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Industry Standard
for Commercial
Fiberglass Reinforced Polymer
Doors and Frames

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WINDOW & DOOR
MANUFACTURERS ASSOCIATION

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WDMA Environmental Stewardship Committee

Statement of Beliefs

The membership of the Window & Door Manufacturers Association (WDMA) supports the intent of environmental stewardship aimed at protecting the earth's resources including sound environmental practices to protect our air, water, land and the human, animal and plant life of our planet.

WDMA encourages our members to make the most efficient use of materials and resources, to recycle or reuse materials where economically feasible, and to conduct business in a manner that supports environmental stewardship.

WDMA supports and defines sustainable forest management as the stewardship of forests that promotes health, productivity and potential to fulfill relevant ecological, economic and social functions at the local, national and global levels, both today and for future generations. We support programs that promote the use of best forestry management practices and sustainable forestry activity.

We encourage and support our members to improve their practice of environmental stewardship and will work to assist them and the broader community in the implementation of sound environmental practices.

Approved by the WDMA Board of Directors

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Foreword

WDMA Door Division

Commercial fiberglass reinforced polymer (Commercial FRP) doors and frames are the premiere grade of FRP door and frame manufacturing. The door and frame manufacturer and material supplier members of the WDMA Door Division combine to promote the use of Commercial FRP doors and frames, and to maintain quality standards and to provide other informational services.

Acceptance, specification and other use of this standard is voluntary, as the WDMA does not in any way control or regulate the method or manner of manufacture or production of industry products.

Because of constant technological changes and product improvements in component parts used by Commercial FRP door and frame manufacturers, industry standards referenced in this document may become outdated. This standard is under periodic review so that situations such as these can be evaluated, recognized, and incorporated as quickly as possible. It is the intent of this standard to define Commercial FRP doors and frames consistent with industry practices and technical advances.

Introduction

ANSI/WDMA I.S.12A is the industry standard that establishes expectations for the performance and aesthetic attributes of Commercial FRP doors and frames. These combined characteristics are used in producing doors and frames for a specified opening. Function and performance are primarily controlled by the door and frame construction. Aesthetics are primarily controlled by the finish selected.

Commercial FRP doors and frames are manufactured with primarily corrosion-resistant fiberglass components. A Commercial FRP door and frame resists penetration by moisture and chemicals.

Environmental

Commercial FRP doors and frames can be supplied in all applications that wood or metal doors and frames are provided; however, FRP doors are superior in environments that require high durability, moisture resistance, and hygiene, such as industrial facilities, laboratories, food processing plants and healthcare settings. They are also common in educational facilities, water treatment plants, and swimming pools due to their resistance to corrosion and harsh conditions. In such environments, a wood door may rot, and a metal door may rust. Commercial FRP doors meet and exceed the performance of hollow metal and wood doors in like applications.

Door Construction Types

Construction types are influenced by several factors, as indicated in Section C. It is the responsibility of the specifier to select the best construction type for each application. Door and frame types include:

Hybrid	Assembled using a combination of FRP, composite material, and non-corrosive metal in construction.
Composite	Assembled using FRP & composite material in construction (no metal included).
Monolithic	Molded or pultruded using FRP & composite materials in construction.

Frame Construction Types

Pultruded	Constructed using glass strands and resins pulled through a heated die matching a given frame profile.
Molded	Constructed by placing fiberglass mats into a mold and saturating the mats with resin and glass while removing trapped air.

Purpose

The purpose of this publication is to:

- Define the performance attributes of commercial FRP doors & frames available throughout this standard.
- Provide general information, referenced standards, and tests that will ensure all products complying with this standard can be evaluated on an equal basis.
- Provide a logical, simple system of references, keyed to guide specifications, which will enable the architect to specify commercial FRP doors & frames thoroughly, precisely, andaccurately.
- Provide information necessary for the specifier to identify products and by which products are to be evaluated.
- Ensure the specifier understands the applications commercial FRP doors and frames are used in which includes both external and internal applications.

Guide Specification Checklists

The following are listings of the basic information required in a specification for commercial FRP doors and frames. The WDMA recommends that these pieces of information appear in any specification for those products. Providing this minimal amount of information will ensure clear communication regarding the construction of the doors and frames specified.

FRP Door Requirements:

Construction Types
- ☐ Hybrid
- ☐ Composite
- ☐ Monolithic

FRP Facing (Section A-2)
- ☐ Smooth
- ☐ Pebble
- ☐ Sandstone
- ☐ Woodgrain

Core Construction:
- ☐ Polyurethane
- ☐ Polystyrene
- ☐ Honeycomb
- ☐ Balsa
- ☐ Fire-Rated
- ☐ Fire-Resistance Rated

Detailed Requirements:
- ☐ Louvers
- ☐ Applied Mouldings
- ☐ Vandal Screen
- ☐ Insect Screen
- ☐ Vision Panels
  - ☐ Bi-fold
  - ☐ Flush or hygienic

Finish Requirements: (Section F-1)
- ☐ Factory Finish
- ☐ Factory Prime
- ☐ Gel Coat
- ☐ Acrylic Polyurethane
- ☐ Color Throughout
- ☐ Stained

Special Function Doors: (Section C-7)
- ☐ Sound-Resistant (STC)
- ☐ Lead Lined (X-Ray)
- ☐ Bullet Resistant
- ☐ Hurricane-Resistant
- ☐Intrusion Resistant
- ☐ Dutch
- ☐ Wicket
- ☐ Monorail
- ☐ Bi-folding
- ☐ Blast-rated
- ☐ Smoke and Draft Rated
- ☐ Fire-Rated
  - ☐ UL 10B Neutral Pressure
  - ☐ UL 10C Positive Pressure
    - ☐ Category A
    - ☐ Category B

Environmental Doors (Section C-8) Rating Program
- ☐ LEED®
- ☐ Green Building Alliance - Green Globe®
- ☐ Recycled Content
- ☐ Low-Emitting Materials
- ☐ UL GREENGUARD®
- ☐ Other

FRP Frame Requirements:

Construction Types: ☐ Molded ☐ Pultruded **Detailed Requirements:** ☐ Knock Down ☐ Chemically-Welded ☐ Jamb Depth ☐ Header Size (2-inch, 4-inch, or custom) ☐ Throat ☐ Sloped Sill **Finish Requirements**: (Section F-1) Finish Application ☐ Factory Finish ☐ Factory Prime ☐ Gel Coat ☐ Acrylic Polyurethane ☐ Color Throughout **Special Function Frames:** ☐ Sound-Rated (STC) ☐ Lead Lined (X-Ray) ☐ Bullet-Rated ☐ Hurricane-Rated ☐ Monorail ☐ Blast-Rated ☐ Fire-Rated ☐ UL 10B Neutral Pressure ☐ UL 10C Positive Pressure (Cat-B only) (Frame-applied intumescent) **Environmental Frames** (Section C-10) Rating Program ☐ LEED® ☐ Green Globe® ☐ Recycled Content ☐ Low-Emitting Materials ☐ UL GREENGUARD® ☐ Other	

Glossary

Access Control—A typically automated approach for entrance system security. Such systems permit authorized access through various technologies that validate credentials.

Active (door or leaf)—In a pair of doors, the primary operating one or one with latching hardware.

ADA Compliance—The Americans with Disabilities Act has implications for doors that relate to such things as door weight, opening and closing force, and the size of the bottom rail.

Affidavit Label—A label on a fire-rated door product on which the manufacturer states that the door meets specified test requirements.

Anchor—A device placed within a mullion, jamb, head, or sill and used to secure the frame to the floor, wall, ceiling, lintel, or building structure above the opening. Numerous types exist as required by an architect.

Anodizing— An electrochemical process that converts the metal surface into a decorative, durable, corrosion-resistant, anodic oxide finish. Architectural Class I anodizing represents a 0.7 mil and thicker anodic coating. Architectural Class II represents a coating of 0.4 to 0.7 mils thick.

Applied Stop—A piece of moulding mounted to a cased, open frame to form the door soffit and stop.

