

The Door Glazing Resource Guide

Answering the Questions... ...you were afraid to ask



Fire & Safety



Safety Only



Fire Only



Impact • Bullet



STC Rated



X-Ray • Safety



Anemostat®
www.anemostat.com



Teach me about Glazing

Glazing can be categorized into three major groupings:

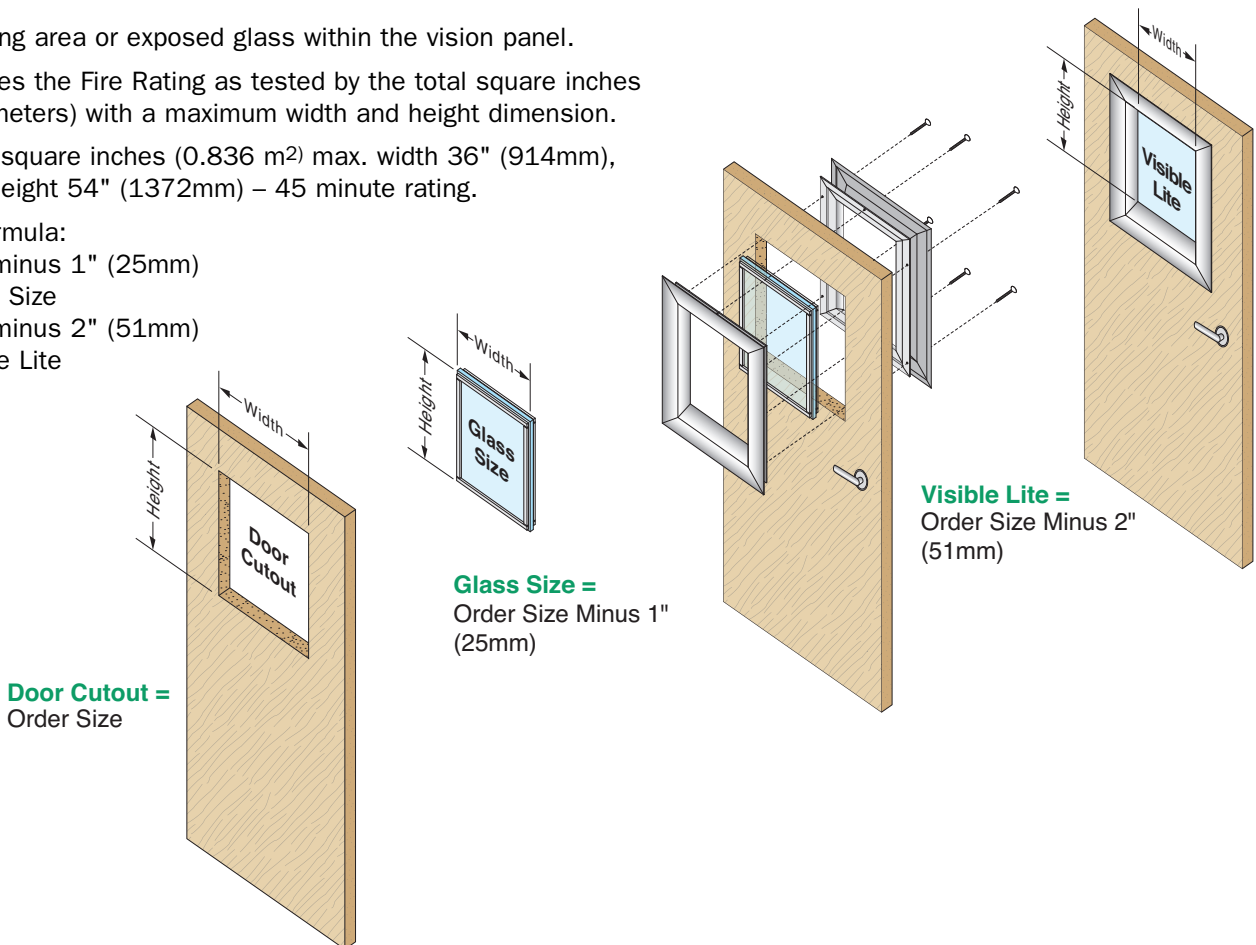
1. **Fire-Rated Only** (walls, transoms, borrowed lights)
2. **Safety/Impact Rated Only** (non-fire rated doors and other hazardous or security applications)
3. **Fire and Safety Rated** (fire rated doors or any application deemed a hazardous location)

What is a Fire Door Assembly?

- Any combination of a Fire door, a frame, hardware, and other accessories that together provide a specific degree of fire protection to the opening, while at the same time allows building occupants to pass through safely
- Each Manufacturer of the Fire Doors, Glazing and all of the other various Component Parts must be Individually fire tested to achieve a fire rating in minutes.
- The Fire Rating of each opening is determined by the **Sum Total** of all the Component parts of the Door Assembly, and based upon the Lowest Rated item in minutes. All items must be rated equally (All 90 min = 90 min Assembly) or (20 min glass in 90 min Door = 20 min Assembly).

What is Visible Lite?

- The viewing area or exposed glass within the vision panel.
- Determines the Fire Rating as tested by the total square inches (square meters) with a maximum width and height dimension.
- ie. 1296 square inches (0.836 m²) max. width 36" (914mm), or max. height 54" (1372mm) – 45 minute rating.
- LoPro Formula:
 - Cutout minus 1" (25mm) = Glass Size
 - Cutout minus 2" (51mm) = Visible Lite



Size Restrictions

If the Anemostat literature says a specific visible lite size and minute rating (i.e. 1296 sq. in., 0.836 m² at 90 minutes with FireLite), can I use that in any brand of wood or metal door?

- **No**, On visible lite sizes larger than 1296 sq. in. (0.836 m²) on 20/45 min. and 100 sq. in. (0.065 m²) on 60/90/180 min. Please consult with your Door / Frame Manufacturer's procedures, for their maximum glass size tested.
- Size limitations (in Visible Lite Sizes) depend on the product and the application. They will also be dictated by the total assembly (ie door, vision frame, glass and glazing tape).
- Please consult www.anemostat.com for the most recent Size Limitations and Technical Data information.



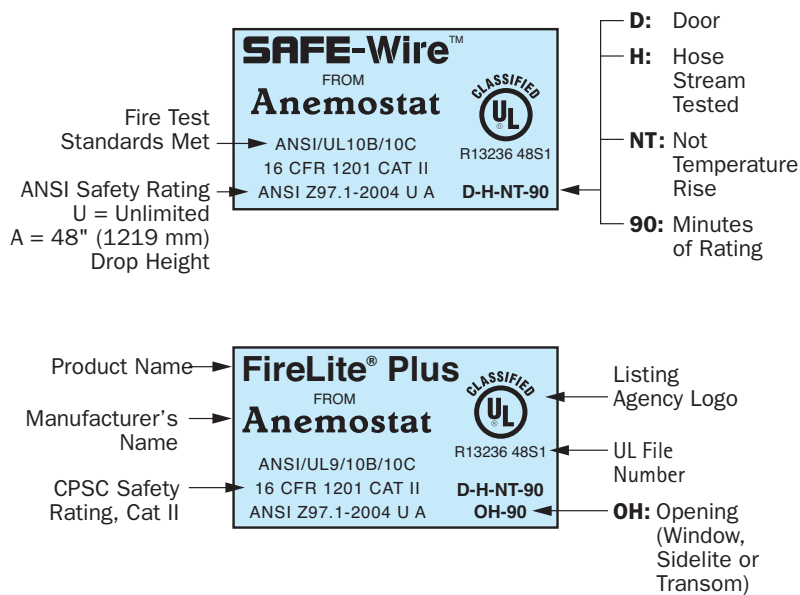
What do the Codes say about Labeling?

