

Sustainable Solutions for Large Openings

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START



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Presented by: Panda Windows & Doors
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Description: Provides an overview of large opening glass wall systems, their LEED® contributions, and how they lend themselves to sustainable design. The course focuses on: their benefits and applications; door types; door system components; and selection and installation considerations.

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REGISTERED CONTINUING EDUCATION PROGRAM

Purpose and Learning Objectives

Purpose: Provides an overview of large opening glass wall systems, their LEED® contributions, and how they lend themselves to sustainable design. The course focuses on: their benefits and applications; door types; door system components; and selection and installation considerations.

Learning Objectives:

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

- define large opening glass wall systems and describe their functional and performance benefits
- discuss how large opening glass wall systems can be used to expand the interior of a space and connect the indoors to the exterior environment
- explain how specific system components and design elements such as glazing and frames contribute to energy efficiency and ensure a weathertight design
- summarize door selection and installation considerations and how they help determine the most appropriate system for a project.



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Introduction to Large Openings

Why Use Large Openings?



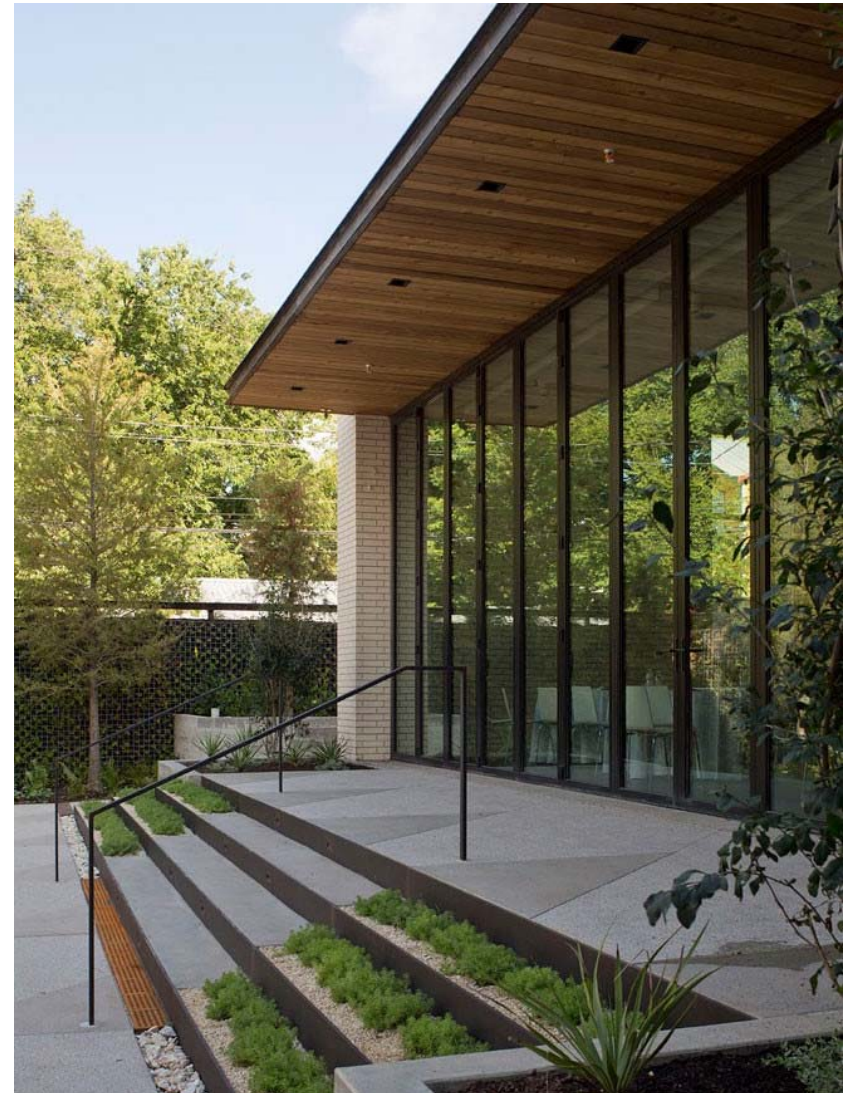
A large opening is typically at least nine feet wide, the width of three door panels, to in excess of 300 feet in width.

Open walls embody the true essence of indoor-outdoor living. When closed, they blur the lines between the two, and when open, the lines are erased. They invite the outdoors in and the indoors out. They also act as interior space dividers contributing to flexible design and light-infused spaces.

Benefits of Large Openings

Large openings provide a number of practical and architectural benefits:

- Greater access to natural daylighting, which improves overall well-being and health conditions
- Better indoor-outdoor connection, which improves occupant lifestyle
- Spatial flexibility, which allows for more efficiently planned spaces and fewer design compromises
- Clean design lines, which enhance contemporary designs



Benefits of Large Openings



- When closed, provide the needed high levels of energy performance, weather resistance, and security
- When open, provide natural ventilation and create seamless flows/transitions between indoor and outdoor spaces
- Enhance views of nature

Applications: Custom Homes



This fully retractable aluminum wood clad folding door system opens to a sheltered dining area in this custom home located in Cincinnati, OH. When it's too cold to keep the wall of doors retracted, the units can be closed up and a single swinging door operates as needed.

Applications: Educational Institutions



This commercial project for Irvine University located in Irvine, California features thermally broken bi-folding door systems. These doors feature a custom 12" kick plate to protect the door during continual use by students and to meet California's ADA requirements.

Applications: Luxury Apartments



The clubhouse at this luxury high-rise apartment complex located in the heart of Cherry Creek in Denver, Colorado features a 6-panel thermally broken folding door system which bi-parts and stacks to the sides. The two middle panels function as flag doors for everyday use as an entryway. When this energy efficient unit is completely opened, it spans a 20' wide by 8' high opening, seamlessly connecting the clubhouse with the exterior deck area for indoor/outdoor living enjoyment. When the system is closed, it provides maximum insulation and shelter against the elements.

Applications: Nightclubs and Bars



The luxurious XS Nightclub at the Encore Hotel & Casino in Las Vegas features a 41' wide x 20' high lift and slide door system. The world's largest lift and slide system opens the indoor club to a large cabana style pool area.

Applications: Resorts and Hotels



On the coast of Newport Beach in Southern California, The Resort at Pelican Hill has 600 automated lift and slide door systems, allowing for indoor spaces to open up to the outdoors and for panoramic views of the Pacific Ocean.

Applications: Restaurants



The Overlook Grill, located in Las Vegas, features three, all aluminum bi-fold door systems, which provide a totally open feel as they allow the restaurant to overlook the entire pool area.

Potential LEED® v3 Contributions

Windows and glass doors play a critical role in a number of LEED credits and may contribute to points earned on a building in the following LEED v3 BD+C categories:

- Energy & Atmosphere: Prerequisite 2 - Minimum Energy Performance
OBJECTIVE - Establish minimum levels of energy efficiency.
- Energy & Atmosphere: Credit 1 - Optimize Energy Performance
OBJECTIVE - Increase energy performance levels beyond the prerequisite.
- Materials & Resources: Credits 4.1 and 4.2 - Recycled Content
OBJECTIVE - Increase demand for building products that use recycled materials.
- Materials & Resources: Credits 5.1 and 5.2 - Regional Materials
OBJECTIVE - Increase demand for regionally extracted and manufactured building materials.
- Materials & Resources: Credit 7 - Certified Wood
OBJECTIVE - Forest management.

Potential LEED® v3 Contributions

- Indoor Environmental Quality: Credit 2 - Increased Ventilation
OBJECTIVE - To provide additional air ventilation.
 - Improve indoor air quality.
 - Promote occupant comfort.

- Indoor Environmental Quality: Credit 4.1 - Low Emitting Materials - Adhesives and Sealants
OBJECTIVE - To reduce the quantity of indoor air contaminants harmful to occupants.

- Indoor Environmental Quality: Credit 4.2 - Low Emitting Materials - Paints and Coatings
OBJECTIVE - To reduce the quantity of indoor air contaminants that are harmful to occupants.

- Indoor Environmental Quality: Credit 7.1 - Thermal Comfort - Design
OBJECTIVE- To provide a comfortable thermal environment that promotes occupant productivity and well-being.

- Indoor Environmental Quality: Credit 8.1 - Daylight and Views - Daylight
OBJECTIVE - Connect indoor and outdoor spaces by introducing daylight and views.

Large Openings

It is easy to imagine using these large openings, and easier still once you understand the broad performance capabilities of this type of door. In this course, we will cover the different types of large openings, their performance capabilities, and how they easily meet the needs of a sustainable design.





Types of Large Opening Glass Door Systems

Types of Doors

Doors for large openings generally fall into two categories:

- Sliding Glass Panels
 - Lift and Slide Door Systems
 - Multi-slides
 - Operable Wall Systems

- Folding Glass Panels
 - Bi-folding Doors

Sliding Glass Panels: Lift and Slide Door Systems



Designed for the luxury market, lift and slide systems have been engineered to be the pinnacle of sliding door technology. A lift and slide system, especially one with thermally broken door panels, can achieve complete weathertightness.