Astragal—(a) A vertical molding usually attached to the edge of the inactive door of a double door installation. The Astragal closes the clearance gap to ensure privacy, minimizes the passage of light, retards the passage of air, sound, smoke or flame, and provides additional security. Flat bar and T-shaped profiles are common. (b) The term may also refer to a component or combination of components applied to a single door, the bottom edge of the flush transom panel, or the bottom of the top leaf of a Dutch door.

Authentic Divided Lites—Individually glazed pieces of glass between muntin bars. Also known as True Divided Lites. See also, Simulated Divided Lites.

Automatic Door—A self-opening door. It may be actuated by a push button switch or may be connected to motion sensors which can initiate the opening. The type of door also closes automatically after a fixed time period or when sensors no longer detect motion. Automatic doors are common in many buildings open to the public and in healthcare facilities.

Automatic Swing Door Operator (Swing Door Operator)—An electromechanical hardware component of an automatic door that opens and closes the door. This device may be mounted on the door (in place of a closer) or may be mounted on the wall above the door opening.

Backset (Lock)—The distance from the edge of the door to the center of the lock cylinder.

Backset (Hinge)—The distance from the face of the door to the edge of the hinge.

Ballistic Resistant (Bullet Resistant)—Reinforced doors designed to resist the penetration of fire arm projectiles. Doors are tested to various standards such as UL 752, which describes 8 levels of protection, and NIJ-STD-0108.01 (from the National Institute of Justice).

Balsa Core- A structural core made of end grain balsa.

Billet—A semi-finished and solid block of aluminum (or other metal). See also Extrusion.

Butt Hinge—(a) The discrete, multiple hinges secured to the abutting surfaces of the door and frame. Commercial ones are typically larger than those used in residential settings and have square corners versus rounded ones used in residential hinges. See also Hinge, Continuous Hinge, and Pivot. (b) Any hinge secured to the abutting surfaces

of the door and frame rather than the adjacent sides of the door and its frame.

Bevel- A machine angle other than a right angle, i.e., a 3 degree bevel that is equivalent to a 1/8 inch drop in a 2 inch span (1 mm in 16mm).

Blocking- A material used to replace core material in specific locations to provide improved screw holding for the attachment of hardware or provide additional structural door reinforcement.

Bonded Core- Stiles and rails are securely glued to the core prior to application of door skins or laminate.

Bow- A curvature along the door height, or a deviation from a flat plane from end to end. A deviation, flatwise, from a straight line drawn from end to end or top to bottom of a piece as measured at the point of greatest distance from the straightline.

Butt Joint- A joint formed by square edge surfaces (ends, edges, and faces) coming together. Also referred to as an end butt joint, or edge butt joint.

Casing—Moulding placed around a door frame to cover the joint between the frame and wall.

Closed-cell Foam—A high-density foam characterized by non-interconnected pores. Closed-cell foams have higher dimensional stability, lower moisture absorption coefficients, and higher strength compared to open-cell-structured foams. A specially-formulated, polyurethane, closed-cell foam is used in the core of some Special-Lite doors to create a rigid, monolithic structure.

Composite- A composite whose ingredients can appear in the form of, but are not limited to: distinct fibers, fiber bundles, particles, wafers, flakes, strands.

Core- The innermost layer or section in component construction.

Core, Fire Resistant- A door core material meeting fire listing requirements for fire protection.

Cup- A deviation in the face of a piece from a straight line drawn from end to end of a piece as measured at the point of greatest distance from the straight line.

Cutout—A hole in or an area removed from the door to accommodate hardware, lites, louvers or other options.

Daylight Opening—The area (measured W x H) of visible glass in a finished lite. Abbreviated as DLO.

Door Frame- A group of components (composite, aluminum or steel) that are assembled to form an enclosure and support for a door. Also known as door jambs.

Door Bow -- Using a straightedge appropriate for the door size, place it diagonally across the door face, maintaining a minimum distance of 12" from each corner. Any gap between the door face and the straightedge shall not permit a 0.0123" rod or block to pass through.

Door Perimeter Flatness -- Using a straightedge appropriate for the size of the door, place the straightedge against both door faces at or within ¼" of the top, bottom, hinge, and lock edges. Any gap between the door face and the straightedge shall not permit a 0.0625" rod or block to pass through.

Door Tolerances

Door Twist -- Lay the door on a suitable, flat surface free of warp, bow, or twist. Place support blocks of equal height between the surface and the door face at all four corners. Any gap between the door face and the support blocks shall not permit a 0.0625" rod or block to pass through. Place two additional support blocks between the surface and the door face at or near the midpoint of the door height.

Door Squareness – The diagonal measurements, taken corner to corner across the same face, shall not differ by more than 1/16".

Edge Band- A strip along the outside edges of the two sides and/or top and bottom of the door (See stiles/vertical edges, rails/horizontal edges).

Egress—(a) The act of coming out or going out of a room or building. (b) The exit.

Fiberglass—In raw form, fiberglass consists of fine fibers of glass. It may be used in mat or cloth form, for example, and mixed with a polymer resin and catalyst to begin its transformation into products.

Fiberglass Reinforced Polymer Door (Commercial)- Fiberglass Reinforced Polymer (FRP) doors and frames are

manufactured with primarily corrosion-resistant fiberglass components. An FRP door and frame resists penetration by moisture and chemicals.

Fire Rated Doors- A door complying with NFPA 80 that is listed and labeled by a qualified testing agency for fire-protection ratings. Ratings are indicated, based on testing at positive pressure, according to NFPA 252 or UL 10C, or at neutral pressure according to UL 10B. The door must be tested and carry an identifying label from a qualified testing and inspection agency.

Fire Rated Frames- Proprietary fire-rated frame construction. See manufacturer's proprietary listings.

Fire-Resistant Core – as approved through testing through a fire-rating testing laboratory.

Fiberglass Reinforced Laminate (FRL)- Fiberglass reinforced laminate. A composite material made from a mixture of strong fiberglass and a special type of plastic, typically a mix of polyester and epoxy resin.

Fiberglass Reinforced Polymer (FRP)- A composite material made of a polymer matrix reinforced with fiber. The polymer is usually an epoxy or polyester thermosetting plastic. The fibers are usually fiberglass including the face sheets of some doors as well as some entire doors and framing components.

Frame Horizontal Alignment with Door – Hinge and strike backsets shall be positioned so that, prior to installation, the horizontal centerline of the door aligns with the horizontal centerline of the frame rabbet within ±1/32".

Frames with Lites or Panels – Opening dimensions, including width and height, for sidelites, transoms, panels, and borrowed lite frames shall have a tolerance of ±1/16" per lite or panel. These tolerances shall be non-accumulative, and the overall frame opening dimensions shall not exceed the specified size by more than 1/8".

Frame Twist – Because frames are somewhat flexible and require proper bracing and alignment during installation, any pre-installation deformation of the jambs or header, including bow or twist, shall not reduce the opening dimensions by more than 1/16" from those shown in the illustration above.

Gaps- An unfilled opening in a continuous surface or between adjoining surfaces.

Honeycomb Core - a repeating geometrical pattern of Kraft paper or cardboard core between two face sheets.

Intumescent- A material ~~a~~ that expands when exposed to extreme heat or fire to fill any gap between the door and frame or between doors.

Joint- The common edge between two adjacent materials in the same plane.

Louver- A panel constructed of slats installed in a door or openings to allow various degrees of light, air, or sound passage. May be constructed as adjustable. Common types are slat and Chevron – an inverted "V" louver (vented or non-vented).

Meeting Edges- Two adjacent door edges not separated by a mullion or transom bar. These are found in pair, Dutch door and door & transom applications.

Neutral Pressure- A fire door test procedure where the neutral pressure plane is at or near the top of the door. Sometimes referred to as negative pressure.

Nominal- A term that designates a stated dimension as being approximate and subject to allowances for variation. The average sizes (width and thickness) of lumber just out of the sawmill before being processed into usable board stock. Always larger than finished dimensions.

Not Noticeable- Not readily visible without careful inspection (as a measurement of natural or machining characteristics).