Does the fire rated glazing used in doors also have a permanent label and be safety rated?

YES, according **N.F.P.A –80, 2013**, Section 4.4.1, “Only Labeled Fire Resistance - rated or Fire Protection - rated glazing material shall be used in Fire Door Assemblies when permitted by the door listing.” Section 4.4.2 says “Fire Protection glazing and Fire Resistance glazing shall meet all applicable Impact Safety Standards.” Section 4.4.3 says “Glazing materials in vision panels shall be installed in labeled glass light kits or in accordance with the fire door listing and shall be installed per the manufacturer's installation instructions.”

Most building codes in North America now require such a label, although enforcement of such requirements lags in some areas. Fire-rated glazing materials do not all perform in a similar manner.

Glazing Label



Vision Panels Label



Embossed fire rated label on all applicable Vision Panel products

Fire Rated Louver Label



NEW

2012 IBC LABELING

The 2012 IBC simplifies the fire-rated glazing assembly marking scheme by reducing the number of marks that indicate test standards with which the glass complies. Glass that has earned a fire rating must be labeled under the 2012 IBC with the following marks, as appropriate:

Fire Test Standard	Marking	Definition of Marking
ASTM E119 or UL 263	W	Meets wall assembly criteria.
NFPA 257 or UL 9	OH	Meets fire window assembly criteria including the Hose Stream test.
NFPA 252 or UL 10B or UL 10C	D	Meets fire door assembly criteria.
	H	Meets fire door assembly “Hose Stream” test.
	T	Meets 450°F (232°C) temperature rise criteria for 30 minutes.
	XXX	The time in minutes of the fire resistance or fire protection rating of the glazing assembly.

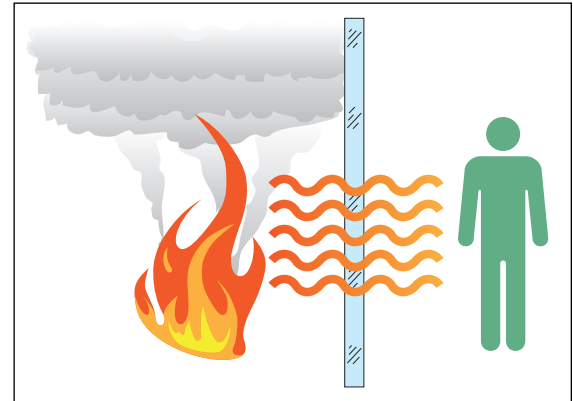


Fire Protective vs. Fire Resistive

What is the difference between Fire-Protective and Fire-Resistive glazing systems?

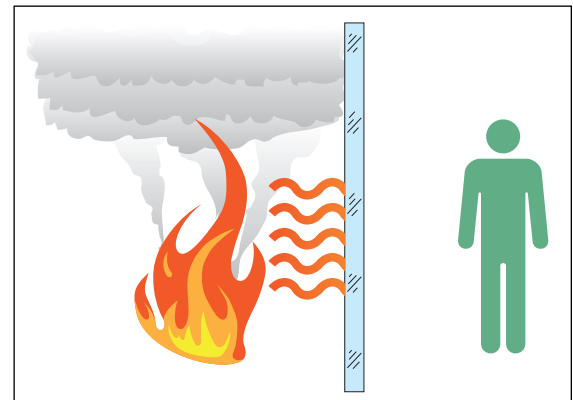
Fire Protection Rated

- Glazing defends against the spread of flames and smoke.
- Designed to compartmentalize smoke and flames and is subject to application, area and size limitations under the IBC.
- Typically is suitable where building codes allow “**opening protective**” assemblies. Glazing is available with fire ratings ranging from 20 to 180 minutes, it is subject to area and size limitations under the applicable building code and/or authority having jurisdiction.
- This designation indicates the duration of the fire test exposure to which a fire door assembly or fire window assembly was exposed and for which it successfully met all acceptance criteria as determined in accordance with test standards such as **NFPA 252 / NFPA 257 / UL 9 / UL 10C**.



Fire Resistance Rated

- Heat Barrier Rated Glass provides the same defense against flames and smoke as fire-protective glazing, and adds further protection **by blocking the transfer of radiant and conductive heat**.
- Products are generally multi-laminates incorporating several layers of glass with fire-resistive, intumescent interlayers or fire retardant-filled transparent units.
- Are considered a “wall,” and tested just like a brick, masonry, or gypsum board assembly. Listings for these products classify them as “transparent walls” that are not restricted to 25 percent of a wall area when the framing system has a rating equal to the glazing.
- This class includes products also rated for Acoustical performance, Blast and Bullet Resistance, and they are typically suitable where building codes require an assembly designated “fire resistant” to enclose a space. Includes applications requiring a 60-minute or greater fire rating that must meet **temperature-rise criteria**, such as stairwells, exit access corridors, or other fire barriers dividing interior construction. In these instances, the IBC requires the temperature rise on the non-fire side of the glass not to exceed 250 degrees Fahrenheit above the ambient temperature at the end of the fire test (generally 60 or 120 minutes). **Such glass must also pass the hose stream test**.
- Designed for materials or assemblies that have withstood a fire exposure as established in accordance with the test procedures such as **NFPA 251 / ASTM E-119 / UL 263**. This rating tests a product’s ability to block the transfer of conductive and radiant heat from a fire.
- Due to the need for special cutting and processing equipment, delivery must be direct from the manufacturer. This extended lead-time is a consideration if glass requires immediate replacement. With a typical thickness of at least 3/4”, frames and glazing “stops” may require modification to ensure proper assembly.





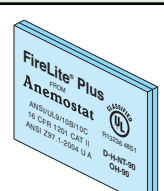
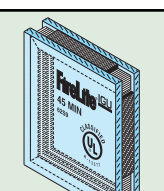


To summarize, fire-protective glass is not designed to block or stop radiant heat; fire-resistive glazing does. Fire-resistive glass is considered as a “wall,” tested just like a brick, masonry, or gypsum board assembly. The ratings required by the U.S. building codes are determined based on applications for fire-protective and fire-resistive constructions. The application requirements are based on time-the time to allow for safe egress and to maintain the structural integrity of the building.

