

Horizontal Sliding Fire Doors: Code-Compliant Design for Wide-Span Opening Protectives

Since 2000, fire and building codes allow for sliding-door systems for emergency egress

Provided by Won-Door™ Products
By Anthony Flint

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“This Land: The Battle Over Sprawl and the Future of America.”



Charlotte Douglas International Airport, Charlotte, North Carolina
Architect: Odell Associates, Inc.
Photo credit: Art Gentile, KPC Photography

Fire protection and increased security needs have prompted the use of horizontal sliding door systems in high occupancy buildings from government facilities to airports.

Many design professionals may not know it, but changes in fire and building codes since 2000 have made it possible to use horizontal sliding-door systems in a wide variety of applications, opening up new possibilities for emergency egress and the juncture of internal spaces, while protecting against fire and smoke, ensuring life safety and enhancing building security.

The changes mark a radical departure from codes developed over the 20th century that allowed horizontal, accordion-style sliding doors in only selected applications, and forced architects to provide emergency exits and separate internal spaces with standard wood or steel-framed hinged swinging doors, a maximum of four feet wide.

Today, the acceptance of horizontal, accordion-style sliding-door systems is for all applications except in certain occupancies which typically involve the storage of flammable material, the categorization known in codes as Group H. The sliding-door systems can be used regardless of the occupancy type or occupancy “load” of the building or the space being served. This has liberated design professionals to take new approaches with openings in required fire separation such as airports, schools, hospitals and museum galleries, while still maintaining fire and life safety standards.

Retractable horizontal sliding-door systems—allowing free-flowing openings some of the time and secure closure when needed—have not only

been approved by the two U.S. national buildings codes, the International Building Code and the National Fire Protection Association (NFPA) 5000 Building Code, but have been deemed ideal and in many cases preferable to traditional hinged swinging doors. As a result, design

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Opening Protectives. To earn one AIA/CES Learning Unit, including one hour of health safety welfare credit, answer the questions on page 5, then follow the reporting instructions or go to continuingeducation.construction.com and follow the reporting instructions.

Learning Objectives

After reading this article, you should be able to:

- Understand the evolution of fire and building codes in the U.S. for emergency egress, fire resistance, and building security requirements.
- Learn the current framework for fire and building codes in the U.S. which allow the use of horizontal sliding doors in any application.
- Analyze the different uses of horizontal sliding-door systems.
- Examine the advantages of sliding door systems for the disabled under Universal Design.
- Understand how horizontal sliding-door systems work and what they are made of.



The Cocoanut Grove nightclub fire in Boston in 1942, which killed 492 people, led to strict standards on emergency egress and fire protection centered on the use of hinged swinging doors.

professionals have many more options for this essential component of their craft: the means of egress system, the free-flowing passageway, the atrium and the juncture of spaces.

Codes Over Time

An important driver of the design of front entrances in the 20th century has been energy concerns, which led to the development of the revolving door, and later the sliding glass door and protected vestibule, which provided a seal against the elements, while accommodating the passage of large numbers of people.

The separation of internal spaces, before the development of fire codes and increased security requirements, could be designed with few restrictions, such as the wide-open passageways separating the galleries at the Louvre Museum in Paris. Ancillary means of egress was likewise a straightforward affair: standard swinging doors at stairwells and back-of-house exits, with little or no requirements for how they would actually function in an emergency or be used by different groups of people, such as the disabled, patients in health-care facilities, or large crowds in entertainment or shopping venues.

All of that changed over the course of the last century, after tragedies that revealed the need for functional emergency egress and fire protection, and led to the development of strict standards in detailed fire and building codes.

The Triangle Shirtwaist Factory fire of 1911, in New York City, was an important turning point in the development of fire safety codes. Immigrant workers trying to flee the fire found the doors to the ninth-floor stairs in that Manhattan building to be locked, and the fire escape was flimsy. A total of 146 people died.

Another tragedy that assured strict standards for interior doors and emergency egress was the Cocoanut Grove fire in Boston in 1942, at a swank nightclub in what is now Bay Village, near the Theatre District. On a cold November night at about 10 p.m., with 1,000 patrons in the palm-tree lined halls, a young couple unscrewed a light bulb to soften the glow at their table. A bartender told a busboy to replace the light. When the busboy struck a match to better see what he was doing, the satin ceiling caught fire, and in moments, a fireball swept upstairs. As panic spread, the revolving door that was the primary entrance was hopelessly

jammed, and others found side doors locked; 492 people died.