Not Restricted- Allowed, unlimited.

Occasional- A small number of characteristics that are arranged somewhat diversely within the face.

Polyurethane Core – A typed of rigid foam core used inside a door, made from closed-cell polyurethan providing

high thermal insulation, structural integrity and resistance to moisture and pests.

Polystyrene Core – A door core made from expanded or extruded polystyrene foam used to improve thermal insulation and reduce weight typically in steel or fiberglass doors.

Positive Pressure- A fire door test procedure where the neutral pressure plane is located at 40 inches (1 m) above the sill.

Pultruded FRP – A composite material made by pulling continuous strands of reinforcing fibers (like fiberglass, carbon or aramid) through a resin bath and through a heated die to form a solid constant cross-section profile.

Pultruded Fiberglass Frame- a frame manufactured by pulling a resin-impregnated continuous fiber composite through a heated die creating a continuous long structural shape.

Pultrusion—The process of pulling fiberglass, mixed with resin, through a heated die to form fully cured, FRP products. Special-Lite AF series doors and frames are created using this methodology.

Rails/Horizontal Edges- Top and bottom edge bands of door.

Show Through

Face Sheet (Skin) - The face sheet, whether flat or contoured, of flush doors, stile-and-rail doors, bending laminations, etc., typically composed of hardwood plywood (usually 3 ply), hardboard, or composition pane.

Sound Transmission Class (STC)- A single number rating system derived from measured values of sound transmission loss or the acoustical performance of a building element, such as a door, window or wall. The higher the STC value, the better the rating and the better the acoustical performance value. The value is determined by testing the product to the ASTM E90 standard.

Stiles/Vertical Edges- The upright or vertical pieces of the core assembly of a wood flush door. Measurement. The width of the vertical edge/stile is measured at its widest side (the wide side of a beveled door).

Telegraph

Threshold—A strip of metal, wood, or other material that is placed in a doorway to transition from one floor covering to another.

Transom- An operable or non-operable fenestration product that is designed to be a companion product installed above a door system.

Twist- A distortion in a wood piece caused by freed tension in the grain as the wood was drying. The surface appears to twist as the four corners of any face are no longer in the same plane. 2) In passage doors, any distortion in the door itself and not its relationship to the frame or jamb in which it is hung, measured by placing a straight edge or a taut string on the concaveface

Vision Lite Kit—The frame, glazing, and glazing tape needed to create a Vision Lite for field installation.

Voids- See Gaps.

Warp- 1) Any deviation from a true or plane surface, including bow, crook, cup, twist, or any combination thereof. Warp restrictions are based on the average form of warp as it occurs normally.

Aesthetics

A-1: Aesthetic Grades for Commercial FRP Doors and Frames

The design professional can specify with confidence using ANSI/WDMA I.S.12A guidelines. WDMA's Commercial FRP Door & Frame Standard addresses both the aesthetic and performance attributes of the door. Both are important to achieve desired appearance and function.

There are other ways to modify the aesthetics of the door as well, such as by the addition of applied mouldings, lite mouldings, louvers, and other accompanying parts.

The design professional is encouraged to consult directly with the manufacturer during the development of the design and specifications for these important projects.

A-2: Face Sheet Selection (Aesthetics)

Specifiers need to determine and specify the door face sheet material required.

Pebble: – A textured surface pattern molded into the face sheet of an FRP (fiberglass-reinforced plastic) door, characterized by small, irregular, pebble-like indentations. This finish helps disguise scuffs and surface wear, improves scratch resistance, and provides a uniform, low-gloss appearance commonly used in commercial, institutional, and high-traffic applications.

Sandstone: A subtle, fine-grained textured surface molded into the fiberglass face sheet of an FRP door, resembling the smooth, lightly gritted feel of natural sandstone. This finish provides a refined, matte appearance that reduces visible wear, enhances impact and scratch concealment, and is commonly used where a clean, architectural aesthetic is desired.

Smooth: A flat, uniform surface molded into the fiberglass face sheet of an FRP door, characterized by minimal texture and a clean, sleek appearance. This finish provides an even, easily cleanable surface ideal for environments requiring a refined look or stringent hygiene, though it may show surface wear more readily than textured finishes.

Woodgrain: A molded fiberglass surface designed to replicate the appearance and texture of natural wood, featuring grain patterns and subtle relief. This finish provides the aesthetic look of wood while retaining durability, moisture resistance, and low maintenance of FRP construction. It is commonly used where a warm, architectural appearance is desired without the vulnerabilities of real wood.

Note: See manufacturer for descriptions/details of face sheet selection (aesthetics), including color-throughout options.

A-3: Frame Selection (Aesthetics)

Specifiers need to determine and specify the frame material required.

Smooth Finish: a smooth finish consists of a flat, uniform surface molded/pultruded into the FRP frame. This finish is characterized by minimal surface texture and a clean, consistent appearance. Smooth Finishes provide an easily cleanable surface and are often preferred in environment where hygiene, maintenance or a refined aesthetic is required.

A-4: Fabrication

General Requirements Workmanship:

Prior to factory finish or field finishing, all exposed and semi-exposed surfaces (faces, horizontal edges) are to be free of chips, dents, gouges, tool marks, adhesive residue, over/under filling, sharp edges, or similar defects. Joints in horizontal edges shall be without gaps. Joints in faces must be tight with no gaps between face and horizontal edges.

Performance

P-1: Performance Standards for Commercial FRP Doors

Performance is a very important aspect of specifying Commercial FRP Doors and is directly related to the use of the door. The following table identifies the tests that are conducted and the criteria that must be reached in order to qualify a given door assembly for each specific Construction Type. For information on selecting the appropriate construction types for the project, refer to the Foreword for suggested application(s).

Performance Attribute	**Construction Types**		
	Hybrid	**Composite**	**Monolithic**
Cycle Slam: (ANSI A250.4/AAMA 920-11, WDMA T.M. 7-23)[a]	25,000,000 cycles	1,000,000 cycles	1,000,000 cycles
Door Finishes: (various ASTM test methods)	AAMA 625, AAMA 2605	AAMA 625	AAMA 625
Fastener Withdrawal: (ASTM-D1761 or WDMA T.M. 10-23 Screw Holding Capacity)[a]	_____N (_____ lbs)	SL - 3977 N (894 lbs)	SL – 3,977N (894 lbs)
Hinge Loading: WDMA TM8-23:[a]	2440 N (550 lbs.)	2110 N (475 lbs.)	1780 N (400 lbs.)
Thermal Transmittance: (NFRC 100) Door with < 50% Glass	U Factor less than or equal to 0.32 Btu/hr·ft^2·°F	U Factor less than or equal to 0.32 Btu/hr·ft^2·°F	U Factor less than or equal to 0.23 Btu/hr·ft^2·°F
Thermal Transmittance: (NFRC 100) Door with > 50% Glass	U Factor less than or equal to 0.57 Btu/hr·ft^2·°F	U Factor less than or equal to 0.44 Btu/hr·ft^2·°F	U Factor less than or equal to 0.41 Btu/hr·ft^2·°F

Notes:

(a) Standard is utilizing wood door test methods with the exception of fiberglass components in lieu of wood components described in the WDMA test methods.

P-2: Dimensional Information for Commercial FRP Doors and Frames

The following dimensional information and tolerances are determined at the time of shipment. Exposure of the door to variations in temperature and moisture during shipment, storage, and prior to building occupancy may affect the size of door components and their interface.

Doors:

Notes:

- Door tolerances based on a standard 3’-0”x7’-0” doors.
- Doors with lites panels -Opening sizes (width or height) for lites or panels cut into doors shall be subject to a tolerance of +/- 1/16” for each lite or panel.
- See Section Glossary for definitions of door terms.