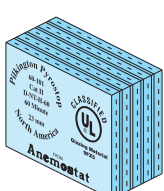
Fire Protective vs. Fire Resistive



Fire Protective glass products include:

Product	Description	Fire Rating	Safety Rating	Typical Application(s)	LoPro-STC Rating
	FireSAFE-20 1/4" (6mm) Specialty Tempered, Clear	20 minutes	CPSC Cat. II ANSI Z97.1-2004 U A	DOORS - 20 min up to max. size tested	N/A
	SAFE-Wire 1/4" (6mm) Safety Wired Glass with surface applied safety film	20-90 min.	CPSC Cat. II ANSI Z97.1-2004 U A	DOORS –20 to 45 min. up to max. size tested / 60 to 90 min. up to 100 sq. in. / SIDELITES, TRANSOMS and WINDOWS - 45 min	STC-38 with LoPro-AA1-STC
	FireLite 3/16" (5mm) Ceramic, Clear	20-90 min.	NONE	TRANSOMS and WINDOWS where safety is not a requirement 20 to 90 min to max size tested	N/A
	FireLite-NT 3/16" (5mm) Ceramic, Clear with surface applied safety film	20-180 min.	CPSC Cat. II ANSI Z97.1-2004 U A	DOORS – 20 to 180 min. up to max. size tested / SIDELITES, TRANSOMS and WINDOWS – 45 to 90 min to max size tested	STC-35 with LoPro-AA1-STC
	FireLite Plus 5/16" (8mm) Laminated Ceramic Safety	20-180 min.	CPSC Cat. II ANSI Z97.1-2004 U A	DOORS – 20 to 180 min. up to max. size tested / SIDELITES, TRANSOMS and WINDOWS – 45 to 90 min to max size tested	STC-38 with LoPro-AA1-STC
	FireLite IGU 1" (25mm) Insulated, Clear Ceramic and Tempered	20-180 min.	CPSC Cat. II ANSI Z97.1-2004 U A	DOORS – 20 to 180 min. up to max. size tested / SIDELITES, TRANSOMS and WINDOWS – 45 to 90 min to max size tested	STC-42 with LoPro-BB1-STC

Fire Resistive glass products include:

Product	Description	Fire Rating	Safety Rating	Bullet Resistance	LoPro-STC Rating
	Pyrostop Multi-Laminate Clear Glass 3/4" (19mm) to 2 3/8" (62mm)	DOORS – 45 to 120 min, based on thickness and max size tested. WALLS, SIDELITES and TRANSOMS – 45 to 120 min to max. size tested	CPSC Cat. II	Level 1 - 1 1/16" (27mm) w/Film Level 2 - 1 9/16" (40mm) w/Film Level 2 - 2 3/16" (56mm) IGU Level 3 - 2 7/16" (62mm) IGU w/Film	STC-41 Pyrostop 7/8" (23mm) 60-101 with LoPro-BB1-STC



Safety Rated Glazing

What is all the talk I'm hearing about Fire AND Safety Rated Glazing? What about Wire Glass? Isn't Wire Glass Outlawed?

IBC CODE - SECTION 2406 SAFETY GLAZING

IBC 2000 and Prior Codes	IBC 2003	IBC 2006 to Present
Wire Glass - was 100% exempt from applicable Safety Standards in Fire Doors.	Wire Glass - a portion of exemption was withdrawn for areas in schools, day care, etc. where children are present.	Wire Glass - 100% of exemption is withdrawn from code.

What does it mean?

For over 25 years CPSC granted Wire Glass an exemption from complying with higher standards (Category I and II) of impact / safety in hazardous locations. Wire Glass was the primary, low cost, and readily available product that would comply with fire rated door requirements. It will not however pass Category I or II Safety testing, and was given an exemption from safety compliance for use in fire doors only.	Lawsuits involving injured children caused IBC to withdraw a percentage of the exemption. IBC 2003 says basically, if children are predominantly present, (i.e. school, day care etc.) glazing in fire doors must be fire AND safety rated per section 2406. Exemption for Wire Glass in these areas only was withdrawn. Now, other more expensive fire rated glazing products are available that also comply with category I and/or II safety requirements.	Plenty of Fire and Safety rated glazing products are now available. Wire Glass exemption is completely withdrawn. Now, all glazing in fire doors must also be safety rated per section 2406 in hazardous locations, as originally intended per Category I and II. Wire Glass (NON-Safety Rated) can only be used in NON-Hazardous locations. See pages 8 & 9.
---	---	--

What are the Differences Between Safety Glazing Standards? CPSC 16 CFR 1201 and ANSI Z97.1-2004

In 1977, the U.S. Consumer Products Safety Commission (**CPSC**) adopted as a mandatory federal safety regulation Safety Standard for Architectural Glazing Materials, codified at **16 CFR Part 1201**.

ANSI Z97.1 is only a voluntary safety performance specification and test method. It does not attempt to declare when and where safety glazing materials must be used, leaving those determinations up to the building codes and to glass and fenestration specifiers.

ANSI Z97.1 uses two Separate Impact Performance categories.

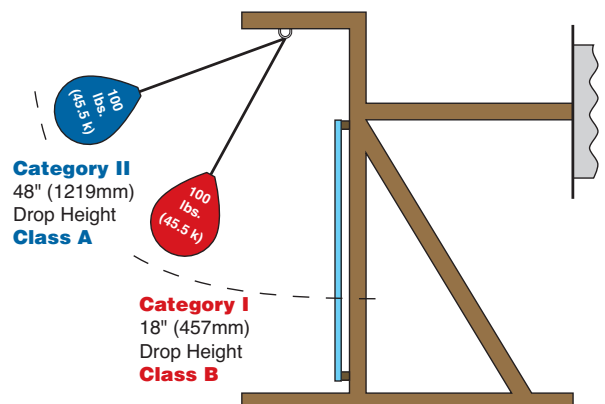
Impact Drop: 48-inch drop height test = **Class A** is comparable to the CPSC's Category II
18-inch drop height test = **Class B** is comparable to the CPSC's Category I

Size Criteria: "U" is for Unlimited size based on passing max test size
"L" is for Limited based on size area based on tested size

CPSC 16 CFR 1201

CATEGORY I: Impact safety level designated by "code of federal regulations" part 16. (16 CFR). "Category I" glazing materials are subjected to the impact of a 100 lb. bag swung from 18" drop height (approx. 150 ft/lb impact), with no single piece of glazing material greater than 9 square feet in surface area. Cat I resembles an 85 lb. child running into the glazing material.

CATEGORY II: Impact safety level designated by "code of federal regulations" part 16. (16 CFR). "Category II" glazing materials are subjected to the impact of a 100 lb. bag swung from 48" drop height (approx. 400 ft/lb impact), with any piece of glazing material greater than 9 square feet in surface area. Cat II resembles a full-grown adult running into the glazing material.





What Does the Code Say?

IBC 2009

SECTION 2406 SAFETY GLAZING

2406.1 Human impact loads. Individual glazed areas, including glass mirrors, in hazardous locations as defined in Section 2406.4 shall comply with Sections 2406.1.1 through 2406.1.4.

2406.2 Impact test. Where required by other sections of this code, glazing shall be tested in accordance with **CPSC 16 CFR 1201**. Glazing shall comply with the test criteria for **Category I or II** as indicated in Table 2406.2(1).