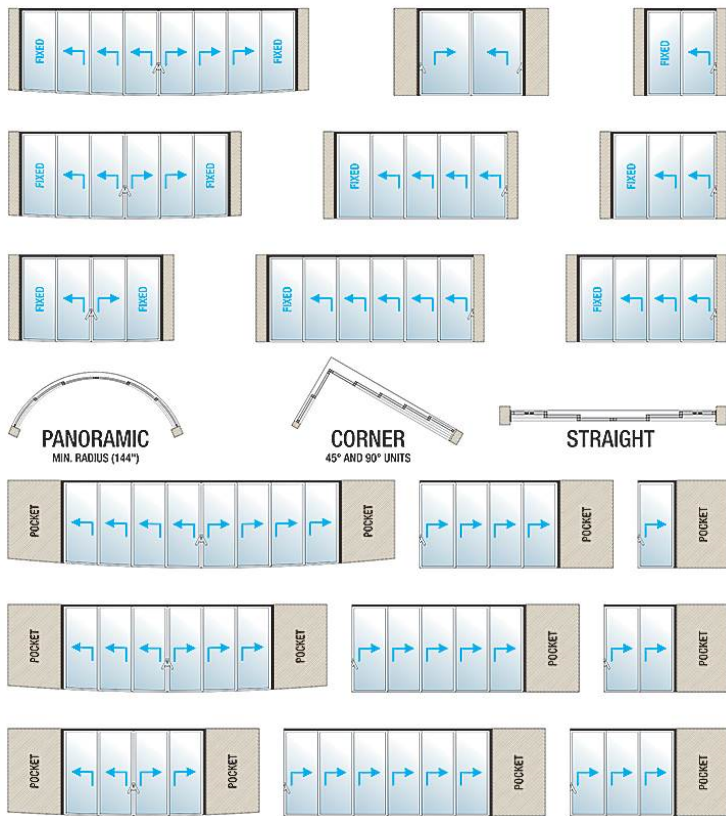
This specially engineered sliding glass door system incorporates a European inspired design. These systems include straight, curved, and specialty segments, which can be combined to create stunning architectural effects and open up panoramic views with virtually no obstruction.

Sliding Glass Panels: Lift and Slide Door Systems

Operation of this type of sliding door system and the track options define the overall description. A double V-gasket seal at the bottom of the door is engaged by rotating the handle 180°, locking the door, and dropping the panels $\frac{3}{16}$ ". Panels use their own weight to compress the seals, thus creating a completely weathertight wall system when in the “down” position. The flooring, with the track system, creates a threshold for the individual panels to seal to. In the “up” position, heavy, oversized panels, are easily moved with minimal effort due to the wheel carriage system. Other features include the ease of use and a multi-point locking system.



Sliding Glass Panels: Lift and Slide Door Systems



Common lift and slide door configurations are pictured to the left. The top images show panels that can stack left and/or right, and the bottom images show panels that can pocket left or right.

- Slide – pocket left or right; stack left or right
- Panoramic; 90°, zero posts; 45°, zero posts

Depending on the manufacturer:

- Each panel can be in excess of 70 square feet in size and over 14' in height
- Each panel weighs approximately 7 to 8 lbs. per square foot depending on overall panel size

Sliding Glass Panels: Multi-Slides

Multi-slides are a highly engineered type of custom sliding door system which is typically made up of multiple panels. The number of panels used varies based on the configuration and number of vertical sight-lines desired (usually between three and ten panels are used).

The panels may all be pocketed or stacked to one or both sides of the opening. When stacked to one side, the total opening is reduced by one panel's width. To eliminate the viewing obstruction completely, the panels may all be pocketed to one or both sides of the opening. Stacking systems may also bi-part and stack on both sides.



Sliding Glass Panels: Multi-Slides



Multi-slide systems operate on a bottom wheel set or series of sets, which allow the panels to easily glide along a track system. They typically have a raised track, about $\frac{5}{8}$ ". It is possible to get multi-slide doors with recessed tracks, providing the look of a lift and slide threshold.

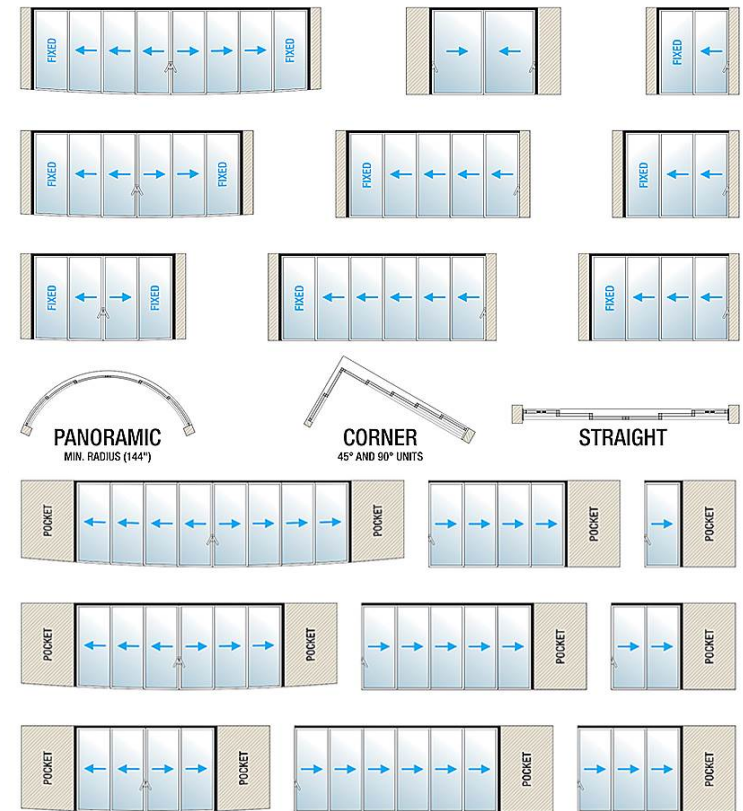
Sliding Glass Panels: Multi-Slides

Common configurations are pictured to the right. The top images show panels that can stack left and/or right, and the bottom images show panels that can pocket left or right.

- Slide – pocket left or right; stack left and/or right
- Panoramic; 90°, zero posts; 45°, zero posts

Depending on the type of frame and the manufacturer, offerings may include:

- Panel heights up to 14'
- Panel widths up to 10'
- Panels weighing approximately 6 to 8 lbs. per square foot depending on overall panel size
- Countless panel groups



Sliding Glass Panels: Operable Wall Systems

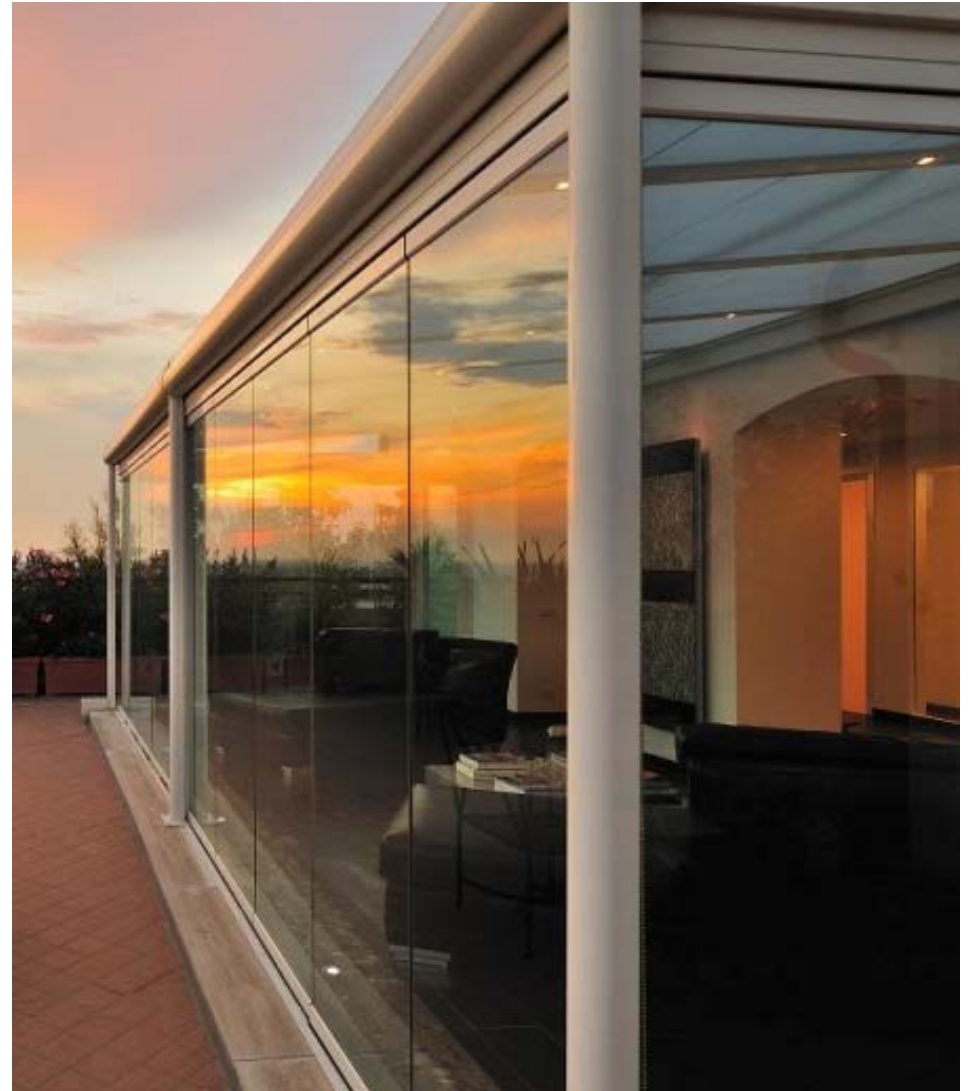


Operable wall systems are multiple panel door systems which all operate along a single, recessed channel track system. This top-hung system operates similarly to folding doors, without hinges, sliding in-line. The tracking used with this type of system allows many panels to span a large opening without having to stack the tracks—which can create a large jamb width requirement. Utilizing specially designed track systems and quad rollers to support panels in top-hung configurations, each panel individually slides off the engineered track, stacking to a right angle or parallel into a pocket, and/or turns a 90° corner.