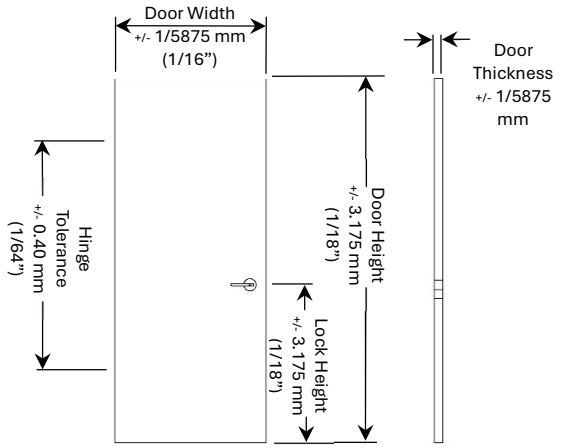


Fig. P-2.1(d)
Door Tolerances
Door size, thickness and vertical location.

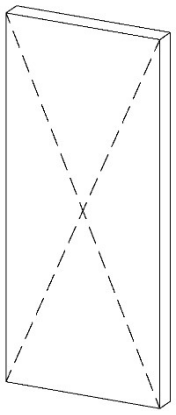


Fig. P-2.2(d)
Door Squareness
The diagonal measurements, taken corner to corner across the same face, shall not differ by more than 1.5875 mm (1/16").

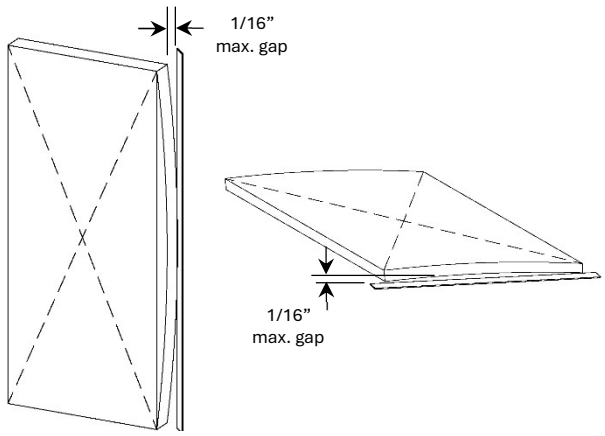


Fig. P-2.3(d)
Door Perimeter Flatness
Using a straightedge appropriate for the size of the door, place the straightedge against both door faces at or within ¼" of the top, bottom, hinge, and lock edges. Any gap between the door face and the straightedge shall not permit a 0.0625" rod or block to pass through.

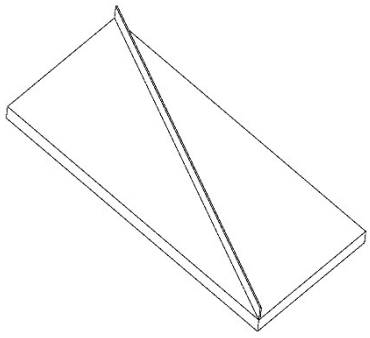


Fig. P-2.4(d)
Door Bow
Using a straightedge appropriate for the door size, place it diagonally across the door face, maintaining a minimum distance of 12" from each corner. Any gap between the door face and the straightedge shall not permit a 0.0125" rod or block to pass through.

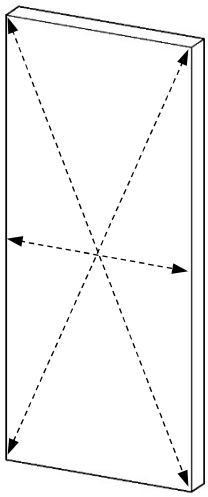


Fig. P-2.5(d)
Door Twist

Use a straightedge to measure the door diagonally or horizontally on the concave side. Any deviation between the straight edge and face of door shall not allow a 0.0625” rod or block to pass.

Frames:

Notes:

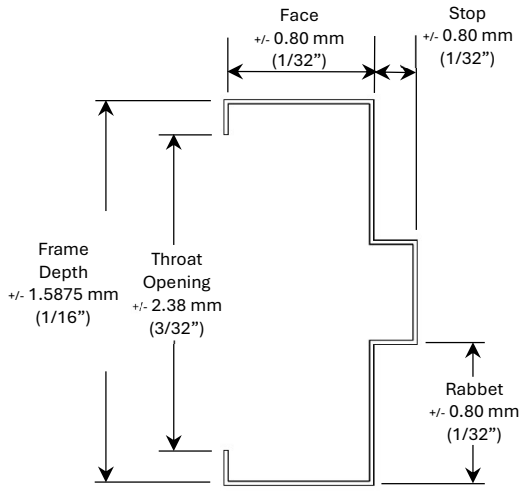


Fig. P-2.1(f)
Frame Profile Tolerances

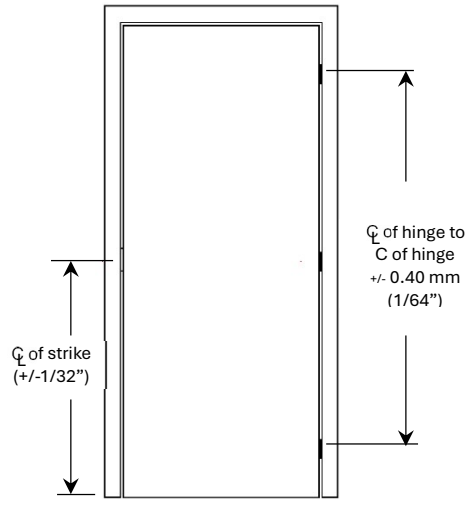


Fig. P-2.2(f)
Frame Twist

Because frames are somewhat flexible and require proper bracing and alignment during installation, any pre-installation deformation of the jambs or header, including bow or twist, shall not reduce the opening dimensions by more than 1/16”.

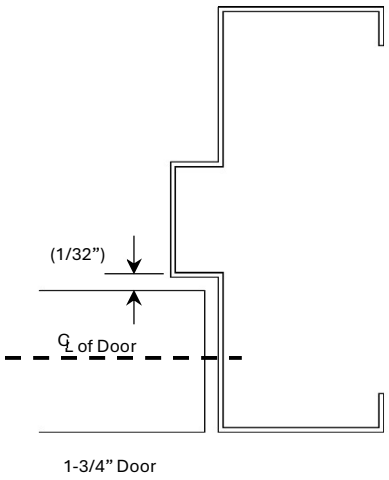


Fig. P-2.3(f)
Frame Horizontal Alignment with Door

Hinge and strike backsets shall allow the horizontal centerline of the door to be in line with the horizontal centerline of the frame rabbet +/- 1/32" prior to installation.

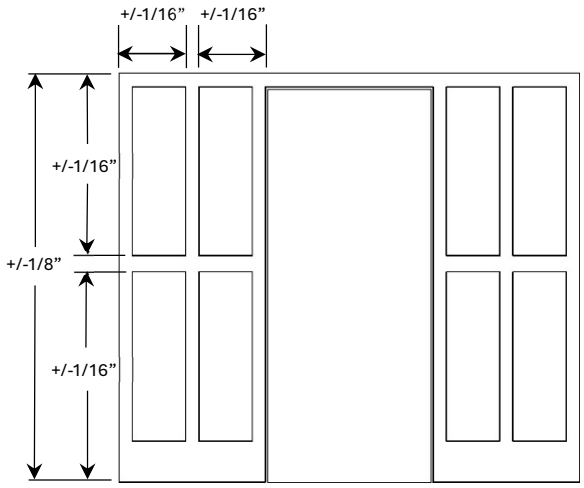


Fig. P-2.4(f)
Frame Horizontal Alignment with Door

Opening sizes (width or height) for sidelites or transoms or panels and for borrowed lite frames shall be subject to a tolerance of +/- 1/16" for each lite or panel. These tolerances shall be non-accumulative so that the overall frame opening sizes are not increased by more than 1/8"