Exception: Glazing not in doors or enclosures for hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers shall be permitted to be tested in accordance with **ANSI Z97.1**. Glazing shall comply with the test criteria for **Class A or B** as indicated in Table 2406.2(2).

**TABLE 2406.2(1) MINIMUM CATEGORY CLASSIFICATION OF GLAZING USING
CPSC 16 CFR 1201**

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZING IN DOORS (Category class)	GLAZED PANELS REGULATED BY ITEM 7 OF SECTION 2406.4 (Category class)	GLAZED PANELS REGULATED BY ITEM 6 OF SECTION 2406.4 (Category class)	SLIDING GLASS DOORS PATIO TYPE (Category class)
9 square feet or less (0.836 M ²)	I	No requirement	I	II
More than 9 square feet (0.836 M ²)	II	II	II	II

Metric System (SI): 1 square foot = 0.0929 m² (Square Meters)

**TABLE 2406.2(2) MINIMUM CATEGORY CLASSIFICATION OF GLAZING USING
ANSI Z97.1**

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZED PANELS REGULATED BY ITEM 7 OF SECTION 2406.4 (Category class)	GLAZED PANELS REGULATED BY ITEM 6 OF SECTION 2406.4 (Category class)
9 square feet or less (0.836 M ²)	No requirement	B
More than 9 square feet (0.836 M ²)	A	A

Metric System (SI): 1 square foot = 0.0929 m² (Square Meters)

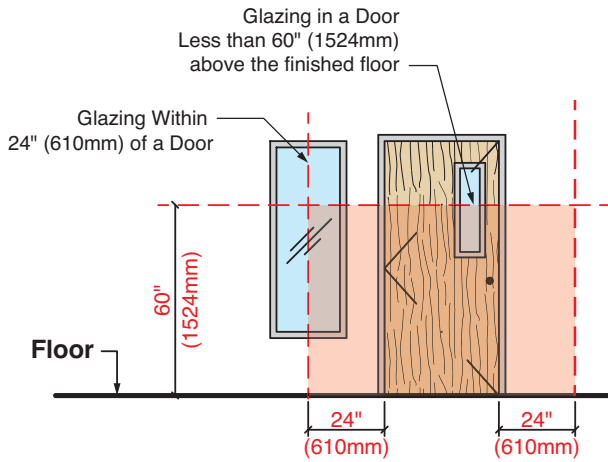


Safety Rated Glazing

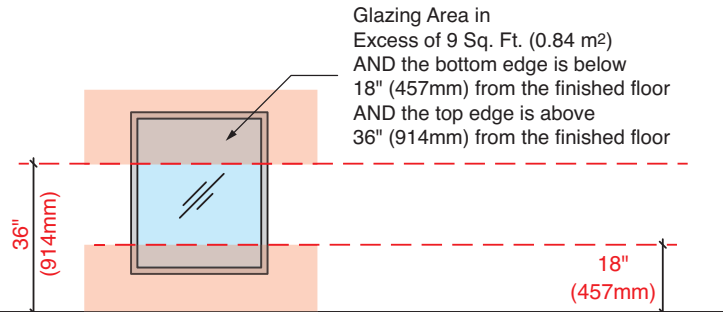
Defining HAZARDOUS LOCATIONS

Where Safety Glazing **IS** Required

Glazing In and Adjacent to Doors



Glazing NOT Adjacent to a Door

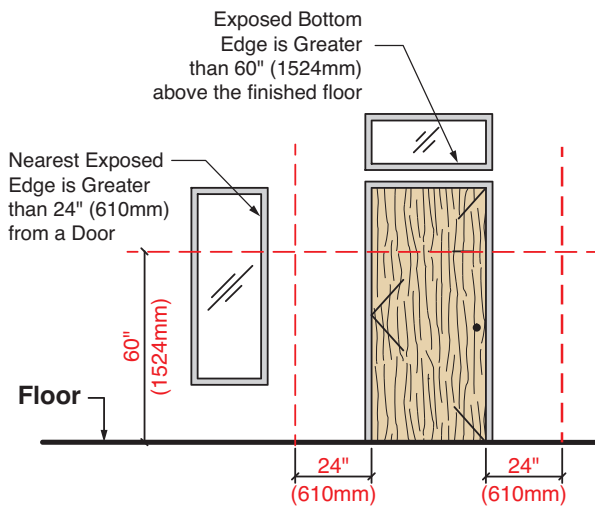


Safety Glazing is required in a fixed panel which meets ALL THE FOLLOWING:

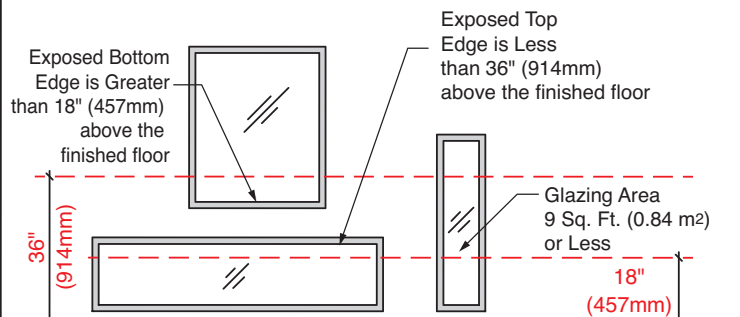
- Safety Glazing is required when any part of the Side Panels to door is within 24" (610mm) of either side of the door edge and under 60" (1524mm) off the finished floor.
- Exposed area of an individual pane greater than 9 sq. ft (0.84 m²).
- Exposed bottom edge less than 18" (457mm) above floor.
- Exposed top edge greater than 36" (914mm) above floor.

Where Safety Glazing is **NOT** Required

Glazing In and Adjacent to Doors



Glazing NOT Adjacent to a Door

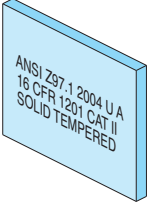
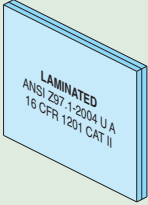
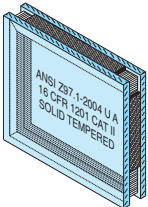
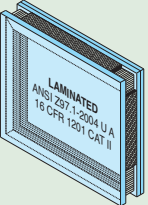


Safety Glazing is NOT required in a fixed panel which meets ONE of the following:

- Safety Glazing is NOT required when the exposed bottom edge of the glass is 60" (1524mm) or greater above the finished floor.
- Exposed area of an individual pane 9 sq. ft (0.84 m²) or less.
- Exposed bottom edge less than 18" (457mm) above the finished floor AND the top edge is below 36" (914mm) from the finished floor.
- Exposed top edge greater than 36" (914mm) above the finished floor AND the bottom edge is greater than 18" (457mm) above the finished floor.