In the aftermath, cities across the nation revisited building codes and made sure evacuation in a fire emergency was paramount in any structure where large numbers of people gathered. One new requirement was that revolving doors could no longer be the primary means of egress, and had to have swinging doors on either side. Sliding doors and overhead doors could not be an exit. Emergency egress had to consist of hinged or pivoted doors, of a minimum width and height, that could be easily opened with minimal effort and that opened in the direction of exit travel.

The fire at the Our Lady of the Angels School in Chicago in 1958, in which 92 children and three nuns died, led to even tougher requirements for egress and fire protection in schools, and in hospital and healthcare facilities as well. The standards applied to museums, sports arenas, office buildings, and shopping and entertainment complexes—any building where large numbers of people gathered.

The standards were put in place both on the basis of performance and specifications, and spelled out in great detail in the three regional groups that promulgated model building codes: the Southern Building Code Congress International, covering southern and Gulf Coast states and producing the Standard Building Code; the Building Officials and Code Administration, covering the Northeast and Midwest and producing the National Building Code; and the International Conference of Building Officials, covering California and the West and producing the Uniform Building Code.

The other model code used by local jurisdictions was the National Fire Protection Association, which regulated key life safety elements such as sprinklers and alarms, and exits, windows, and doors.

Each of the regional groups had requirements for exit doors that differed slightly, based on the occupant “load,” for example, the square footage of a building in proportion to the number of maximum allowed occupants. But the basic performance-based standard for a door that was to be used in an emergency was that it should not require any tool, key or special knowledge to open from the inside; and that it would take no more than 15 lbs. of pressure to release any latch, 30 lbs. of pressure to initiate the opening, and 15 lbs. of pressure to swing it open fully.

New rules were also set for the number of exits. Every accessible space had to have a minimum of one exit. Two exits were required in stores, hospitals, educational institutions, hotels, apartments, and office buildings where the occupancy ranged from 10 to 50, and two exits were also required for all floors with an occupancy of 10 or more. A minimum of three exits are required in buildings with an occupancy load of 501 or more, and a minimum of four are required where the occupancy load exceeds 1,001.

Similarly, the required width of exits broadened according to occupancy. The spacing of exits was based on the idea that occupants should not have to travel more than 200 to 300 feet to get to an exit in an emergency.

The Sliding Door and Codes

The standards strictly limited the use of horizontal sliding doors. These systems could not, for example, be the primary means of egress. Any horizontal sliding-door system that separated internal spaces also had to meet tough requirements for fire resistance. The distinction between a fixed wall and a door was that flammable objects could be stored next to a wall, but not in the way of a swinging door; moveable

partitions fell into a kind of no-man's land between the two.

Horizontal sliding-door technology grew out of a desire to create a high acoustically rated folding partition which would produce sound transmission ratings comparable to insulated walls. In the early 1960s, early models were developed that used a two-track folding partition system that consisted of two walls of steel independently suspended from overhead tracks and a six-inch dead air space. While built with acoustics in mind, the horizontal sliding door was also capable of resisting fire.

In the 1970s, the horizontal sliding door passed the two major fire testing methods for door assemblies to withstand the passage of fire, holding up in intense heat rising to 1,700 degrees Fahrenheit and maintaining structural integrity. In 1986, the National Fire Protection Association committee that writes the Standard for Fire Doors and Windows first considered the introduction of a new chapter for the installation of special-purpose horizontally sliding accordion or folding doors. A few years later, the NFPA committee that writes the Means of Egress section considered a recommendation to permit the use of certain horizontal sliding doors as a means of egress in selected applications—to protect elevator lobbies, in buildings where the occupant loads were less than 50, and as fire and smoke barriers in healthcare facilities.

Sliding doors had been previously accepted for elevator lobbies, and the committee also determined that doors that slide horizontally did not present any more of a problem than swinging doors that open against the direction of travel—the latter deemed acceptable for buildings serving occupant loads of less than 50. Finally, horizontal sliding doors served as effective smoke barriers, which were required under the code for health care facilities virtually every 75 feet, to facilitate the “defend in place” approach used with occupants with special needs in fire emergencies. All of these proposed changes appeared in the 1988 edition of the Life Safety Code, and the three regional model building codes subsequently adopted them as well. The horizontal sliding door was thus acceptable as an alternative to traditional swinging doors in selected instances.