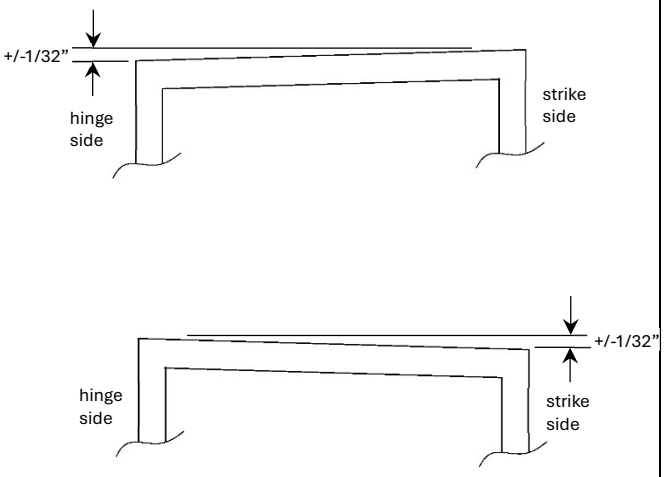


Fig. P-2.5(f)
Frame Squareness

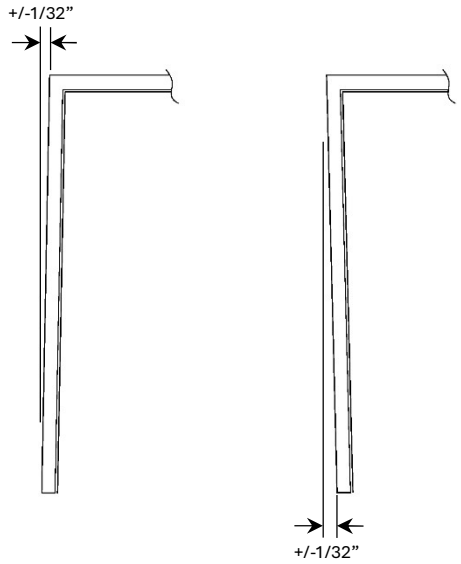


Fig. P-2.2(f)
Plumbness

Fig. P-2.7(f)
Frame Alignment

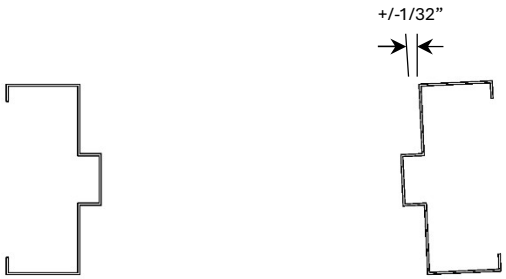


Fig. P-2.8(f)
Frame Twist

Hardware Machining:

Hinge Mortises:	
Location:	±0.8 mm (±1/32 inch)
Height:	+0.8 mm, -0 mm (+1/32 inch, -0 inch)
Depth:	+0.6 mm, -0 mm (+.025 inch, -0 inch)
Backset:	+0 mm, -0.8 mm (+0 inch, -1/32 inch)
Lock Fronts:	
Location:	±0.8 mm (±1/32 inch)
Height:	+0.8 mm, -0 mm (+1/32 inch, -0 inch)
Width:	+0.8 mm, -0 mm (+1/32 inch, -0 inch)
Depth:	+0.6 mm, -0 mm (+.025 inch, -0 inch)

Typical Pre-fit Clearances

Non-fire rated Doors:	
Top & Hinge Edges	3 mm (1/8 in) clearance
Lock Edge, Single Door	3 mm (1/8 inch) clearance
Meeting Edges, Pairs	1.6 mm (1/16 inch) per leaf
Bottom Edge	Per project requirements
Non-fire rated Transoms, Side Lites & Dutch Doors	
Width	Per manufacturer's specifications
Height	Per manufacturer's specifications
Fire Rated Openings	See NFPA 80 Standard for Fire Doors and Other Opening Protectives

P-3: Flame Spread Smoke Development for Commercial FRP Doors

Performance Attribute	Construction Type		
	Hybrid	**Composite**	**Monolithic**
Surface Burning: ASTM-E84 (Door Skins)	Class C Door Skin: Flame Spread ≤ 200, Smoke Developed ≤ 450. Class A Door Skin: ASTM-E84: Flame Spread ≤ 25, Smoke Developed ≤ 450.	Class C Door Skin: Flame Spread ≤ 200, Smoke Developed ≤ 450. Class A Door Skin: ASTM-E84: Flame Spread ≤ 25, Smoke Developed ≤ 450.	Flame Spread ≤ 25, Smoke Developed ≤ 450.
Surface Burning: ASTM-E84 (Pultruded Structural Shapes)	NA	Flame Spread ≤ 25, Smoke Developed ≤ 450	Flame Spread ≤25, Smoke Developed ≤ 4

Tests

T-1: Show Through or Telegraph of FRP Doors

Telegraphing of vertical and horizontal edges and cores is considered a defect when the face of the door varies from a true plane in excess of 0.25 mm in any 76 mm span (0.010 inch in any 3-inch span), using a straight edge and feeler gauge or other accurate measuring methods.

T-2: Joint Gaps of FRP Doors and Frames

Maximum gaps between exposed components shall be tested with a feeler gauge at points designed to join where members contact or touch.
Joint gaps shall not exceed 1.6 mm (1/16 inch) unless otherwise specified by the manufacturer.

Construction

General

FRP Doors are customarily manufactured as a minimum 44mm (1-3/4 inches) thick. The design professional encouraged to consult directly with the manufacturer for available door thickness greater or less than 44mm (1-3/4-inches).

C-1: Face Requirements

FRP face requirement to be selected in Guide Specification Checklist. In the absence of a face requirement, Smooth will be furnished. All face requirements to meet requirements of Sections A-1 through A-9.

FRP Face Requirements Options:

- Smooth
- Pebble
- Sandstone
- Woodgrain

C-2: Door Face Construction:

Composition of face construction

- Composition – Composite material made with a resin with woven fiberglass reinforcement.
- Physical properties
  - Strength – High strength, rigidity, and resistance to bending and tearing.
  - Moisture Resistance – Non-porous and resistant to moisture, mold, and mildew.
  - Corrosion Resistance – Resists corrosion and mild chemicals.
  - Flame Resistance – Some varieties are fire-resistant, with ratings like Class C.

Thickness: 0.090-inch minimum

`

C-3: Core Requirements

Below is a list of general core constructions used FRP doors. Other core can be used, providing the final door construction meets or exceeds the performance duty levels specified in Section P-1. Please refer to the Glossary for descriptions of each core type.

- Polyurethane
- Polystyrene
- Honeycomb
- Balsa
- Fire resistant Core

Special Core Types:

Special core constructions applicable for Sound Resistant (STC), Hurricane Resistant, Lead Lined (X-ray), Bullet Resistant and Attack Resistant doors are available. See Section C-9 for description on special core types. Consult individual manufacturers for details.

C-4: Edge Requirements

Vertical Edges (Stiles):

- Vertical edges may be constructed of pultruded, tubular, molded fiberglass or composite fabrication (single or multiple plies) or aluminum. The use or inclusion of wood into stile construction is not permitted.

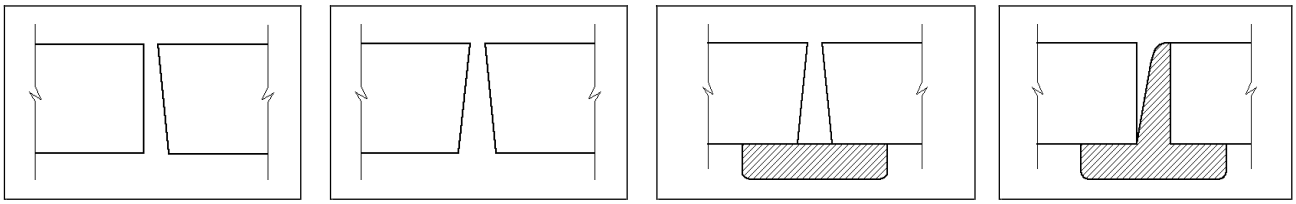
Horizontal Edges (Rails):

- Horizontal edges may be constructed of pultruded, tubular, molded fiberglass or composite fabrication (single or multiple plies) or aluminum. The use or inclusion of wood into rail construction is not permitted.

C-5: Construction Details

The following are illustrations of the most common meeting edge, Dutch door, transom meeting edge, glazing, louver, and blocking options that are available. Consult individual manufacturers for options.