TYPES of SAFETY RATED GLAZING

Product	Description	Fire Rating	Safety Rating	LoPro-STC Rating
	Tempered 1/4" (6mm) Clear Safety Rated	N/A	CPSC Cat. II ANSI Z97.1-2004 U A	N/A
	Laminated Clear Safety Rated 1/4" (6mm)	N/A	CPSC Cat. II ANSI Z97.1-2004 U A	N/A
	Tempered-IGU 1" (25mm) Clear, Insulated Safety Rated	N/A	CPSC Cat. II ANSI Z97.1-2004 U A	STC-35 with LoPro-BB1-STC
	Laminated-IGU 1" (25mm) Clear, Insulated Safety Rated	N/A	CPSC Cat. II ANSI Z97.1-2004 U A	STC-42 with LoPro-BB1-STC

2406.4 Hazardous locations. The following shall be considered specific hazardous locations requiring safety glazing materials:

1. Glazing in swinging doors except jalousies (see Section 2406.4.1).
4. Glazing in unframed swinging doors.
6. Glazing in an individual fixed or operable panel adjacent to a door where the nearest exposed edge of the glazing is within a 24-inch (610 mm) arc of either vertical edge of the door in a closed position and where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the walking surface.
7. Glazing in an individual fixed or operable panel, other than in those locations described in preceding Items 5 and 6, which meets all of the following conditions:
 - 7.1. Exposed area of an individual pane greater than 9 square feet (0.84 m²).
 - 7.2. Exposed bottom edge less than 18 inches (457 mm) above the floor.
 - 7.3. Exposed top edge greater than 36 inches (914 mm) above the floor.



Threat Exposure: There are three threats regarding window glass and glazing systems. **Forced Entry, Ballistic and Explosive Blast Attacks.**

Safety: Provides for the reduction of the risk or occurrence of injury, loss or death from **accidental or natural causes.**

Security: Provides for the reduction of the risk or occurrence of injury, loss or death from the intentional **actions of man.**

UL Protection Level Ratings

- Levels for Bullet-Resistant systems have been established by **UL (Underwriters Laboratory)**, the primary testing organization for materials used in these systems. While ratings extend to Level 8, the needs of most banks, credit unions, and convenience stores are well covered in Levels 1-3.

Underwriters Laboratories Inc. (UL) 752 Ratings of Bullet Resistant Materials

UL Level	Weapon	Description	Ammunition	Grain (g)	Min FPS	Max FPS	# of Shots
1		9mm Full Metal Copper Jacket with Lead Core		124 (8.00)	1175	1293	3
2		.357 Magnum Jacket Lead Soft Point		158 (10.20)	1250	1375	3
3		.44 Magnum Lead Semi-Wadcutter Gas Checked		240 (15.60)	1350	1485	3
4		.30 Caliber Rifle Lead Core Soft Point		180 (11.70)	2540	2794	1
5		7.62mm Rifle Lead Core Full Metal Copper Jacket, Military Ball		150 (9.70)	2750	3025	1
6		9mm Full Metal Copper Jacket with Lead Core		124 (8.00)	1400	1540	5
7		5.56mm Rifle Full Metal Copper Jacket with Lead Core		55 (3.56)	3038	3388	5
8		7.62mm Rifle Lead Core Full Metal Copper Jacket, Military Ball		150 (9.70)	2750	3025	5

Ballistic Protection Level Ratings

- Total system of frame, door and glazing material must absorb the energy from the projectile.
- Framing system must also stop the potential threat and retain the glazing system during attack. Bullet resistant glazing in a non-certified frame will not ensure the desired level of protection.
- Ballistic glazing certified to meet a ballistic standard, must be retained in a certified framing system

What about Forced Entry?

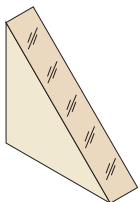
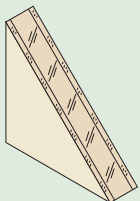
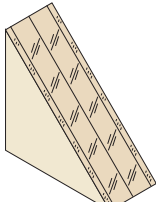
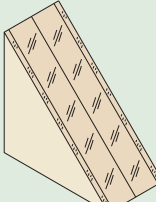
- Is the attempted penetration of a door, window and walls using a wide variety of tools.
- Tools may include, but are not limited to sledge hammers, pry bars, wood splitting mauls, fire axes, battering rams, gasoline, acetone, propane torches and CO2 fire extinguishers.
- Standards include **ASTM F1233** for glazing material, **ASTM F588** for windows, and **ASTM F476** for doors. These standards have multiple levels of ratings based on the severity of the threat.

Glazing is not required by code to:

1. Resist any certain level of burglary attempts - **Forced Entry Resistance**
2. Defeat projectile penetration - **Ballistic Resistance**
3. To defeat and maintain integrity from explosive effects - **Blast Resistance**

- These utilize independent testing laboratories test methods and standards that subject glazing to these specialized classifications of attack.



Product	Description	Thickness	Bullet Resistant	Forced Entry Test
	Lexan MR-10 Polycarbonate	1/8" (3mm) 1/4" (6mm) 3/8" (10mm) 1/2" (13mm) Clear	NA	Burglary Resisting to UL 972
	MP-750 Laminated Polycarbonate	3/4" (19mm) Clear	Level 1 (9mm) per UL 752	N/A
	MP-1000 Laminated Polycarbonate	1" (25mm) Clear	Level 2 (.357 magnum) per UL 752	HPW-TP-0500.02 Level IV (Step 52) ASTM F-1233-08 - Contraband Class II (Step 11) - Body Passage Class V (Step 41)
	SP-1250 Laminated Polycarbonate	1-5/16" (33mm) Clear	Level 3 (.44 magnum) per UL 752	HPW-TP-0500.02 Level V (Step 54) ASTM F-1233-08 - Contraband Class III (Step 20) - Body Passage Class V (Step 41) ASTM F-1915-03 - Security Grade Level 1

PLEASE NOTE: New Products may be added to this Product Category. Consult Factory for the most current information.

Explosive Blast Attacks

- Based on the deliberate or intentional acts of man. Can also be based on industrial or chemical blasts occurring in refineries, manufacturing, or R & D facilities.
- Four generalized damaging effects are generated from explosive blasts:
 1. Primary cause, or the shock or initial blast wave from the explosion.
 2. Damage from the impact of fragments from the encasement material.
 3. Hot gasses and flame igniting fires, burn victims and its subsequent damage.
 4. Ground vibrations or "seismic loading" causing effects similar to that produced by an earthquake.

Explosive Blast Testing Requirements

- Centered around the air-blast standard. Test protocol and procedures are defined by **ASTM F1642-96**. The standard effects the whole surface area of the test specimen, and can be reproduced without substantial variances. Standard is for testing glazing systems including those fabricated with glass, plastic, glass - clad composites, laminated glass, glass/plastic glazing materials and film-backed glass.
- Test is usually conducted in a shock tube, but can also be in an open-air arena capable of accommodating the detonation types of explosives, charge weights, peak positive, incident or reflected pressures, and encasement materials, stand-off distances and positive phase durations. Open-air arena atmospheric conditions cannot be as easily regulated as in the chamber. Another advantage of the shock tube test is replicating secondary rebounding pressures and durations, more commonly associated with high-rise urban environments.