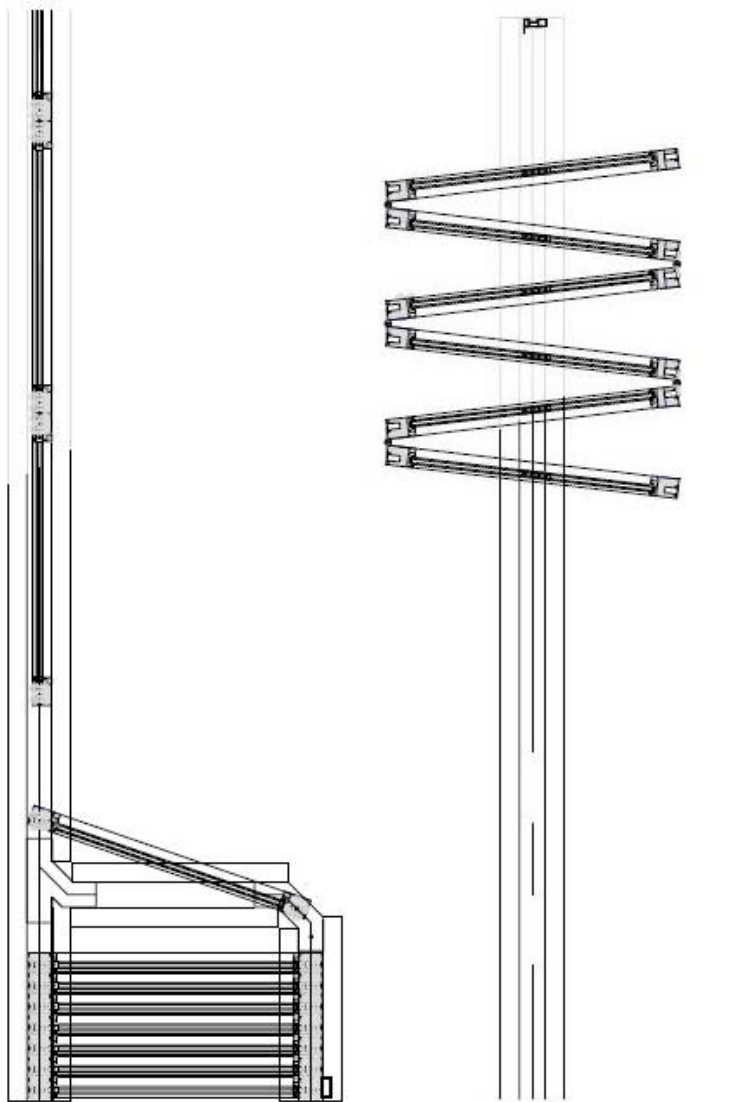
Sliding Glass Panels: Operable Wall Systems

Configurations include independent panels which all stack together when the system is open. Frameless models are not weathertight; they have about a 1/8" to a 1/4" gap between panels. Surface applied weatherstripping can be added to help with weather sealing.

Panel storage in the open position is minimal. This system is ideal for dividing a room into two, separate, interior spaces as well as for windbreak, dividing the interior from the exterior. Depending on the manufacturer, these doors may be custom built. Configurations made up of many panels support large openings in an array of angles to partition off nearly any size and shape of space.



Sliding Glass Panels: Operable Wall Systems



Configurations are pictured to the left. The first image shows individual panels, which allow for the greatest variety of configurations.

- Sliding; stacking; pivoting main door
- Segmented panoramic; 90°, zero posts; 45°, zero posts

Depending on the manufacturer, they accommodate:

- Panel weights in excess of 1000 lbs.
- Panel widths up to 72"
- Panel heights up to 192"

The second image shows folding/pivoting panels, which allow for ease of operation.

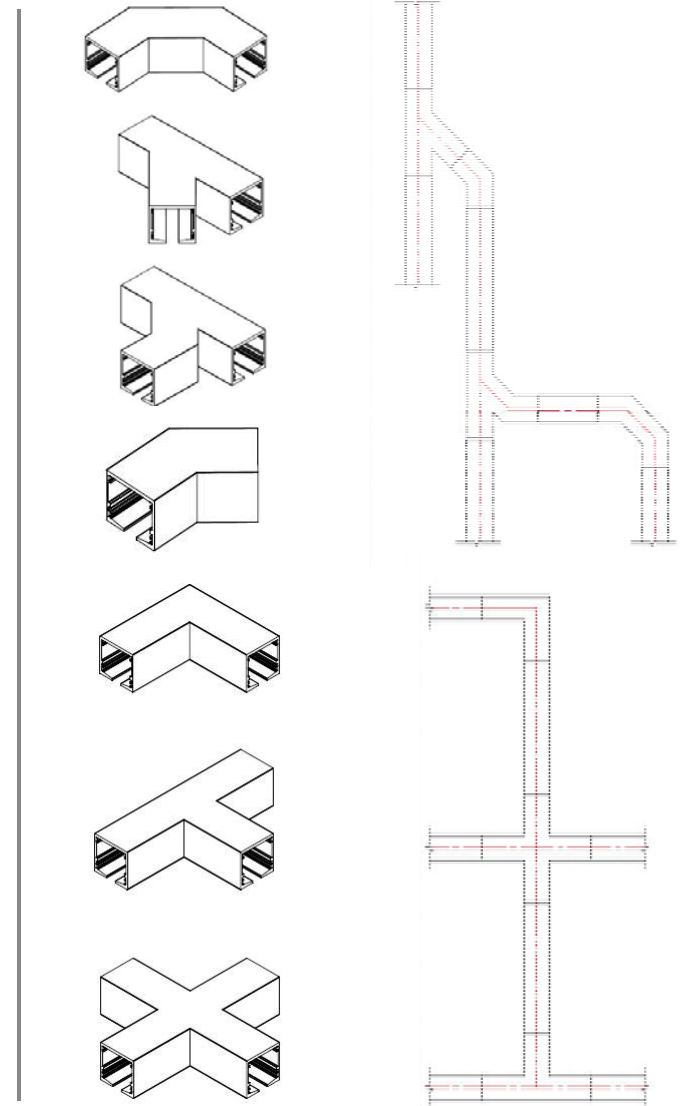
Depending on the manufacturer, they accommodate:

- Panel weights in excess of 550 lbs.
- Panel widths up to 60"
- Panel heights up to 168"

Sliding Glass Panels: Operable Wall Systems

Self-guiding corners allow for smooth transition through an infinite variety of configurations and parking conditions to meet the needs of the project. Corners can be programmed to self-steer panels into their positions.

Tracks can be used to create tight 90° corners, which is a space saver for limited parking areas. They can be used to connect multiple panel walls at 90°. Tracks allow panels to travel to any position.



Folding Glass Panels: Bi-Folding Doors

A bi-folding door system maximizes an opening without having to pocket the doors.

They are used along a single track system and are composed of multiple hinged panels (up to ten in one direction) or unlimited in paired groups of up to six hinged panels multiplied across the opening. The weight of the panels is carried along the header, which allows for ease of operation, even with large groups of panels. Recessed U-channel track options are offered for an ADA compliant and seamless transition from the interior to exterior spaces. (Check with manufacturer.)



Folding Glass Panels: Bi-Folding Doors



These custom door systems can utilize completely integrated locking and operation mechanisms, which give a clean, sleek visual appeal and a secure, long-lasting overall product.

Air infiltration is prevented by the use of quadruple Z-gaskets that are nested together between panels. These gaskets maintain the integrity of the thermal pocket and eliminate accidental pinching of fingers between panels.

Of key importance is the ease of operation; a set of panels can be opened with just one finger.