Meeting Edge: Specify by number

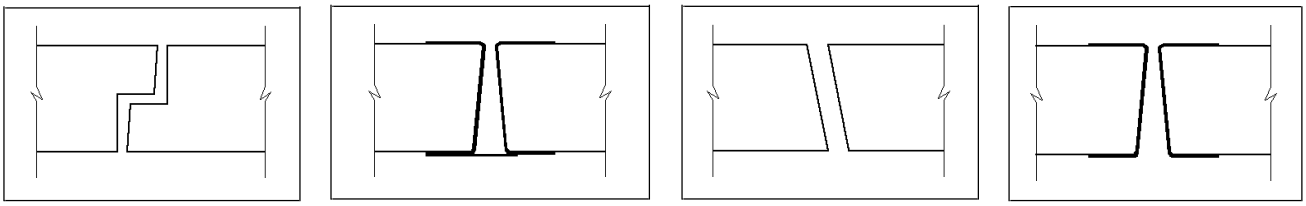


E1: One Bevel
(bevel active leaf)

E1: Two Bevel

E3: Flat Astragal
(one or two bevel)

E4: Tee Astragal
(one or two bevel)



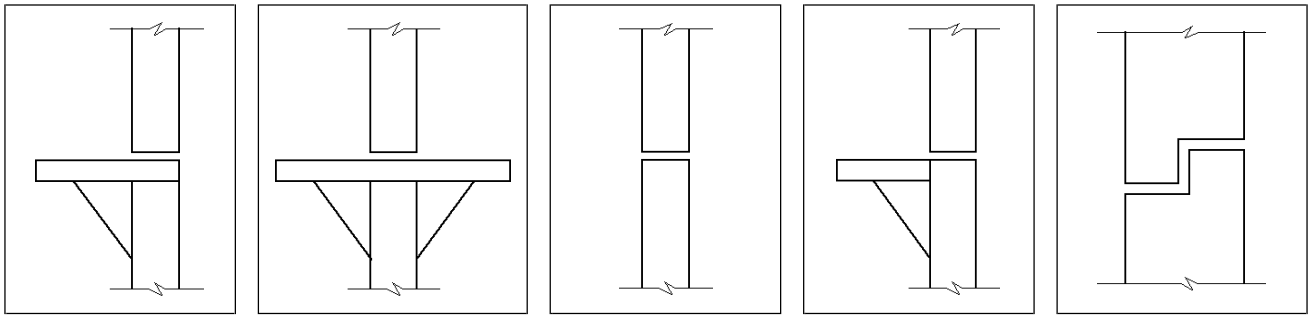
E5: Rabbeted
(bevel or square)

E6: Metal Edge Guard (bevel) and Astragal (bevel or square)

E7: Parallel Bevel
(double egress)

E8: Metal Edge Guard
(inactive edge may be square)

Dutch Door: Specify by number



D1: One Side Shelf

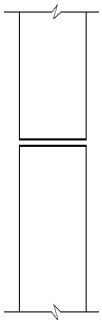
D2: Two Side Shelf

D3: Non-Rabbeted

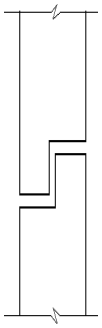
D4: Non-Rabbeted with Side Shelf

D5: Rabbeted

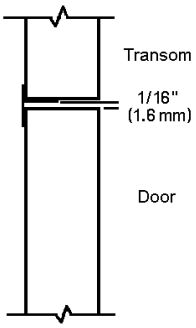
Transom Meeting Edge: Specify by Number



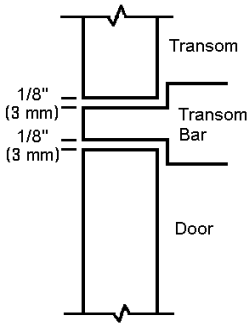
T1:
Non-
Rabbeted



T2:
Rabbeted

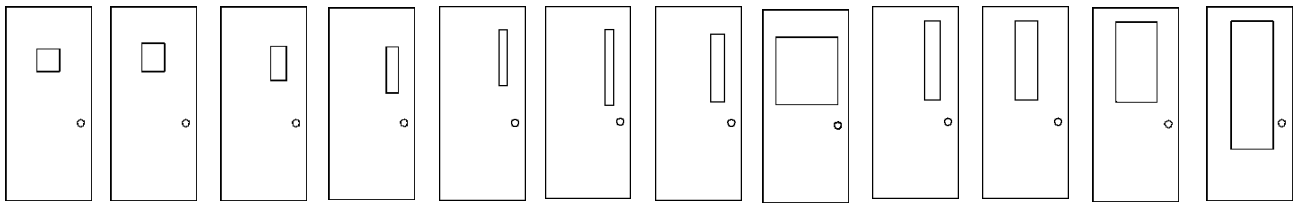


T3:
Astragal



T4:
Transom Bar

Glazing: Specify by number



F/M/P
1010

F/M/P
812

F/M/P
616

F/M/P
520

F/M/P
425

F/M/P
333

F/M/P
630

F/M/P
2430

F/M/P
636

F/M/P
836

F/M/P
1836

F/M/P
1654

F = Fiberglass

M = Metal

P = PVC

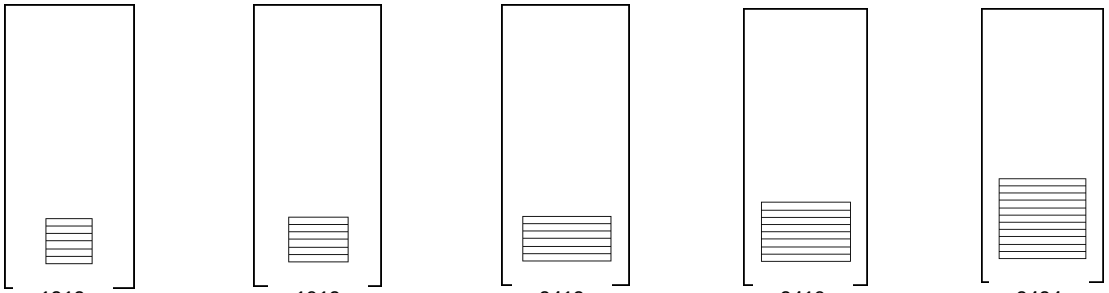
For rated or non-rated doors, cutouts can be ordered with limitations for availability based on manufacturer's restrictions, availability of lite kits, glass, and manufacture's listing with third-party testing agencies.

Note: edge distance may vary depending on vision kit.

Vision Kit Options:

Non-rectangular shapes are available. Refer to manufacturer for availability and limitations.

Louver: Specify by number



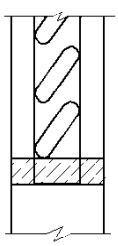
1212

1812

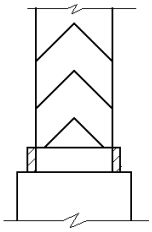
2412

2418

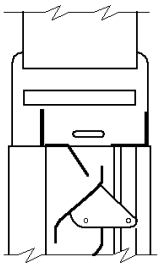
2424



L1:
Slats



L2:
Chevron



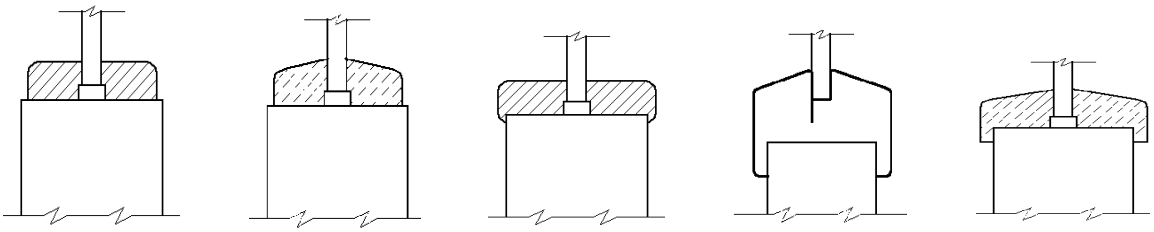
L3:
Fusible Link

ML = Metal Louver
F = Fiberglass
P = PVC
FL = Fusible Link Louver
Number indicates size. For example, the industry reference of 2412 is the louver opening size of 24 in. wide x 12 in. high (610 mm x 305 mm).