This information not intended to be utilized for the interpretation of building codes, regulations, or statutes governing security glazing. Information contained herein is subject to change in accordance with manufacturer's product line updates as well as building industry regulations.



STC - Sound Ratings

What is an STC rating? (Sound Transmission Class)

- STC is a numbered rating system derived from measured values of sound transmission loss in accordance with **ASTM E90-09**, Standard test method for laboratory measurement of airborne sound transmission loss of building partitions **ASTM E2235-04**, Standard test method for determination of decay rates for use in sound insulation test method. **ASTM E413-04**, Classification for rating sound insulation. STC ratings provide an industry accepted method for comparing the sound reduction effectiveness for various sound doors and windows.

How Changes in STC Affect Changes in Apparent Loudness

Changes in STC Rating	Changes in Apparent Loudness
+/- 1	Almost Imperceptible
+/- 3	Just Perceptible
+/- 5	Clearly Noticeable
+/- 10	Twice (or half) as Loud

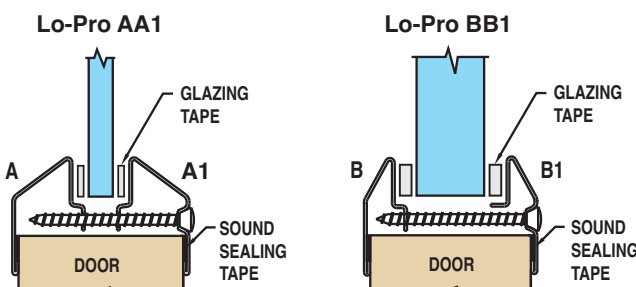
Define Sound Transmission Class (STC) and Transmission Loss (TL)

- Door's ability to reduce noise is called its transmission loss (TL) effectiveness. **TL** is a value given in decibels, which is determined by measuring sound pressure levels at a certain frequency in the source and receiving rooms. Adjusted difference between the two levels is the TL of the door.
- TL ratings for a door are taken across a range of frequencies, which makes it difficult to compare the effectiveness of different doors. STC ratings solve the problem by giving a number value to the acoustical performance for a door. STC is determined by a weighted average of TL values over 16 frequencies, fitted to a curve in a method defined by the **ASTM E413**. **The higher the STC value, the better the rating** and sound protection.

Product	STC Rating	Definition
Hollow Metal or Wood Door (without seals)	20-25	Normal Speech - Easily Understood
1/4" (6mm) Plate Glass	26	
	25-30	Normal Speech - Audible, but Unintelligible
Various Types of Sound Doors	30-35	Loud Speech - Understood
1/2" (13mm) Plate Glass	32	
1/4" (6mm) Laminated Glass	35	
1/2" (13mm) Drywall on Wood Studs, both sides	38	
	35-40	Loud Speech - Audible, but Unintelligible
5/8" (16mm) Drywall on Steel Studs, both sides	42	
	45	Loud Speech - Barely Audible
8" (203mm) Hollow Concrete Block	46	
	50	Shouting - Barely Audible
12" (305mm) Poured Solid Concrete Wall	53	
	55	Shouting - Not Audible

LoPro™ -STC

Rated Vision Frame & Glazing Assembly



Sound Ratings

LoPro-AA1-STC with 3/16" (5mm) FireLite NT:*	STC - 35
LoPro-AA1-STC with 1/4" (6mm) SAFE-Wire:*	STC - 38
LoPro-AA1-STC with 5/16" (8mm) FireLite Plus:*	STC - 38
LoPro-BB1-STC with 7/8" (23mm) Pyrostop 60-101 23mm:*	STC - 41
LoPro-BB1-STC with 1" (25mm) FireLite Plus IGU:*	STC - 42
LoPro-BB1-STC with 1" (25mm) Tempered IGU:(Safety Rated Only)	STC - 35
LoPro-BB1-STC with 1" (25mm) Laminated IGU: (Safety Rated Only)	STC - 42
* Fire Rated - see Glazing Section for ratings and maximum allowable sizes	



Tell me about X-RAY GLASS

Medical X-Ray View Window Design Requirements: NCRP #49 requires under Radiographic Installations 5.3.2. "Provision shall be made for the operator to observe and communicate with the patient from a shielded position at the control panel. When an observation window is provided it shall have a lead equivalence at least equal to that required of the partition (or the door) in which it is located."

- AIA and FGI (Facility Guidelines Institute) Guidelines for Design and Construction of Health Care Facilities requires under **Shielded Control Alcoves 5.5.4.4**. "Each X-Ray room shall include a shielded control alcove. This area shall be provided with a view window designed to provide full view of the examination table and the patient at all times, including full view of the patient when the table is in the tilt position or the chest x-ray is in use. The window(s) should be at least 18" x 18" (457 x 457mm) and centered 60" (1.5m) above the finished floor."

***Please Note the above uses of the word "shall" is a requirement, and use of the word "should" is a recommendation**

X-Ray Glass for Radiation Shielding: Is specifically formulated to efficiently attenuate and protectively shield against X-Ray Gamma Radiation by using a combination of a heavy density and a high content blend of heavy oxides and minerals for maximum radiation resistant shielding performance while utilizing optimum glass thickness mass, while providing excellent optical clarity and a non-browning optimal level of light transmission. Is code compliant, radiation life and safety protection for the medical technician and allows an excellent clear view of the patient during critical medical diagnostic imaging procedures.

Lead Shielding Equivalences: X-Ray Glass is readily available in 4# and 8#. Higher ratings available on request.

X-Ray Safety Glass is Permanently Labeled: Provides required impact resistance for use In doors or walls or for additional seismic safety. Provides a clear view, while shielding X-Ray/Gamma radiation, and 95% of UV protection. X-Ray Safety Glass is NOT fire-rated, tempered, impact proof, shatter proof or scratch resistant. Fire-rated designs are usually available upon request.

Visible Light Transmission: Glass transparency results may vary depending upon X-Ray glass thickness, glass composition, light frequency, spectrum, and or sources such as natural sunlight, UV, incandescent, florescent, halogen, sodium, mercury, metal halide or LED and light transmission measurement methods and controls.

Lead Equivalence: Lead has the property of blocking/ absorbing x-ray radiation due to its high density. Various thicknesses of pure lead provide different levels of protection or attenuation (reducing the Intensity of radiation passing through) as material under specified conditions. The protection provided by this type of sheeting is compared with that of pure lead and referred to as "Lead Equivalence". Lead equivalence as specified for materials used in diagnostic X-Ray rooms is measured at 150 kV (X-Ray beam dosimetry defined as "distribution of radiation emitted from a source of ionizing radiation") unless indicated otherwise.