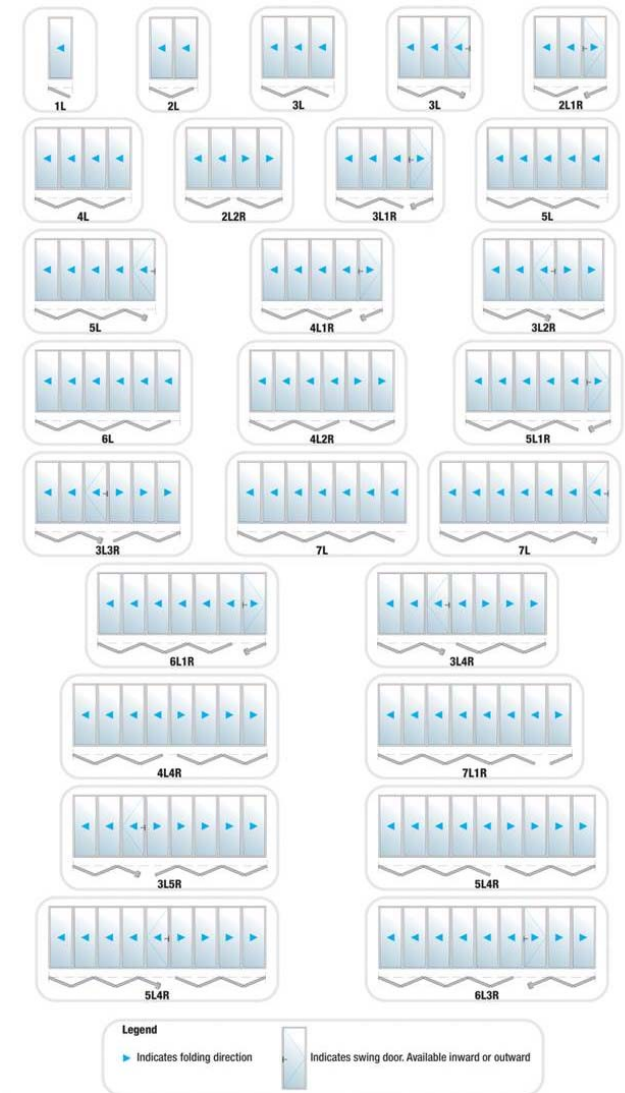
Folding Glass Panels: Bi-Folding Doors

Common bi-folding door configurations are pictured to the right. These systems stack or swing and stack either to the interior or exterior.

- Manual inswing and outswing options
- Segmented panoramic; 90°, zero posts; 45°, zero posts

Depending on the type of frame and the manufacturer, offerings may include:

- Panel widths up to 42"
- Panel heights up to 120" and up to 144" with a true divider
- Panels weighing approximately 6 to 8 lbs. per square foot





Door System Components

Track Systems: Capabilities and Functionality

Track systems serve multiple functions and need to be selected with the goals of the project in mind.

Their main function is that of supporting the door system and guiding the panels into their appropriate positions.

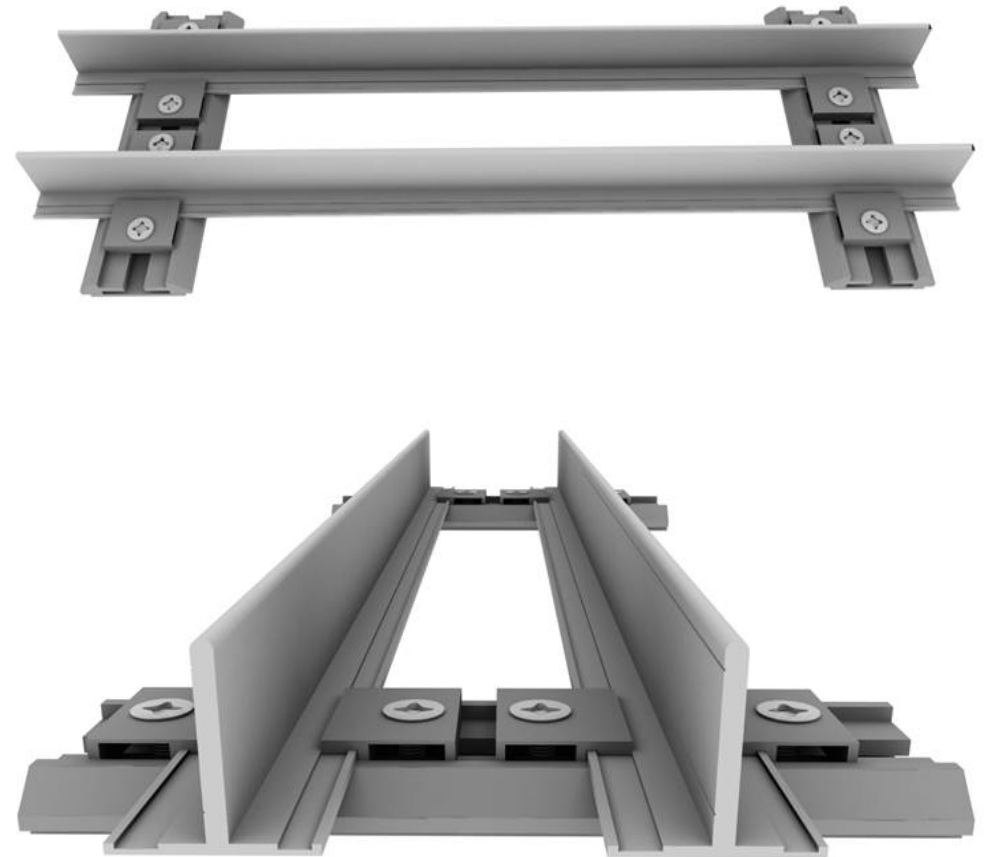
For areas where high weather performance is a requirement, tracks are available that protect against wind-driven rain. If water penetration is a concern, a raised track or a track that provides drainage can be used.

Flush and low profile tracks are used where water infiltration is not a concern and if ADA requirements must be met. Surface mounted flush tracks are also available for a variety of applications. In some situations, the bottom track may be eliminated entirely, creating a seamless transition between two spaces.

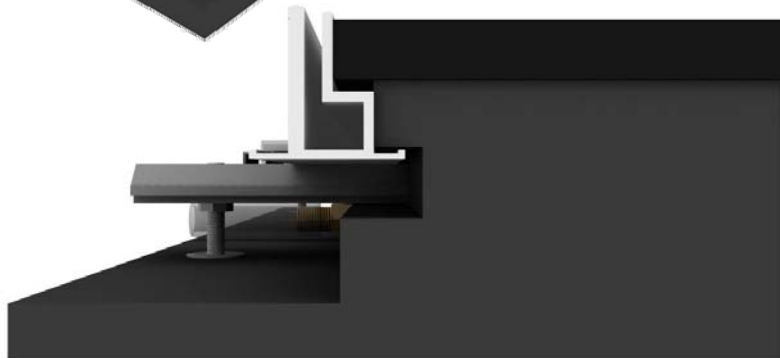
Types of Tracks: Recessed

A recessed track is set in a trench either $1\frac{1}{4}$ " below the finished floor or $2\frac{1}{2}$ " below the finished floor, and only a $\frac{3}{16}$ " portion sits above the finished floor level. This type of track is available for both wood and concrete flooring. This nearly flush track enhances the feeling of bringing the outdoors in by providing an aesthetically appealing, clean opening and a smooth transition between the indoors and outdoors.

A recessed track easily meets ADA requirements. Available with and without drainage, pictured here is a recessed track without drainage.



Types of Tracks: Recessed with Drainage



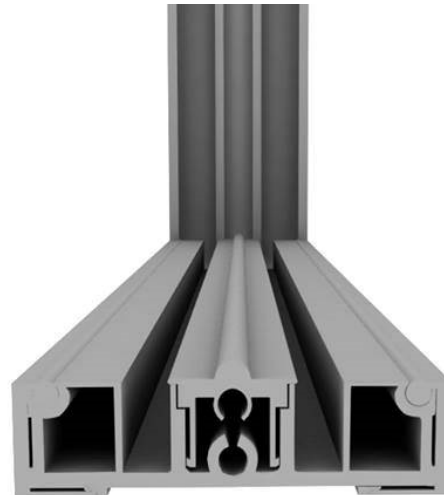
This recessed track is a patented drainage system. It is shown here sitting in the trench that must be included in design drawings.

This drawing also shows the adjustable support that some tracks come with, allowing for an uneven trench.

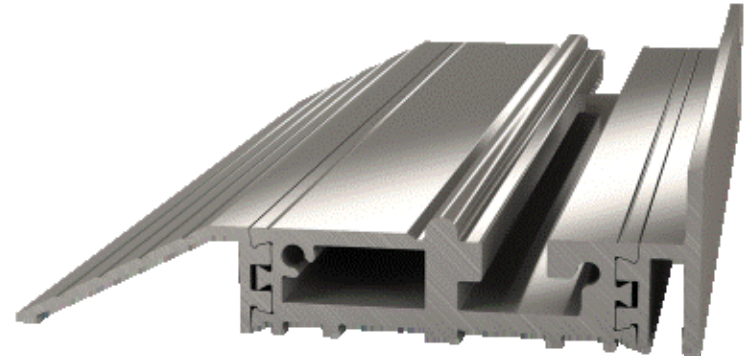
Once the track is laser leveled and anchored in the final position, the trench is backfilled with concrete to the level of the sub-floor. Finished floor materials can then be installed up to the track.