The Final Push

In 2000, the three regional building code entities merged into a single group that produced a single national uniform code—the International Building Code. Around the same time, the horizontal sliding door had a final breakthrough: an acceptable means of egress in all applications, regardless of occupancy loads, except for storage areas for flammable materials. The National Fire Protection Association changed its code as well, essentially to reflect what was in the IBC.

A chief characteristic that convinced the code writers was that the sliding-door systems could actually be easier to get through in an emergency than conventional swinging doors, while providing an effective barrier for fire and smoke, and serving as a key segregating device in other security emergencies.

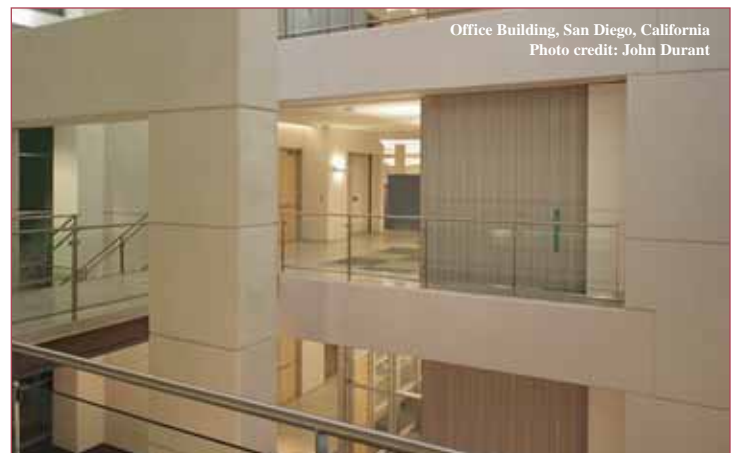
“The burden of proof is high. The industry is reactive to cataclysmic events,” said Tim Welch, vice president of business development at Won-Door, based in Salt Lake City, Utah. “We did a lot of education and showed that these systems were reliable, electronically supervised, and functioned well for egress. So over about 15 years, it’s been mainstreamed. There are no restrictions on use. They can be used in

any occupancy. This is all very new to enforcement professionals and design professionals.”

The idea of doors not swinging for exit travel is a significant change, maybe one of the more significant changes in the building code for the last 60 years, Welch said. The change is in recognition of new technology that makes sliding-door systems ideal as both fire and smoke breaks and emergency exits, particularly for the disabled. This latter issue has been a primary concern for independent living and Universal Design advocates, because traditional swinging doors proved to be cumbersome for people in wheelchairs.

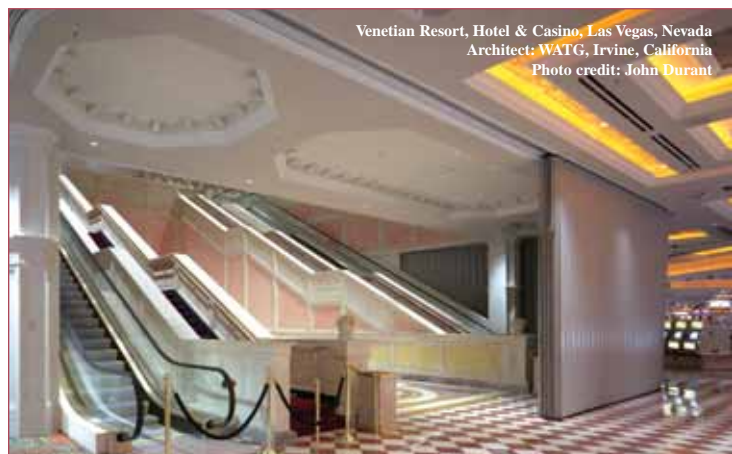
Universal Design is the approach to design that allows the use of the built environment by all people, regardless of age, ability or situation. It is an attempt to integrate accessibility requirements such as those under the Americans with Disabilities Act into one broad approach to make environments usable.

Emergency egress standards developed post-World War II in particular did not adequately consider the needs of the disabled. The problem was first recognized by Ed Roberts, a paraplegic appointed by then-California Governor Jerry Brown to be director of the state Department of Rehabilitation, who started thinking about how people



Office Building, San Diego, California
Photo credit: John Durant

Horizontal sliding fire doors protect this multi-story atrium built around a reflecting pool. Using code provisions for shaft enclosures rather than atrium separation eliminates the need for costly smoke removal systems.