All calculations for shielding requirements should be determined by a qualified health radiation physicist currently recognized by the state in which the project occurs

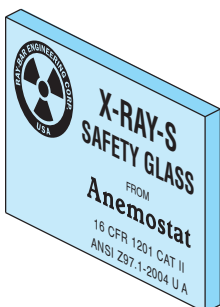
X-Ray Protection Glazing Products

X-Ray-S Glass

Category II Impact/Safety Rated 5/16" (8mm)
Clear Visibility Radiation Protective Lead Glass

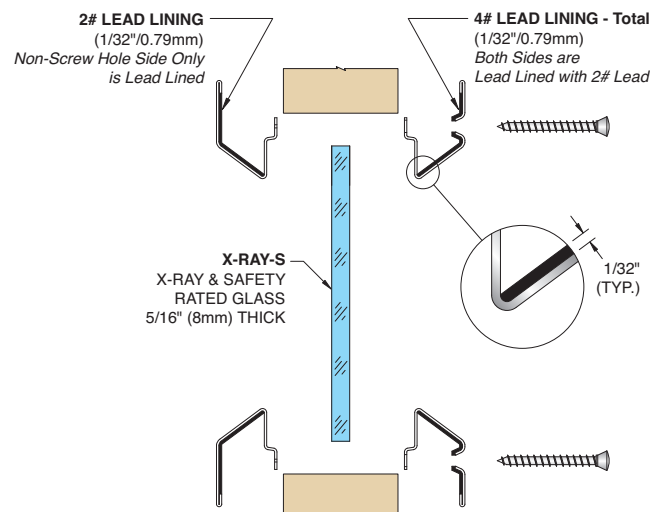
X-Ray Glass

Non-Safety Rated



- **MATERIAL:** 5/16" (8mm) X-Ray-S Safety Glass 5/16" (8mm) X-Ray Glass - Non-Safety Rated
- **INSTALLATION:** By using glazing tape or glazing compound on both sides of glass, sandwiched between a lead lined metal vision frame
- **CLASSIFICATION MARKINGS:** Each piece of glass is cut to size. 5/16" (8mm) X-Ray Safety Glass is permanently marked as meeting ANSI Z97.1 and CPSC 16 CFR 1201 Cat II requirements for impact resistance.
- **FIRE RATINGS:** Only when utilizing Lead Lined FGS-MS5-FR and FireLite® NT or FireLite® Plus
 - **20/45 minute:** Approved listing at 1296 sq. in. (0.836 m²) visible lite
 - **60/90 minute:** Approved listing at 100 sq. in. (0.065 m²) visible lite

LoPro Vision Frame - Non-Fire Rated





Hurricane Rated Glazing

The Test Methods and Specifications

There are two basic test methodologies utilized in hurricane testing; HVWZ **TAS 201** and **TAS 203** (Florida Building Code) and **ASTM E1886**. These documents describe the technique used to propel the timber through the air and impact the fenestration system, and also provide the specifics for subjecting the glazing to the required repetitive cyclical loads. The ASTM test method has a corresponding specification, **ASTM E 1996**, that indicates what missile size shall be used depending upon application and wind speed (see figures 3 and 4), location of impact, pass/fail criteria and substitution limitations. For example, below 30 feet from grade is typically the zone for impact by a lumber (large missile), whereas above 30 feet from grade is the zone for impact by 2 gram steel ball bearings (small missile).

Missile impact standards and testing

The ICC Standard for Residential Construction in High Wind Regions specifies that doors, skylights, and windows in the windborne debris region shall be either impact resistant or protected with an impact resistant covering. The American Society of Civil Engineers' newly developed wind speed maps define the wind-borne debris region as the regions within one mile of the coastal mean high water line and where ultimate wind speeds of 130mph or greater. Per the Florida Building Commission 2010 Code, **ASTM E1996** wind zones are to be specified as follows:

Missile Type and Wind Zone

Missile Level	Missile	Impact Speed feet/sec (mph)	Typical Use
A	2 gram steel ball	130 (89)	Above 30 ft., Wind Zone 1 - 4, FBC & HVWZ Area
B	2 lb. Lumber	50 (34)	Skylights ≤ 30 ft., Wind Zone 2 (Basic)
C	4.5 lb. Lumber	40 (27)	Less than 30 ft. , Wind Zone 1 & 2 (Basic)
D	9 lb. Lumber	50 (34)	Less than 30 ft., Wind Zone 3 & 4 (Basic), Wind Zone 1 & 2 (Enhanced) HVWZ Area
E	9 lb. Lumber	80 (55)	Less than 30 ft., Wind Zone 3 & 4 (Enhanced)

Wind Speed and Missile Chart for Basic Level Protection

Wind Zone	Wind Speed mph (km/hr)	Approximate Design Pressure	HVWZ Missile Level ≤ 30 ft. (9m)	ASTM Basic Missile Levels ≤ 30 ft. (9m)	ASTM & FBC Small Missile > 30 ft. (9m)
1	110 (177)	+/- 30	D	C (B for Skylights)	A
2	120 (193)	+/- 37	D	C	A
3	130 (209)	+/- 42	D	D	A
4	140 (225)	+/- 50	D	D	A



Hurricane Rated Vision Frame, Glass and Tape System

Vision Panel	Glazing	Description	Hurricane / Windstorm
		18 GA (1.2mm) Vision Panel 1/2" (13mm) Clear Glazing and VHB Glazing Tape System for 1-3/4" (4mm) Doors	Approvals with UL Mark: ASTM E330, E1886, E1996 Florida Building Code Standards File: FL# 11736, ANSI 250.13* Large Missile Test (D) Impact 350 ft. lbs. Approximately 167mph Wind Speed Design Pressure: +/- 70 PSF

*ANSI 250.13 Testing and Rating of Severe Wind-Storm Resistant Components for Swinging Doors Assemblies is equivalent to ASTM E 330-84, ASTM E 1886-97 and ASTM E 1996-99 except for the High Velocity Hurricane Zone (HVHZ).



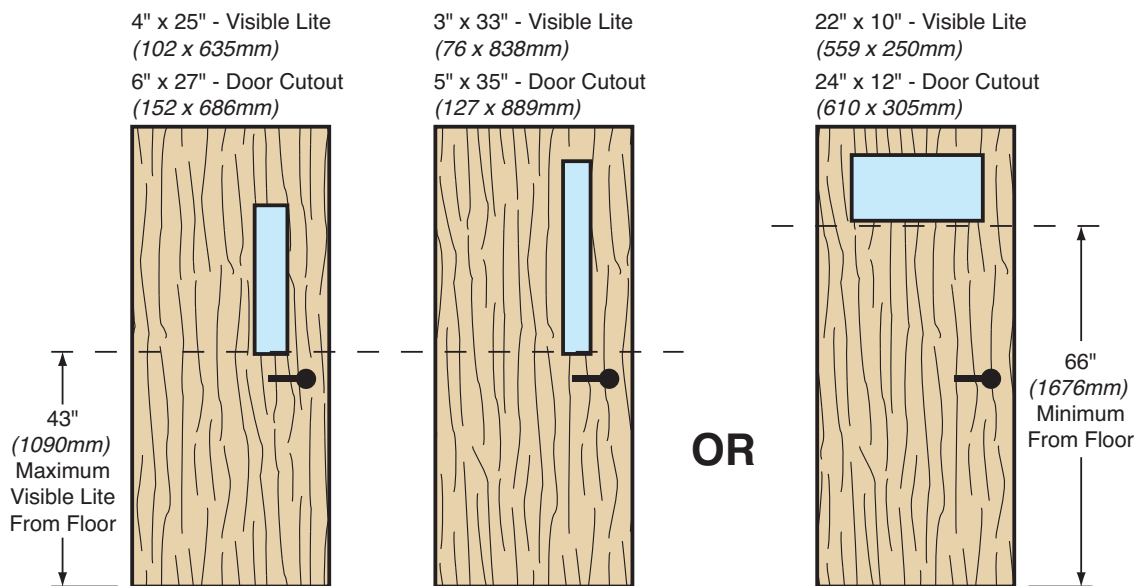
Americans with Disability Act - 2010 ADA Standards for Accessible Design