Types of Tracks: Surface Mount

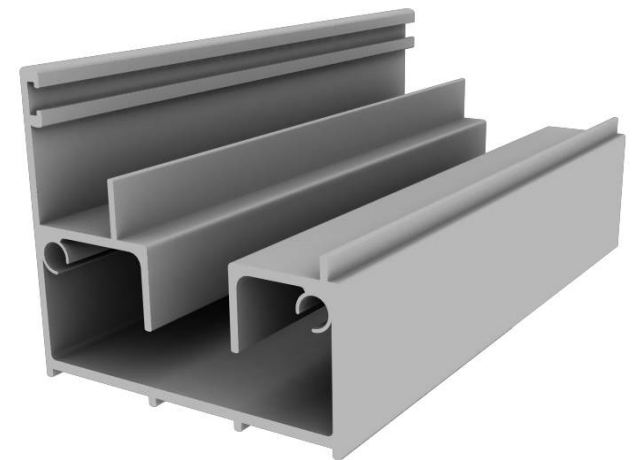
Surface mounted track systems are ideal in a retrofit situation or where a trench in the floor is not possible. They can be ADA compliant or non-ADA compliant, depending on the height above the finished floor—check with the manufacturer. Typical surface mount for a multi-slide door system is $\frac{5}{8}$ " above the finished floor. Some manufacturers offer surface mounted tracks with drip pans.



Surface Mounted Tracks for Multi-Slides



Surface Mounted Track for Folding Doors



Glazing Options



The standard option is generally clear low-E tempered-insulated glass, depending on the door system and the manufacturer. A minimum of ¼" single pane safety glass to a maximum 1½" hurricane rated insulated safety glass is standard. Custom door manufacturers can accommodate any glazing type that fits within their frame profile.

Custom options include frosted or tinted glass, argon or krypton fill, SDLs (simulated divided lites) or TDLs (true divided lites), and integrated blinds or shutters, again, depending on the door and system and the manufacturer.

A high performance option is hurricane rated insulated safety glass, and an extreme weather option is available where Dade County compliance is indicated.

Energy Performance Ratings

Two common energy performance ratings used in the fenestration industry are U-factor and solar heat gain coefficient (SHGC).

- U-Factor – Measures how well a product prevents heat from escaping a home or building. U-factor ratings generally fall between 0.20 and 1.20. The lower the U-factor, the better a product is at keeping heat in.
- Solar Heat Gain Coefficient (SHGC) – Measures how well a product blocks heat from the sun. SHGC is expressed as a number between 0 and 1. The lower the SHGC, the better a product is at blocking unwanted heat gain.

Depending on the manufacturer, it is possible to find large opening glass door systems with the U-factor as low as 0.24 and systems with the solar heat gain coefficient as low as 0.08.

Source: NRFC. "The Facts About Solar Heat Gain and Windows."

http://c.ymcdn.com/sites/www.nfrcommunity.org/resource/resmgr/factsheets_2013/solarheatgain2.pdf Accessed October 2013.

Frame Materials: All Aluminum

Manufacturers offer aluminum frames that are thermally broken as well as ones that are not thermally broken.

Aluminum is the optimal choice for windows and doors for numerous reasons. Its durability is almost unmatched, as aluminum can easily be reclaimed and recycled into new products (it is the most commonly recycled post-consumer metal in the world), and it rates very high in terms of life cycle assessment.



Aluminum and Sustainability

As per the Aluminum Extruders Council:

- Aluminum can be recycled over and over without resulting in any degradation to its physical properties. This is the only elemental metal for which this is the case.
- About 75% of over 1 billion tons of primary aluminum that has been produced since 1888 is still being used today.
- Recycling represents approximately 35% of global aluminum production.
- Recycling aluminum requires about 5% of the energy required for primary aluminum production.
- For every ton of aluminum recycled, instead of produced from ore:
 - 24 barrels of crude oil equivalents
 - over 15 tons of fresh or sea water, and
 - over 9 tons of CO₂ equivalents are saved.
- Substituting aluminum for other materials, especially denser materials, has significant in-use benefits, saving energy and reducing CO₂ emissions.

Source: Aluminum Extruders Council. <http://www.aec.org/sustainability/index.cfm> Accessed October 2013.

Thermally Broken Frames

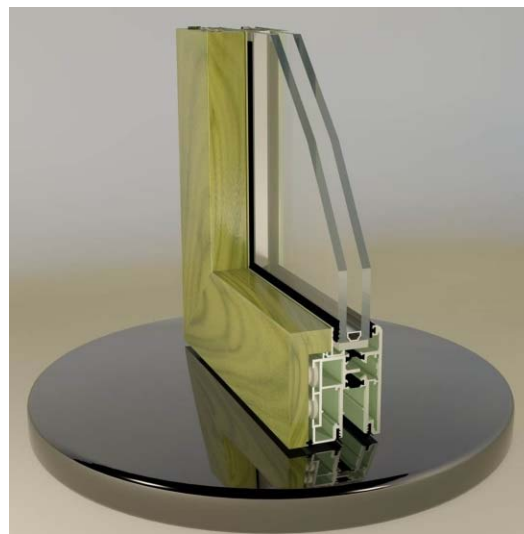
Thermally broken aluminum door systems for large openings separate the frame into two separate interior and exterior pieces which are joined with a less conductive material between, reducing temperature transfer. An aluminum thermally broken frame minimizes heat loss from the inside of a building, as well as heat gain from the outside.

To create a thermally broken frame, one option is to use a central polyamide iso-bar core material with glass fibers to act as a barrier to heat flow from a warm interior to a cold exterior in winter, and vice-versa in summer. Polyamide is 100% recyclable and has no disposal or chemical concerns.

Thermally Broken Frames



Folding Door Frame



Aluminum with Wood Clad Lift and Slide Frame



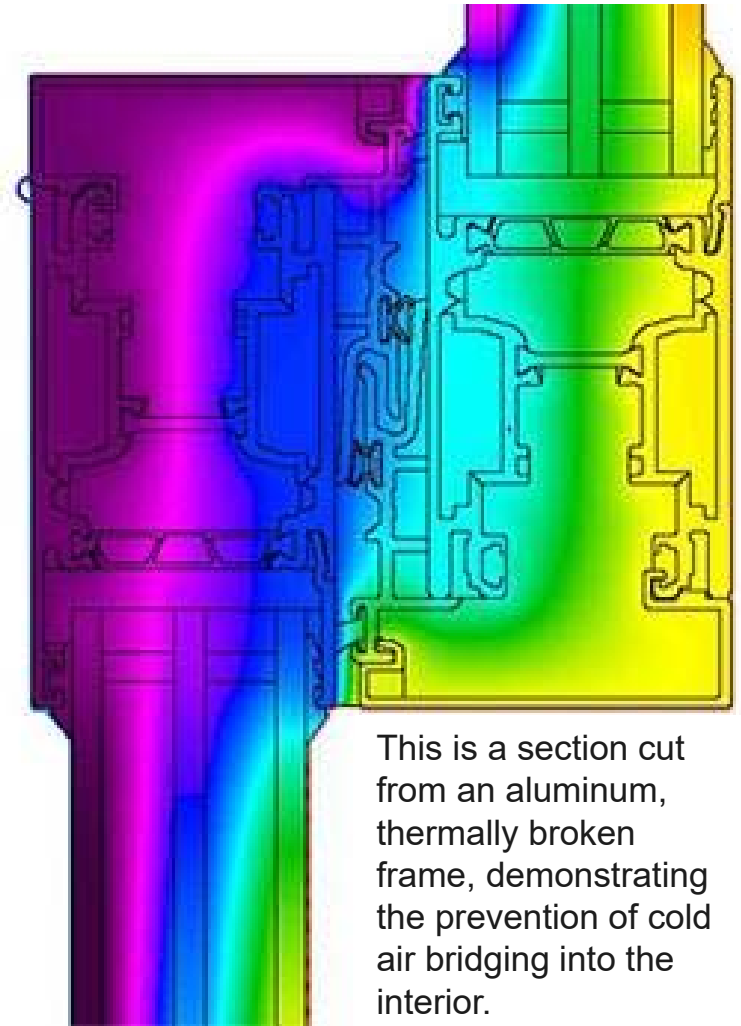
Multi-Slide Frame

Thermally Broken Frames

A thermal break is designed to provide resistance to heat flow. The example on the right illustrates how thermally broken frames prevent cold air bridging, greatly restricting its flow from either direction as it “pools” in the middle, rather than transferring heat or cold from interior to exterior (or vice versa).

Thermally broken door systems are engineered to drastically minimize heat transfer, greatly reducing air conditioning use in the summer and heating use in the winter.

This construction creates an exceptionally thermally efficient frame and enables the system to take advantage of other important aluminum properties such as durability, strength, stability, and corrosion resistance.



R Index (Sound Insulation Ratings)

The glass and frame together determine the acoustic insulation performance of the entire window, and in some cases, the entire facade. Thermal breaks reduce sound transmittance by dampening vibration.

The performance of a window cannot be determined from that of the glass element alone. The sound reduction index for a window/door can only be verified after testing the complete assembly. It is advisable to match the glass type to the frame and type of pointing. Top-of-the-range glass should be installed in high-performance frames.