Venetian Resort, Hotel & Casino, Las Vegas, Nevada
Architect: WATG, Irvine, California
Photo credit: John Durant

This fire door, measuring more than 100 feet long, satisfies vertical opening protection as well as occupancy separation requirements by sealing off the escalator from the main gaming level.

with disabilities were supposed to escape from upper floors and buildings in general in the event of an emergency or fire. What happens if there's a power failure? People in wheelchairs obviously couldn't heed the admonition outside elevators that "in case of fire, use the stairs." Safe staging areas for emergency evacuation were needed.

Interior doors that were heavy and swung out or in posed another problem for those in wheelchairs. Getting the door open and getting through was unwieldy at best and sometimes impossible.

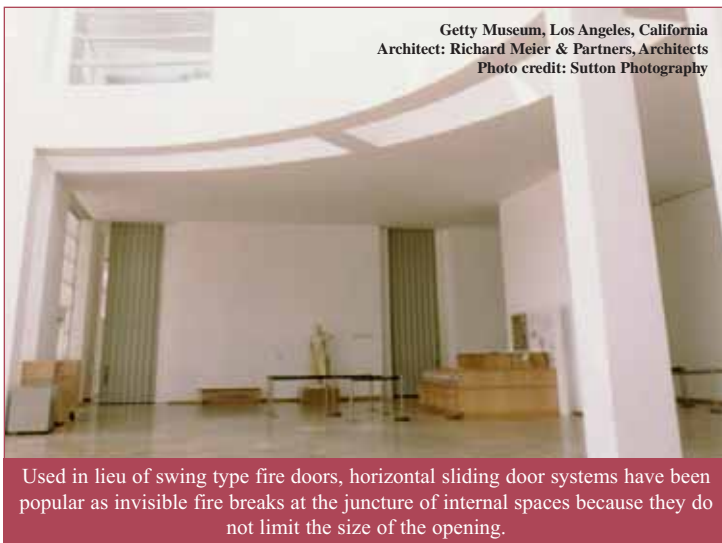
Sliding-door systems actually had an advantage in this regard. Manufacturers developed sensors, integrated processors, and motor technology that controlled the opening and closing of the partitions with maximum precision for any circumstance. Today's sliding-door systems can open with very little pressure, and have a manual override feature. Backup power systems are built in. In addition, a person in a wheelchair can simply make contact with an accordion-style horizontal sliding door system and it will automatically retract in an emergency. The systems also automatically stop closing if there's any obstruction, but then resume closing after a pause to maintain the integrity of the partition, similar to most elevator doors.

"A large horizontal sliding door in a fire-rated partition raises a number of questions: is it self-closing? What measures can be taken to prevent it from being blocked? What are the implications for someone trying to pass through the doorway as it is closing?" said A. Vernon Woodworth, AIA, principal in the Sullivan Code Group at the Boston-based R.W. Sullivan Engineering.

The use of electronic sensors and controls can address these concerns, Woodworth said. "This adds a new layer of complexity to building design and maintenance," he said. But, he noted, "The issue of expectations and habit are key to behavior in the built environment, and doors are for people and their use. Side-swinging doors present obstacles for people in wheelchairs whereas sliding doors do not."

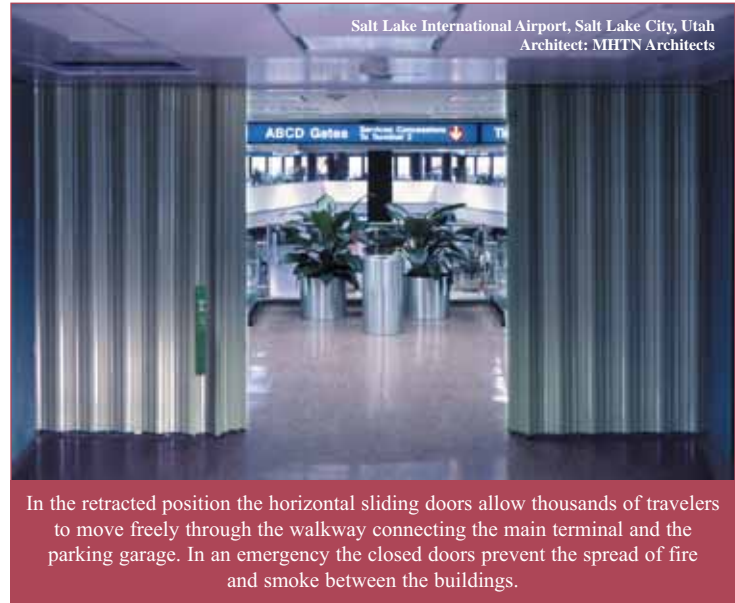
Opening a New Frontier: From Museums to Courthouses

