating the effort to bring products and services closer to local jobsites is our network of distributor partners and service centers. They bridge the gap between manufacturers and customers to ensure complete opening solutions and services.

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### Distributor Partners

Our large nationwide network of distribution partners are well-versed in our product offering and provide many value-added services including: product training, custom modifications, scheduling and order coordination, inventoried products, installation, maintenance and repair assistance.

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### Regional Service Centers

Our coast-to-coast network of strategically located Service Centers brings top quality doors and frames closer to distributors and local job sites. These modern, fully-equipped facilities represent the largest and most responsive delivery system in the industry.





ASSA ABLOY is the global leader in door opening solutions, dedicated to satisfying end-user needs for security, safety and convenience

**ASSA ABLOY**



**ASSA ABLOY Door Security Solutions**

110 Sargent Drive

New Haven, CT 06511

[www.assaabloydss.com](http://www.assaabloydss.com)

1.800.DSS.EZ4U (377.3948)

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