Frame Materials: All Aluminum / Wood Clad Interior



All aluminum frames with a wood clad interior for a warm, traditional look are available thermally broken and non-thermally broken. The wood cladding is fastened with a clip system that allows for the removal and replacement of the interior cladding if necessary. This provides a lot of design flexibility as the wood can be replaced with another type for an instant update. Any type of wood that is available in appropriate lengths can be used for the doors.

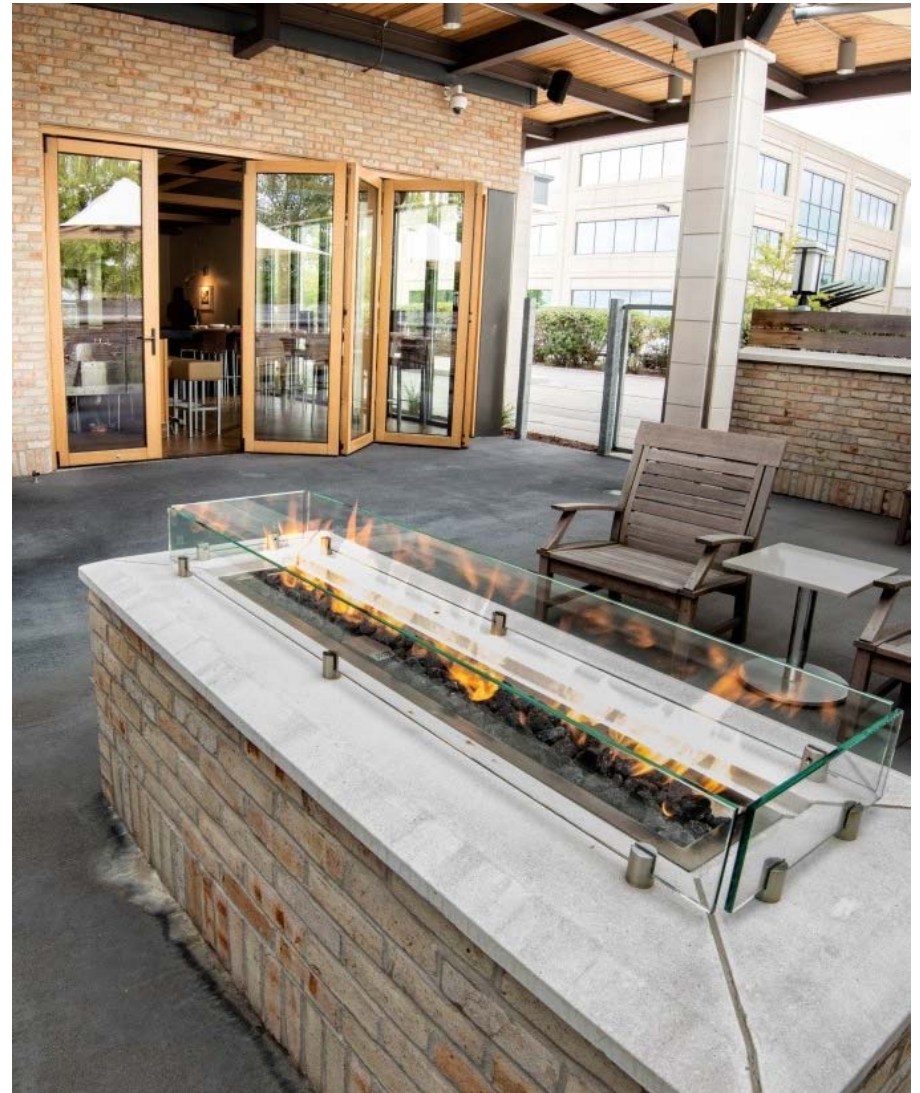
One company manufactures all aluminum and all aluminum wood clad thermally broken doors that can achieve a U-factor of 0.24.

Frame Materials: All Wood – LVL Core

All wood frames with an LVL core allow for the use of taller wood panels with no warping or twisting and 1/8" tolerance. An all wood framed product has a 1/4" finish with an LVL core. (Check with the manufacturer.)

The bottom carriage is aluminum and completely covers the bottom face of the wood door, thus protecting it from moisture wicking up the panel. This is particularly important for lift and slide doors as they often sit on the floor in the dropped position.

An FSC® certification is the best indicator that the wood used to make the door was harvested sustainably. Manufacturers should offer a chain of custody certification for FSC® certified wood.



Frame Materials: Frameless



Frameless operable wall systems create divisions that are functional—they separate spaces—and also provide a minimalistic feel of expansive, open space. They are ideal for expanding living space for balconies, residential outdoor rooms, restaurants, and cafes.

The glass panels are adhesive-bonded in the top and bottom glazing rails and are further secured by a hardened steel pin passing through a recess in the glass. Plastic end covers are of interlocking design and serve to stabilize the panels in their extended inline arrangement.

Finishes

With aluminum framed doors, virtually every color imaginable can be produced in a powder coated finish, along with a variety of finishes such as anodized, Kynar[®], metallic, wrinkle, translucent, gloss, flats, and hammered. Manufacturers may offer custom color matching.

Some of the advantages of powder coatings over conventional liquid coatings:

- emit zero or near zero volatile organic compounds (VOCs), and therefore, there is reduction in air pollution compared to liquids
- produce much thicker coatings than conventional liquid coatings without running
- overspray can be recycled, can achieve nearly 100% use of the coating
- production lines produce significantly less hazardous waste
- capital equipment and operating costs are generally less
- have fewer appearance differences between horizontally and vertically coated surfaces

Anodized coating is an electrochemical process that converts the metal surface into a decorative, durable, corrosion-resistant, anodic oxide finish. Aluminum is ideally suited to anodizing. PVDF coating (polyvinylidene fluoride) or Kynar[®] coating is a chemical resistant thick film barrier unaffected by most chemicals and solvents and has excellent wear and abrasion resistance.

Hardware: Handles

Manufacturers offer door handles in a variety of standard colors and finishes, and some offer customized finish and powder coating options in a range of colors for an additional charge.

Other hardware includes magnetic gaskets, which ensure a weathertight seal every time. Gaskets made of EPDM rubber ensure weather tolerance and longevity. Quadruple Z-gaskets seal the unit, keeping the thermal pocket and also preventing the door from pinching fingers.



Sample door handles for bi-folding glass panels. Check with the manufacturer for available styles and finishes.



Sample door handles for lift and slide glass panels. Check with the manufacturer for available styles and finishes.

Hardware: Hinges



Sample hinges for bi-folding glass panels.

Stainless steel screws, bolts, pins, and hinges are available for coastal regions where excessive corrosion is a concern.

The hinges use a 10mm pin and a set screw locking the hinge in a channel. The hinges can be powder coated to match the frame.

Hardware: Guiding Pins

Guiding Pin for a Standard Flush Track:

The $2\frac{3}{16}$ " standard track shown here is a very weather-resistant track and is great for direct exposure type situations. It can be recessed into the flooring with some site prep considerations.

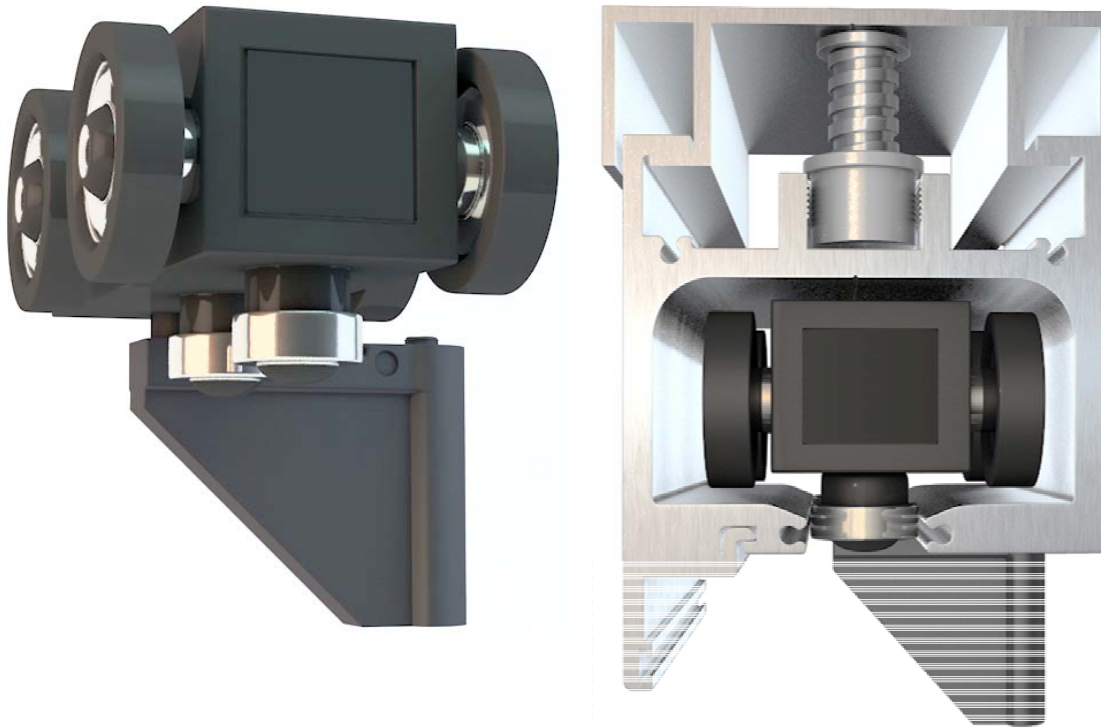
Guiding Pin for a Recessed Track:

The ADA compliant recessed track shown here has a $\frac{1}{8}$ " winged saddle, allowing it to be nearly flush with the floor. The floor will need some preparation to receive the recessed groove. This track will need to have at least 50% cover to keep moisture away from the door. A weeping drainage track can be used for more exposed openings.