In recent years, design professionals have been turning to horizontal accordion-style sliding door systems in museums, sports arenas, casinos, government facilities, entertainment and shopping venues, airports,



Getty Museum, Los Angeles, California
Architect: Richard Meier & Partners, Architects
Photo credit: Sutton Photography

Used in lieu of swing type fire doors, horizontal sliding door systems have been popular as invisible fire breaks at the juncture of internal spaces because they do not limit the size of the opening.



Salt Lake International Airport, Salt Lake City, Utah
Architect: MHTN Architects

In the retracted position the horizontal sliding doors allow thousands of travelers to move freely through the walkway connecting the main terminal and the parking garage. In an emergency the closed doors prevent the spread of fire and smoke between the buildings.

and healthcare facilities. The use of the systems satisfies fire and building codes but allows considerable design flexibility. The accordion-style doors retract into wall recesses and hang from a ceiling track when closing, but require no track on the floor. The separation of internal spaces, the design of corridors leading to atriums and other open areas can thus be seamless and open in ways that were previously not possible.

Frank Gehry, FAIA, and his firm, Gehry Partners, LLP, used 10 fire-rated, horizontal accordion-style sliding-door systems in his acclaimed Guggenheim Museum in Bilbao, Spain, creating striking interior views among the interior exhibition spaces. Richard Meier, FAIA, and his firm, Richard Meier & Partners, Architects used 64 sliding-door systems at the J. Paul Getty Museum outside Los Angeles to accomplish a similar unobtrusive design for the collection of antiquities, Impressionist paintings, decorative art, and contemporary photography.

Sliding-door solutions are like "invisible fire breaks," he said. When retracted, they are actually hard to notice, allowing free-flowing passage among internal spaces.

Tim Love, principal at the Boston-based architectural firm Utile, Inc., worked on the Getty villa, an extension of the museum that opened in January 2006, while at Machado and Silvetti, Associates, Inc., also based in Boston. Sliding-door solutions are like "invisible fire breaks," he said. When retracted, they are actually hard to notice, allowing free-flowing passage among internal spaces. But they close and serve a critical function in a fire or other emergency. ■

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- Understand how horizontal sliding-door systems work and what they are made of.

Questions

1. After the Coconut Grove fire in Boston in 1942, changes in building codes included all but which of the provisions below?

- a. Emergency exit doors that easily swing open in the direction of travel.
- b. Swinging doors on either side of revolving doors at the primary entrance.
- c. Sliding or overhead doors as means of emergency egress.
- d. Minimum width and heights for hinged swinging doors.

2. The occupancy “load” used to determine emergency egress standards is based on what calculation?

- a. The maximum number of people allowed in a building.
- b. The square footage of a building in proportion to the maximum allowed occupants.
- c. The number of exits.
- d. The number of floors.

3. Horizontal sliding doors were first allowed in all but which of the following applications?:

- a. To protect elevator lobbies.
- b. In buildings with occupant loads less than 50.
- c. As the primary entrance.
- d. As fire and smoke barriers in healthcare facilities.

4. In 2000, the three regional building code entities merged into a single group to produce what single uniform code?

- a. The International Building Code.
- b. The National Fire Protection Association Code.
- c. The Standard Building Code.
- d. The Uniform Building Code.

5. Horizontal accordion-style sliding doors are now accepted as emergency egress:

- a. Only in healthcare facilities.
- b. Only in buildings with occupancy loads of less than 50.
- c. Only to protect elevator lobbies.
- d. In all applications regardless of occupancy load, except in areas used for storage of flammable materials.

6. Horizontal accordion-style sliding doors are commonly used in which applications?:

- a. As a seamless separation of internal spaces such as museum galleries.
- b. As fire protection and security barriers in airports and government facilities.
- c. As a means of emergency egress in back-of-house commercial buildings.
- d. All of the above.

7. Under Universal Design, where the built environment is designed for people of all abilities, sliding-door systems are:

- a. Easier to use by people in wheelchairs because they can be opened and navigated with minimal effort.
- b. Slightly harder to use as emergency egress compared to hinged swinging doors.
- c. Only easier to use compared to swinging doors that open in the direction of travel.
- d. Not permitted under the Americans with Disabilities Act.