Generally, fusible link louvers installed in 45, 60, and 90 minute fire-rated doors must comply with individual fire door authorities and ADA requirements. Dimensions may vary depending on construction or manufacturer's warranty.

Vision Kit Options

Specify by number



M1 M2 M3 M4 M5

Some variances may occur in the fit of flush-type bead due to door thickness, moulding dimensions, machining characteristics and glazing material thickness. The glazier is responsible for the aesthetic appearance of the lite opening.

Variations in profile are available for vision kits. Consult manufacturer.

C-6: Fire Doors

Fire Door Ratings and Openings Classification

The model codes have established a fire door rating system for door assemblies that protect openings in fire resistant rated wall constructions. In 1997, the International Council of Building Officials (ICBO) approved a change to the Uniform Building Code (UBC) that requires fire doors to be tested under positive pressure instead of neutral pressure. Many states and local jurisdictions across the U.S. have adopted the International Building Code (IBC) which also

contains therequirement for positive pressure.

It is very important that architects, contractors and distributors are aware of the requirements in their area so the appropriate type of door is supplied (neutral or positive pressure). Requirements for fire ratings and neutral or positive pressure depend upon local codes; door manufacturers are not responsible for interpretations of local code requirements. All fire doors must meet the requirements of recognized fire door tests and bear certifying labels of an independent testing agency approved by the building official.

Installation is required to be in accordance with the National Fire Protection Association's Publication NFPA 80, Standard for Fire Doors and Other Opening Protectives. Machined fire doors shall be provided with detailed installation instructions when doors bear a label indicating compliance to UL 10B or UL 10C.

Important Facts to Consider When Reading Specifications

Note: Refer to current or adopted edition where applicable.

Key phrases indicating positive pressure	Key phrases indicating negative (neutral) pressure	Phrases that don't indicate either positive or negative pressure
• UBC 7-2 (1997) – UBC Fire Test • International Building Code (IBC) • NFPA 5000 – Building Construction and Safety Code • UL 10C – Fire Test • After 5 minutes into the test the neutral pressure plane should be at 40 inches • Shall meet positive	• UL 10B – Fire Test • UBC 7-2-1994 – UBC Fire Test • UBC 43-2 – UBC Fire Test • Tested at atmospheric pressure • Neutral pressure • Negative pressure	• NFPA 101 – Life Safety Code • NFPA 105 – Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives • NFPA 252 – Fire Test method which gives the option to be positive or negative • UBC – With no date given could be either positive or negative • UL 1784 – Air Leakage Test for Door Assemblies • NFPA 80 – Installation standard for fire doors

There are two categories of doors available for positive pressure fire openings.

Category A doors require no additional edge-sealing system. Doors included in this category have been evaluated without intumescent on either the frame or door, or the door has intumescent incorporated into the door by the door manufacturer.

Category B doors require additional edge-sealing system. Doors included in this category have been evaluated with intumescent applied to the frame surface, or incorporated into the frame by the frame manufacturer. Refer to the manufacturer's listings or installation instructions for meeting edge requirements, which may not require a field applied edge sealing system. Refer to the individual door listing and Category G, Edge-Sealing Systems for individual manufacturer's requirements.

Smoke and Draft Control Rating [S] (Category H)

Many positive pressure openings will also require a smoke seal. An "S" label requirement indicates the opening needs to have Smoke and Draft Control Gasketing. Category H includes gasket systems that are surface-applied to the perimeter of the door or frame. They may be kerf applied, adhesive backed or mechanically attached. It includes gasketing for the meeting edges. This category covers gasket systems that have been evaluated for use in positive pressure rated assemblies but generally do not provide an edge-sealing system to the opening as described below.

Edge-Sealing Systems (Category G)

Category G includes field applied systems only. Category G Edge-Sealing Systems are for use on Category B doors, or meeting edges (only) of Category A doors. These systems are surface-applied to either the perimeter of the door or frame, or meeting edge of the door. They may be kerf- applied, adhesive- backed, or mechanically fastened.

Door Specification Descriptors

Section D-1 lists the different types of flush door constructions available in the industry. Fire rated flush doors for positive pressure openings are designated with the "PP" suffix.

Labeling and Listing

The U.S. model building codes require fire doors to be labeled. The label indicates the rating and is a permanent identifying mark attached to the door. Labeling on the door indicates compliance with the requirements of the certification organization. In addition to the door, the door frame, glazing and hardware are required to be labeled for use with a specific fire door. NFPA 80 requires that all fire doors must be self-closing and self- latching.

C-7: Special Function Doors

Special Function doors are fabricated to meet specific functional criteria such as deterring sound, radiation, bullets, or attack from penetrating the opening. The design of the door to meet the product's purpose may impede its performance duty level as outlined in Section P-1 of this standard.

When specifying special function doors, it is the responsibility of the specification writer to outline all of the requirements within this standard for performance duty levels for the special function door.

Hurricane Resistant

Hurricane-resistant doors, also known as impact-resistant doors, are specifically engineered with reinforced materials, laminated glass, and heavy-duty hardware to withstand extreme wind pressures, flying debris, and water intrusion during severe storms. They must meet strict building codes and testing standards such as the Florida Building Code.

Sound Resistant (STC)

Sound Resistant Doors are specified by the Sound Transmission Class (STC) ratings as determined by ASTM E90 and ASTM E413. These doors are certified by the manufacturer with regard to their sound resistance. The assigned STC rating shall reflect the operable value. To ensure acceptable sound resistance of the door, specifications shall indicate the operable STC rating that is required. Specifiers should be aware that in order to incorporate acoustical materials, door thickness may exceed nominal 44mm (1-3/4 inches) . Consult manufacturer for details of actual door thickness, gasketing, automatic door seals, thresholds, frames or hardware which may be required.

Lead Lined (X-ray)

Lead Lined doors are usually manufactured to have continuous lead sheet(s) from edge to edge in the center of the door or between the FRP face and core. The total thickness of the lead sheet(s) determines the shield rating. Various thicknesses of lead sheets are available.

Thickness		Corresponding	
0.8 mm	(1/32 inch)	0.9 kg	(2 lb.)
1.6 mm	(1/16 inch)	1.8 kg	(4 lb.)
3.2 mm	(1/8 inch)	3.6 kg	(8 lb.)
4.8 mm	(3/16 inch)	5.4 kg	(12 lb.)
6.4 mm	(1/4 inch)	7.3 kg	(16 lb.)

Bullet Resistant

Bullet resistant doors are manufactured with special ballistic rated materials within the core assembly. They are available to meet or exceed protection levels defined in UL 752 or NIJ. 0108.01 performance standards. When specifying bullet resistant doors, identify what protection level is required.

Intrusion Resistant

Intrusion resistant doors are tested and manufactured as a system including the door components, hollow metal frame, hardware, specific glass, glazing and metal lite kit assembly. Consult manufacturer.

C-8: Environmental Doors

Doors have always been at the forefront of responsible use of our natural resources and many manufacturers offer doors that contribute to sustainable or high-performance building certification programs, such as LEED, Green Globes, Collaborative High-Performance Schools (CHPS) and other local and national programs.

Most doors are produced with pre-consumer recycled components and low emitting adhesives and binders. Doors can be supplied as chain of custody of certified products through programs. In addition, manufacturers can supply EPDs, HPDs and other certification documentation for their products.

WDMA does not publish or recommend any single sustainable or high-performance building standard or certification program. It is the responsibility of the specification writer to ensure the individual door manufacturer's products can contribute to the sustainable or high-performance building systems listed in the project specifications.

C-9: Door Construction Detail

Construction details outline the construction from the face, core, and structural support.

Refer to manufacturer's specific drawings for construction details.

Finishing

General

Finishes described in this Section are intended for FRP door and frame applications only. It is highly recommended that specifications require factory finishing to achieve the best overall door and frame appearance and durability.