These are used with folding doors that are offered as inswing and outswing.



Hardware: Wheel Carriage



The images shown here are that of a wheel carriage that allows the door to move with one finger. This carriage is made using wheels that are fabricated from Delrin[®] plastic over stainless steel sealed bearings. This carriage can support up to 450 pounds, much higher than other systems, allowing for 14' tall doors.



Door Selection and Installation Considerations

Door Selection Criteria Overview

With such a wide variety of large opening doors available, the selection process may sound complicated. What follows are some initial considerations for door selection:

Operation

- Sliding versus folding

View

- Frameless versus framed panels
- How panels are parked – stacked versus pocketed
- Number of vertical stiles
- Recessed track




Door Selection: Folding Doors vs. Sliding Doors

The configuration and system type determine how much an opening can be maximized to allow for a greater aperture and less obstruction.

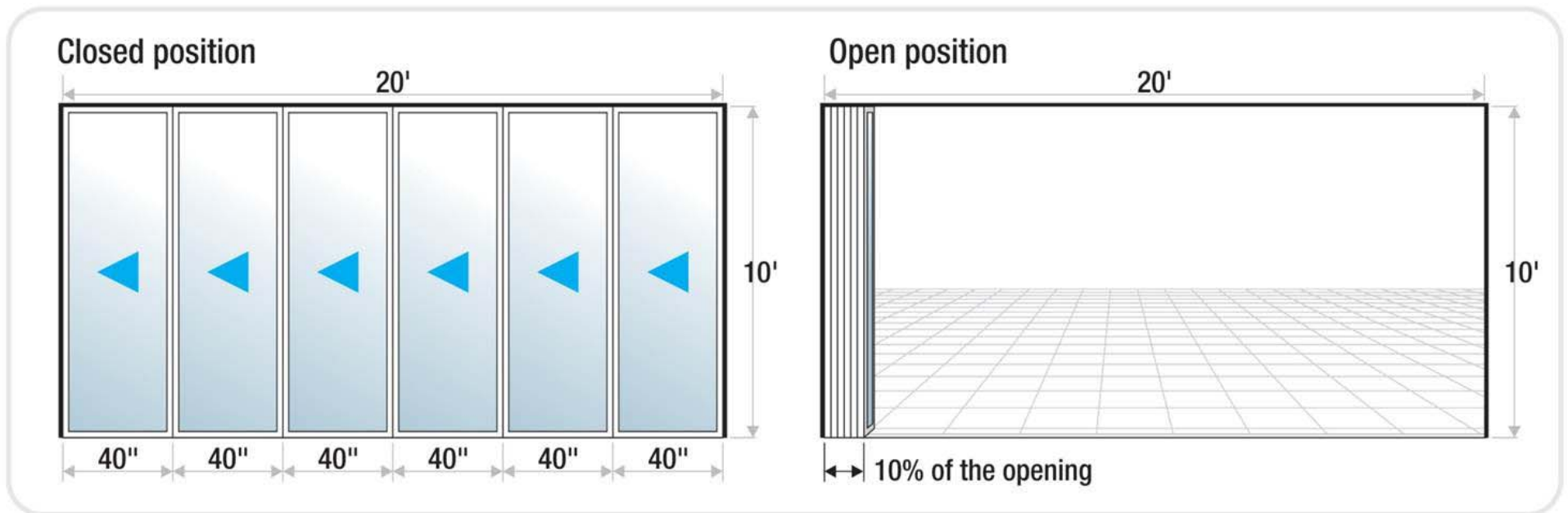
In the closed position, folding doors have more vertical stiles due to the panel width limitation; therefore, they impose greater view obstruction when compared to sliding doors. Sliding doors allow for larger panels, which results in fewer vertical posts and more unobstructed views.

In the open position, folding doors stack to one or two sides, obstructing the view—approximately 10% of the opening. When building structure allows it, sliding doors can be pocketed into the wall, leaving a completely unobstructed opening. If stacked, they take up the width of one entire panel.

 Please remember the **exam password POSITION**. You will be required to enter it in order to proceed with the online examination.

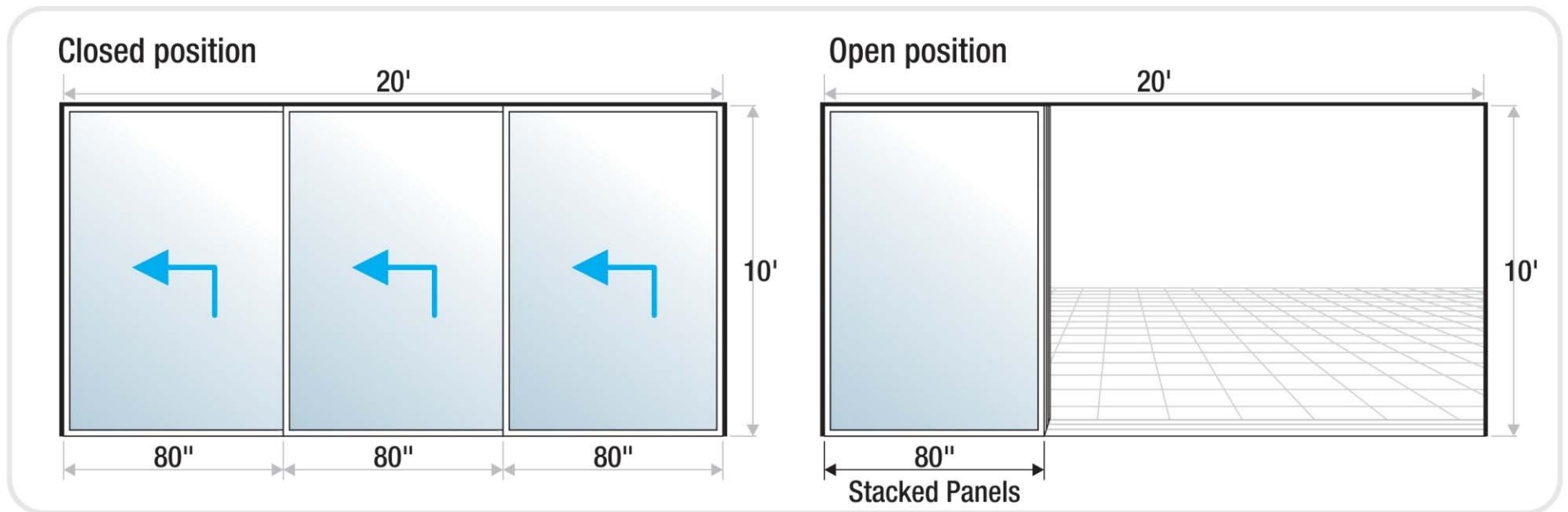
Door Selection: Folding Door Systems

Folding door units are always stacked perpendicular to the opening. The amount of space that the folding doors will take away from the opening is dependent on the number of panels, panel width, height, and thickness.



Door Selection: Sliding Door Systems

The sliding glass walls offer more flexibility in configuration than the folding glass walls. Sliding glass panels stack or disappear into a pocket when open, opening up living spaces to the outdoors.



Door Selection Criteria Overview



Thermal Performance

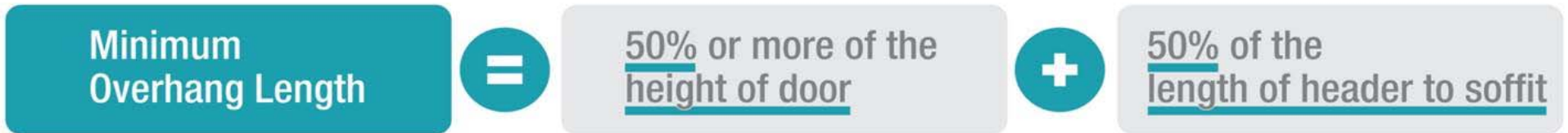
- Glass selection based on local climate
- Thermally broken frame or not