8. The horizontal sliding-door system is designed to respond to:

- a. Smoke detector activation.
- b. A fire alarm system.
- c. A manual pull station.
- d. All of the above.

9. In an emergency, horizontal sliding-door systems:

- a. Close and can be re-opened only with 30 lbs of lateral pressure.
- b. Close and can be re-opened with 5 lbs of pressure and then stay open.
- c. Close and can be re-opened with 5lbs of lateral pressure, retract, typically to 36 inches, then recycle closed.
- d. Cannot be re-opened for emergency egress.

10. The fire separation advantages of a horizontal sliding-door system also provide design flexibility for all but which of the following reasons?:

- a. A floor track is never needed.
- b. In the retracted position they are not highly visible.
- c. They require both a ceiling and a floor track.
- d. They can be designed in radial configurations.

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The systems are well suited for museums that require this function and are in place at the Smithsonian and several dozen other museums, art institutes, and performing arts centers.

Airports face a similar but slightly more practical design challenge: they must accommodate the rapid movement of thousands of patrons while complying with life safety requirements and building security. Horizontal accordion-style sliding doors can emerge from recessed walls and seal off openings as large as 60 feet, as is the case at Orlando International Airport. The systems are in use at the major airports in New York, Washington, Chicago, Newark, Houston, Miami, and Los Angeles, as well as others.

Government facilities have seen a dramatically increased need for building security in the wake of the September 11, 2001 terrorist attacks on New York and Washington. At the Pentagon, where American Airlines Flight 77 slammed into the side of the building and killed 125 occupants, 38 horizontal accordion-style sliding doors were in place in the building's vast network of corridors.

They were there in part because conventional swinging doors at the end of long corridors were cumbersome for the electric carts that were used to transport paperwork and supplies. Some of these doors in the 26-foot-wide corridors had actually been chained open.

On September 11, the sliding-door systems took on new significance, activating instantly at the signal of alarm. One general recalled that he saw a fireball racing down a corridor and felt certain he would perish, but the horizontal sliding door drew shut, sealing off the inferno and allowing him to escape.

Courthouses that require free-flowing access for judges and attorneys but need to be similarly sealed off in a security emergency have also turned to the systems as a design solution.

There are no restrictions on use. They can be used in any occupancy. This is all very new to enforcement professionals and design professionals.

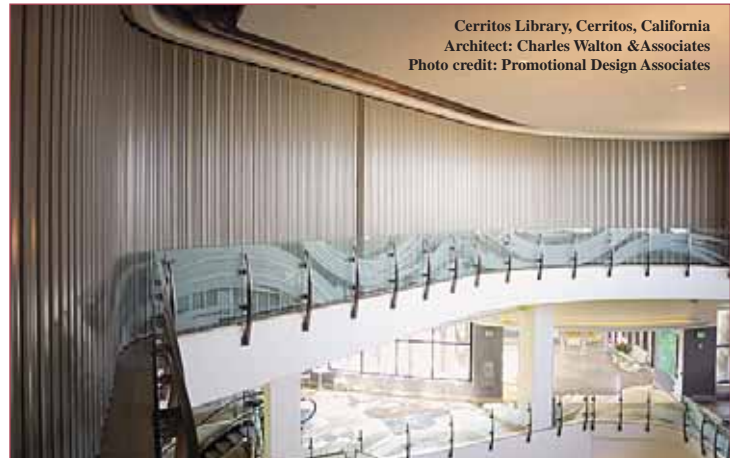
Public Venues and Places of Assembly

Sliding-door systems are also in use at hotels including Walt Disney World, the Hyatt, Hilton, Marriott, Fairmont, Ritz-Carlton, and Intercontinental chains, around atriums and as a retractable protective barrier around elevator lobbies, needed to prevent the vertical migration of fire. They are commonly used in sports facilities for football, baseball, basketball and hockey, where large numbers of fans must pass through openings and corridors that must be sealed off in an emergency while still providing emergency egress.

Shopping malls, with their distinctive fire safety and security requirements, use horizontal sliding-door systems as long as 100 feet, which curve and snake along the line of the desired protective barrier. At virtually every gaming facility in Las Vegas, the systems take the place of conventional swinging doors that limit design flexibility and can be cumbersome for large numbers of guests moving between spaces. At Caesar's Palace, the system serves as a fire-assembly separator, between the casino and the shopping center.