F1: Factory Finishing

Factory finishing is generally specified when a project requires high quality performance and superior appearance. Factory finishing offers many benefits.

- Factory finishing utilizes state-of-the-art equipment in a dust-free environment provides uniform color, texture, and sheen - conditions normally unavailable in the field.
- Often in field finishing, numerous limitations prevent proper preparation. If improperly prepared, a door and frames lacks the clarity of finish and uniformity of color that is achieved by factory finishing.
- Factory finishing provides adequate drying time in a dust free environment.
- Manufacturing facilities are subject to strict State and Federal environmental standards which result in the proper handling, application, and disposal of finishing materials. Specifying factory finish improves environmental compliance.
- In most cases, the cost of factory finishing is lower than the cost of using a separate finishing contractor.
- Factory finished doors and frames can immediately be installed after delivery, which means faster project completion.

F-2: Finish Selection

Normally, door and frame manufacturers will only supply their standard finishing system. The factory finishing information provided by the specified manufacturer should be consulted before specifying the type and extent of finishing desired.

Selection of a finish should be based on physical samples provided by the door manufacturer for custom finishes.

F-3: Finish System Description

When selecting a finish, consider the desired appearance, exposure, and maintenance it will require.

By identifying a particular finish system, an expectation of performance characteristics for the factory finish is established. There are finish systems that are commonly referenced for commercial FRP doors and frames. These are by the manufacturer.

F-4: Sample Submission

Door manufacturers shall provide standard colors for selection.

To specify non-standard colors and sheens, the manufacturer is to provide two or more samples at least 3-inches x 3-inches (200 x 200 mm) showing the desired color on fiberglass face sheets.

Samples are to bear identification of the project and supplier. The manufacturer shall be permitted to submit samples in sets of two or more.

F-5: Job Site Finishing

Because of the many uncontrollable variables that exist at a job site, such as temperature, dust and other factors, manufacturers' warranties do not cover the appearance of finishes applied in the field. See Section J-3 for information on field finishing.

F-6: Visual Inspection Standards

FRP door faces and frames sometimes require touch up due to manufacturing or installation marks.

Factory finished doors and frames must be final inspected in the vertical position, at the opening, viewed under lighting identical to final job site conditions, prior to installation.

Jobsite Information

J-1: Jobsite Information for Commercial FRP Doors and Frames

To preserve the fine qualities of doors and frames and a lifetime of superior service, proper storage, handling, finishing and installation is very important. This section is not intended to “Scope” the proper storage, handling or field finishing of doors and frames received on the jobsite. The responsibility of properly preserving the quality once shipped from the factory and is the sole responsibility of the general contractor. The following guidance is provided to assist the general contractor to avoid damage that may occur to the door or frame due to improper storage, handling or field finishing. Contractors or subcontractors responsible for field finishing of doors should consult the architect for the proper finish selection, color and sheen desired. Any damage as a result of improper storage, handling and finishing is not the responsibility of the manufacturer.

J-2: Storage and Handling

Store doors or frames flat on a level surface in a dry, indoor environment while products are in shipping/packaging materials. Doors and frames should be kept at least 4 in. (102 mm) off the floor with cross supports. After unpackaging, doors and frames should be stored vertically. Doors and frames should always be handled with clean dry hands or while wearing clean dry gloves. Doors and frames should be lifted and carried when being moved, not dragged across one another.

J-4: Installation

Where provided, the installer shall install the door or frame in accordance with the manufacturer’s installation instructions. Where the installation instructions are not provided by the manufacturer, the guidelines below should be followed.

Do not install doors or frames in buildings where wet work is still being conducted, such as the taping and floating of drywall or cement, or floor coatings.

The utility or structural strength of the doors or frames must not be impaired when fitting to the opening, applying hardware, or preparing for lites, louvers, plant-ons or other detailing.

The recommended clearance between the top, hinge edge and lock edge to the frame and meeting edge of pairs of doors, refer to manufacturer’s hardware template.

The maximum clearance for fire doors at the top, hinge edge, lock edge and bottom shall be in accordance with NFPA 80.

All hardware locations, preparations and methods of attachment must be appropriate for the specific door construction. Templates for specific hardware preparation are available from hardware manufacturers or their

distributors.

Consult door manufacturer for trimming of door. Trimming of fire-rated doors must be in accordance with NFPA80.

Doors should be installed plumb, square and level. Ensure that all doors swing freely and do not bind in their frame.

J-5: Cleaning and Touchup

Inspect all doors prior to hanging them on the job. For noticeable marks or defects that may have occurred from improper storage and handling, please contact the manufacturer.

When cleaning door surfaces, use a non-abrasive soap and water designed for cleaning FRP surfaces that does not leave a film residue that would build up or affect the surface gloss of the door finish. Consult manufacturer's cleaning recommendations.

J-6: Adjustment and Maintenance

To properly ensure the working condition of the opening, first review the condition of the frame. Periodically test the door(s) so that it swings freely and does not bind in their frame. Adjust the finish hardware for proper alignment, smooth operation and proper latching without unnecessary force or excessive clearance.

Referenced Standards and Organizations

ADA
Americans with Disabilities
Disability Rights Section Mailing Address
U.S. Department of Justice 950 Pennsylvania Avenue, NW Civil Rights Division
Disability Rights Section - NYA
Washington, D.C. 20530
www.ada.gov

ANSI
American National Standards Institute, Inc.
25 West 43rd Street, 4th floor
New York, NY 10036
www.ansi.org
ANSI A208.1 – 16 Particleboard
ANSI A208.2 – 16 Medium Density Fiberboard (MDF) for Interior Applications

ASTM
American Society for Testing and Materials
100 Barr Harbor Drive
P.O. Box C700
West Conshohocken, PA 19428-2959
www.astm.org
ASTM D1308 - 02(2013) Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D3359 – 17 Standard Test Methods for Measuring Adhesion by Tape Test
ASTM D4060 - 14 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
ASTM E90 - 16 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
ASTM E413 - 16 Classification for Rating Sound Insulation

CHPS
Collaborative for High Performance Schools
2443 Fair Oaks Blvd., #259
Sacramento, CA 95825
www.CHPS.net

GBI US
The Green Building Initiative
7805 SW 40th Ave,
Suite 80010
Portland, Oregon 97214
www.thegbi.org

ICC
International Code Council
500 New Jersey Avenue, NW, 6th
Floor Washington, DC 20001-2070
www.iccsafe.org
International Building Code (IBC) – all editions

Intertek Testing
545 East Algonquin Road
Arlington Heights, IL 60005
www.intertek.com

MPI
Master Painters Institute
www.MPI.net
MPI Architectural Painting Specification Manual Revision 2019

NFPA
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
www.nfpa.org
NFPA 80 – 19 Standard for Fire Doors and Other Opening Protectives
NFPA 101 – 18 Life Safety Code
NFPA 105 – 19 Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives
NFPA 252 – 17 Standard Methods of Fire Tests of Door Assemblies
NFPA 5000 – 18 Building Construction and Safety Code

NIJ
National Institute of Justice
810 Seventh Street, NW Washington, DC 20531
www.nij.ojp.gov

SCS
Scientific Certification Systems
2200 Powell Street, Suite 600
Emeryville, CA 94608
www.scsglobalservices.com

UL
UL Standards and Engagement
1603 Orrington Ave., #2000
Evanston, IL 60201
www.ulse.org
UL 10B – 08 (Revised 2024) Standard for Fire Tests of Door Assemblies
UL 10C – 16 (Revised 2026) Standard for Positive Pressure Fire Tests of Door Assemblies
UL 752 11th Edition – 05 (Revised 2021) Standard for Bullet-Resisting Equipment
UL 752 12th Edition – 23 Standard for Bullet-Resisting Equipment
UL 1784 – 15 (Revised 2025) Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives

USGBC
U.S. Green Building Council
2101 L Street, NW, Suite 500
Washington, DC 20037
www.usgbc.org
LEED – Leadership in Energy and Environmental Design

WDMA
Window & Door Manufacturers Association
2001 K Street NW, Suite 300
Washington, DC 20006
www.wdma.com