Weatherability Requirements

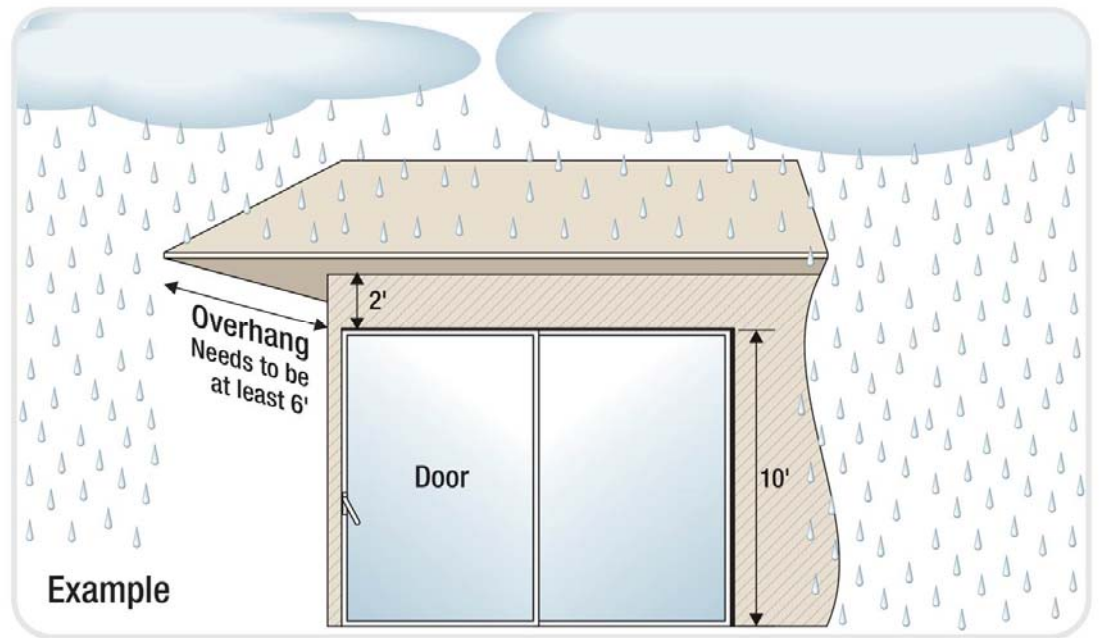
- Local weather, orientation, and amount of overhang will impact the level of weathertightness required.

Door Selection: Overhang

An overhang over any type of door protects the door from weather and weathering. A simple rule is as follows:



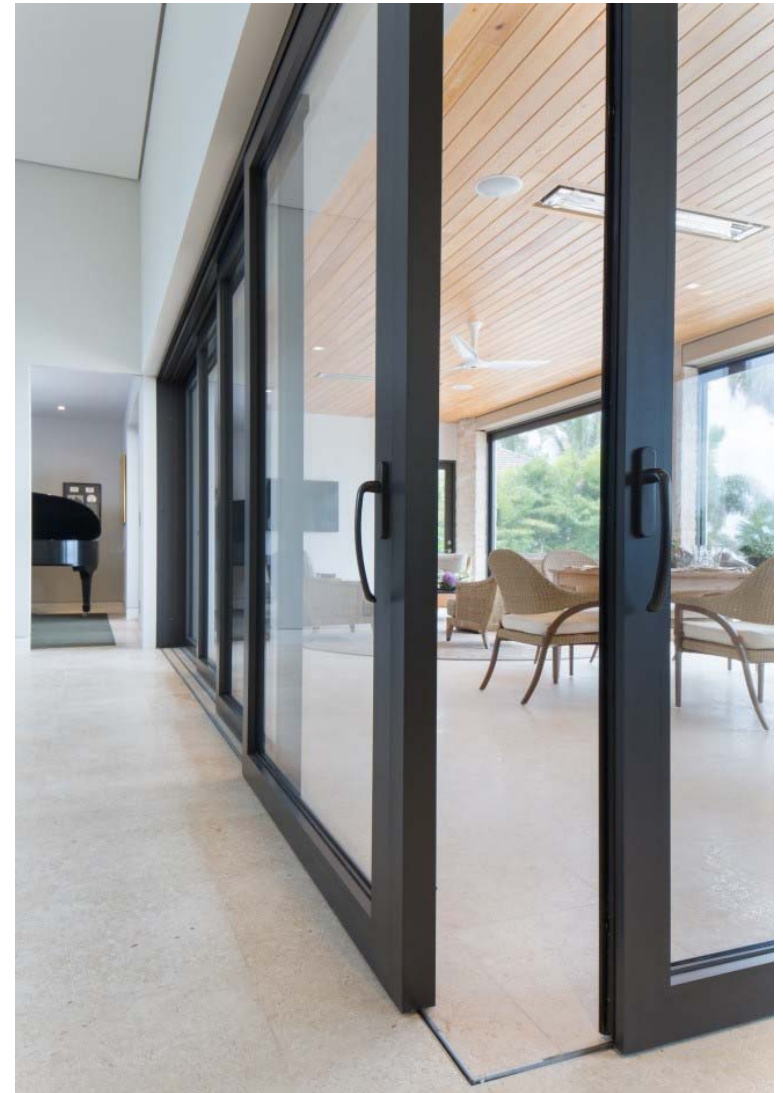
If the overhang is less than the minimum required, the door will be more exposed to the weather. When selecting large opening glass door systems, look for tight seals between the panels and from the panels to the floor. It is also beneficial to consider a track with drainage. In areas with frequent driving rain, the overhang will not protect the door from the weather, and a weathertight door and track are required, regardless of the overhang.



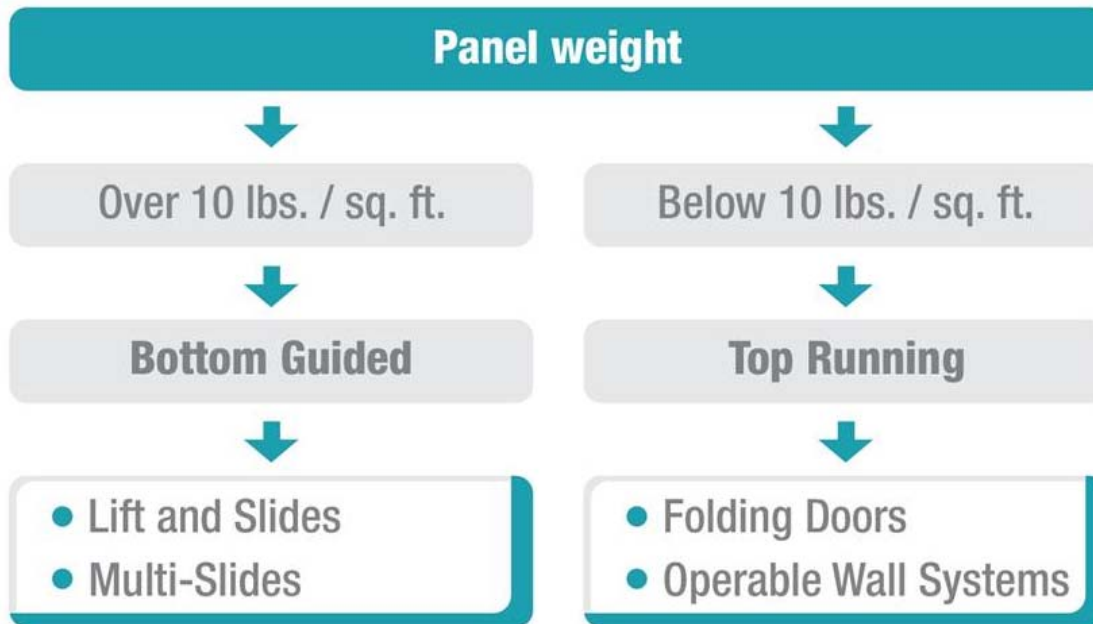
Door Selection Criteria Overview

Panel Weight

- Door size and number of panes of glass
- Track system – subfloor type helps determine track system that should be used



Door Selection: Panel Weight



The structural capacity at the opening determines whether it is best to use a bottom guided or top running mechanism.

The standard folding door system is top-hung, where the main weight is carried by the head track, and the bottom track is a guide.

A floor mounted system is recommended for applications where the load bearing capability of the header is a concern; the main weight is therefore carried by the floor track, which is the case of the sliding glass systems.

Preparing the Opening

Once the selection is made, the design drawings must include the opening requirements for the door. Getting the dimensions correct, including rough opening size, is vital when installing the large opening door.

It is important to note that when using flush mounted tracks, the industry standard definition for rough opening applies. When using recessed tracks, the rough opening is calculated from the finished floor to the bottom of the header. Additionally, doors with recessed tracks may have door sizes taller than the rough opening, as the door height includes the recessed track. Some manufacturers design doors with an adjustable head rail, which typically accommodates $\frac{1}{2}$ " of adjustment.

The required trench depth and width for recessed tracks must be included in drawings. When allowance for trench depth and width is not clear, architects can typically leave $4\frac{1}{2}$ " for trench width per panel and $2\frac{1}{2}$ " for trench depth.



Summary

Summary

Large opening glass walls are a versatile design option that offer architects and designers the ability to provide better indoor-outdoor connection; spatial flexibility; access to natural daylighting and ventilation; energy performance and weather resistance; and enhanced views of nature.

These systems are the standard of the elegant, energy-efficient building. Thermally broken door systems with low U-value glazing not only provide a vast view of the outdoors, but are engineered to drastically minimize heat transfer, reducing air conditioning demands in the summer and heating use in the winter, thereby minimizing the overall carbon footprint.

With the array of door system and component options available in the marketplace, it is possible to custom design a system to meet the needs of virtually any residential or commercial building project.

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Conclusion

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