At hundreds of Wal-Mart stores, the sliding-door systems serve as emergency egress in back storage areas. Some of the emergency exits are required to be in the back of the large stores, and in the event that front entrances are inaccessible, patrons need to be moved through the storage areas. But the storage and stockroom areas typically have high ceilings and require large openings to get products in and out; the sliding-door systems serve that function but also provide emergency egress and fire protection. The systems are in use at other large stores such as Nordstrom, Macy's, Target, and Sears, and also in smaller sales areas in stores such as Banana Republic and Brooks Brothers.

Designers of hospitals, specialized health-care facilities, and assisted-living complexes have also increasingly turned to the sliding-door solution, particularly as the design of interior spaces (i.e., expansive foyers, atriums, and gathering spaces that take advantage of natural lighting) has been linked to the psychological well-being of patients. The retractable systems facilitate interiors that are open and airy rather than stark and sterile. The same is true in educational institutions, where stringent fire and building code requirements can sometimes compromise



Cerritos Library, Cerritos, California
Architect: Charles Walton & Associates
Photo credit: Promotional Design Associates

With no floor track, a sliding door system provides hidden protection of these communicating stairs. The wide-span capabilities mean building functionality need not be compromised in order to satisfy code requirements.



Westgate Town Center, Kissimmee, Florida
Architect: Florida Design Professionals
Photo credit: Design Photo

Horizontal sliding fire doors are often the least expensive way to create unobtrusive, yet code-compliant, elevator lobbies in high-rise buildings. These door assemblies can even accommodate radius applications.

Glossary of Sliding-Door System-Related Terms

Defend in place: the strategy of keeping occupants that are less mobile, such as the disabled or those in healthcare facilities, in a fire- and smoke-protected sector rather than evacuating them.

Emergency egress: the exits that allow unimpeded travel out of a structure in an emergency.

Fire-rated or fire resistance: a system including a door that has been tested to endure intense heat from fire for several hours; “fire separation” in this context is the use of a fire-rated door system to segregate spaces in such an emergency and prevent the spread of fire and smoke.

Horizontal sliding doors, also horizontal accordion-style sliding doors: retractable sliding doors that recess into a wall pocket guided by a ceiling track, activated on alarm; as distinct from an overhead door.

International Building Code: the single nationwide code that resulted from the merger of the Southern Building Code Congress International (Standard Building Code); the Building Officials and Code Administration (National Building Code); and the International Conference of Building Officials (Uniform Building Code).

National Fire Protection Association: the other chief code-writing authority, listing standards and criteria for emergency egress and all matters concerning life safety.

Universal Design: the approach to design that allows the use of the built environment by all people, regardless of age, ability or situation, as part of, but not limited to, the standards of Americans with Disabilities Act.

architectural quality with unsightly permanent barriers. The systems are in use at university facilities from Harvard and Duke to Michigan and Stanford.

New applications are also seen in convention centers, theatres, parking garages, subway systems, and a wide variety of office buildings.

The Way They Work

Typically, horizontal accordion-style sliding-door assemblies are custom-designed to be stored in shallow recessed pockets in walls. Pocket door covers are made to be consistent with the interior finish of the adjacent space and stay in the closed position with the use of simple magnetic latches. The fire door is installed to ignore obstructions during the first few feet of closing to allow the pocket cover door to be pushed out of the way.

Some of the most important features concern electronic surveillance and power issues.

The door assemblies incorporate the use of a back-up battery system, direct current (DC) motor and an integrated microprocessor to control

the operation of the door during fire emergencies.

In a typical system, the 12-volt battery is continuously charged by the in-house 120-volt electrical system, and the microprocessor and logic board regularly supervise all critical operating functions of the door system, multiple times per second. In addition, the system replicates a “loaded stress test” designed to simulate the voltage required to actually close the door during a real-life emergency. All fault signals are sounded audibly at the door location and can be communicated to a remote location in the building or to an off-site central monitoring station.

The vertical “fire-exit-type hardware” is attached at or near the leading edge of the door assembly and is programmed to respond to light pressure applied in the direction of exit travel. Most manufacturers set the force to open at 5 pounds or less to comply with ADA requirements for fire doors in egress applications. Upon activation the door assembly is programmed to retract a preset distance, typically 36 inches, pause for a moment, and then recycle close. If the door encounters an obstruction during the closing cycle it will stop, pause for three seconds and then continue the closing cycle. At all times a door serving as a means of egress can be opened manually.

The horizontal sliding accordion-type fire door is designed to respond to smoke detector activation, a fire alarm system, a manual pull station or in some instances even the activation of a sprinkler flow valve. Upon activation the door assembly will automatically begin closing. The building code permits a rate of closing speed not less than six inches and no more than 24 inches per second.

The Underwriters’ Laboratories (UL) listing contains no limitations on the size of opening width and heights can be designed up to 28 feet. The typical assembly has a separate listing from UL as a rated fire door assembly for 20 minutes, one hour, one-and-a-half hours, and three hours. It also meets the UL 864 standard for electrical safety as a releasing device and as an IBC air leakage (smoke control) assembly when tested to UL 1784.

In terms of installation, the assembly can be designed in radial configurations and never needs a floor track, both features increasing design flexibility.

Lag Time in Awareness

The chief reason that horizontal sliding-door systems aren’t used in more applications, manufacturers say, is that design professionals are not aware of the blanket acceptance of them in fire and building codes.

“There’s always an audible gasp,” said Welch, from Won-Door. “I’ve had 100 design professionals in a room and there has not been the awareness that the publication of the IBC in 2000 said, with a uniform voice, that you can use a sliding door in any application regardless of occupancy. It’s unheard of. But enforcement officials felt the technology was better. If it was just as good as a swinging door, there would be no reason to make a code change.”

The International Building Code is clear on the subject. In Section 1008.1.2, the code states that “egress doors shall be side-hinged and swinging,” but the sixth exception is this: “In other than Group H occupancies, horizontal sliding doors complying with Section 1008.1.3.3 are permitted in a means of egress.”

Section 1008.1.3.3 of the International Building Code requires that the horizontal door systems:

- Shall be power operated and shall be capable of being operated manually in the event of a power failure;
- Shall be openable by a simple method from both sides without special knowledge or effort;
- The force required to operate the door shall not exceed 30 pounds...to set the door in motion and 15 pounds...to close the door or open it to the minimum required width;
- The door shall be openable with a force not to exceed 15 pounds... when a force of 250 pounds...is applied perpendicular to the door adjacent to the operating device;
- The door assembly shall comply with the applicable fire protection rating and, where rated, shall be self-closing or automatic closing by smoke detection, shall be installed in accordance with NFPA 80 and shall comply with Section 715;
- The door assembly shall have an integrated standby power supply;
- The door assembly power supply shall be electrically supervised;
- The door shall open to the minimum required width within 10 seconds after activation of the operating device.

As long as the horizontal sliding-door systems meet those performance standards, they are allowed.

The confusion arises because many design professionals refer to the provisions of the three regional building codes developed over the 1990's that allowed horizontal sliding door systems with restrictions, Welch said.

The first modifications appeared in the 1986 NFPA life safety code and appeared in print in the 1988 edition of the NFPA life safety code. "That was a kind of beachhead," Welch said. Then the revisions appeared in 1990 in the Building Officials and Code Administration's National Building Code, and in 1991 in the International Conference of Building Officials' Uniform Building Code and in the Southern Building Code Congress International's Standard Building Code. In all of those revisions, there were restrictions—limiting the use of the systems to elevator lobbies, in healthcare facilities, and in buildings with an occupancy load of 50 or less.

By 1996, the Building Officials and Code Administration lifted those restrictions. But it was only in 2000, when the three regional codes were combined in the International Building Code, that the restrictions were lifted uniformly.

The revisions are increasing in complexity but also opening up options for architects who wrestle with emergency egress and fire protection issues in even the largest occupancy structures. Spencer M. Johnson, AIA, principal at Cole + Russell Architects in Cincinnati, OH, recalled that when a fire-rated separation door was needed for two large openings in the expansion and renovation of the Cincinnati Convention Center recently, the initial move was to replace the existing overhead coiling doors with new overhead doors. The building code required that one of the doors be capable of being opened by convention attendees during an emergency, and the overhead doors in place could not be re-opened even by the staff of the facility; the vendor had to be called in to raise them back in place. The new overhead doors were capable of being opened by occupants, but changes to the structural steel design and the architecture were required to conceal the overhead coiling drum and support the coiling door weight.

"The final result was not as eloquent" as a horizontal sliding-door system, Johnson said. A horizontal sliding-door system was more expensive than the overhead coiling system, but after it was value-engineered out and savings were realized elsewhere on the project, Johnson said it was the first item he sought to have reinstated.