The 2010 ADA Standards, as adopted by the Department of Justice (DOJ) in September 2010, became mandatory on March 15, 2012. DOJ is allowing immediate use of these standards as an alternative to its original 1991 standards but requires that the selected standard be applied consistently to a project. DOJ's ADA standards apply to facilities covered by the ADA, including places of public accommodation, commercial facilities, and state and local government facilities. They do not apply to transportation facilities, including bus stops and rail stations, which are subject to similar standards issued by the Department of Transportation.

What does ADA say about Vision Frame placement?

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

EXCEPTION: Vision lights with the lowest part more than 66 inches (1676 mm) from the finish floor or ground shall not be required to comply with 404.2.11.



The above drawings are based on 3-0 x 7-0 (914 x 2134mm) doors and are drawn to scale.

What about Glazing in Wood Doors?

Does it have to be factory installed?...Read and Decide

NFPA-80-2013, 4.4.3.1 reads: For new wood doors, glazing materials in vision panels shall be installed in labeled glass light kits or in accordance with the fire door listing and shall be installed in accordance with inspection service procedure and under label service.

What this means is that all glass in new wood doors must be installed either by the door manufacturer, or in a licensed door shop, following the procedures and instructions of both the door manufacturer and light kit manufacturer. It also ensures that all components of the glazed assembly in the new wood door have been properly installed per the manufacturer's follow-up service procedure.

PLEASE NOTE: This does not apply to Steel Doors.



World Wide Fire Test Standards

FIRE TEST STANDARDS – Worldwide

US/CANADIAN STANDARDS – WITH hose stream test (UL & WHI)



Steel and Wood Doors (UL-10C, UBC 7-2 and UBC 7-4)

- 20 & 45 minutes at 1296 Sq. in. (0.836 sqm) Visible Lite, unless otherwise tested.
60, 90, & 180 minutes at 100 sq. in. (0.065 sqm) Visible Lite, unless otherwise tested.
- Is based on a fire, then hose stream test for both wood (timber) and steel door assemblies.
- US does not require hose stream test for 20 minute tests.
- Follow up inspection by UL or Warnock Hersey is required and each product is **required to have a certification label** on each individual item in the assembly. Compliance with the implementation of the label is enforced by UL /WHI follow up inspection in the respective factory.
- Ratings are based upon a maximum square inch area (or square meters) with a maximum width and maximum height dimension, equaling the maximum area tested, measured in Visible Lite.
- Vision panel and the steel or wood (timber) door must also have UL approval to install this over sized vision panel and glazing assembly into their door, and it should be part of their approved test procedures or as we state in the Anemostat literature “Must be used in an appropriately tested door assembly.”
- Once products are been tested and approved by UL or WHI, the certification verification is the UL / WHI logo imprinted on the specific product.
- Test Reports are rarely if ever furnished due to the proprietary information included. The individually labelled product makes up for the need for a test report. Likewise, product certificates can be provided to replicate website information on UL letterhead when required.

BRITISH STANDARD (BSI or BS EN) WITHOUT hose stream test



- **Timber Doors** – 30 & 60 minutes (E & EW)
Steel Doors – 30 & 120 minutes (E & EW)
- **BS EN #:** as European standards are agreed they are adopted as British Standards and so get a BS EN number.
- **E- Integrity** - The ability of the system to keep back flames, smoke and fumes. No flaming on the non-fire side is permitted within the approved time classification
- **EW – Partial Radiation** - EN 357 classification for partial insulation or reduced heat radiation for fire resistant glass. The length of time that a construction can give fire resistance in relation to the passage of flames and smoke as defined in BS 476: Part 20. In addition to the integrity, the ability of fire-resistant systems limit the radiant heat on the non-fire side to 15 kW/m² at a distance of 1 m to the surface, in order to prevent for example the ignition of goods on the protected side.
- Like the US standard, the British Standard incorporates width and height test limitations based on square meter area. Basic difference is that the maximum width and height dimensions are based upon the door aperture (cut out) as opposed to the US standard which is measured in visible glass, and no hose stream test.
- Unlike the US standard, labels are not required, nor is there an in factory follow-up inspection done on products tested to the British Standard. Products are tested, then “assessed” by the Test Lab for continued compliance every five years. Test Reports are issued to prove compliance with tested standards

EUROPEAN STANDARD (EN) - WITHOUT hose stream test



- **EN 1634:** Fire resistance tests for door shutter assemblies
Part 1: Fire doors and shutters.
Based on a Fire using a Temperature Rise measurement,
EI-30, EI-60, and EI-90 (minutes) regarding Integrity and Insulation for fire resistant glass.
- **All Doors** – EI-30 – 30 minutes
EI-60 – 60 minutes
- **EI - Insulation** - EN 357 classification for Insulation, fire resistant glass. In addition to the integrity, the ability of glazed screens or doors to limit the average temperature rise on the non-fire side to 140°C and the maximum temperature rise to 180°C above ambient temperature.



Testing Fire-Rated glazing for Door and Window Assemblies

- Rated from 20 minutes to 3 hours. Rating reflects the amount of time the Assembly is to remain in place to stop the spread of fire and smoke.
- Building codes dictate where rated products will be allowed in a building. Codes are designed to take into account how long it will take people to exit a building in the event of a fire.
- Fire Ratings are based on testing done by independent testing facilities, such as Underwriters Laboratories, using Positive Pressure test standards such as **UL 10C**, **UBC 7-2** and **UBC 7-4** simulating real fire conditions. Testing is based on complete door, frame and glazing system in a wall assembly. This assembly is then subjected to test standards that include two



Fire hose impacting fire rated glass immediately after fire test.

required elements: a “Fire” then a “Hose Stream Test.” Within two minutes of completion of the fire portion of the test, the side of the assembly exposed to the furnace or “Hot Side” of the glass and framing is subjected to the Hose Stream Test and is sprayed with water from a fire hose at pressures and durations specified in **NFPA 257, Table 6.2.3**.

Why is the “fire hose stream” (thermal shock) test so important?

- In real world fires, the glass and framing systems that have been exposed to the heat of flames will most likely be subjected to water from a fire hose, sprinklers or fire extinguishers.
- When one area of the glass/ framing system is hot while another area is cool, stress on the glass, or thermal shock occurs. Since the glass is expanding and contracting at the same time, the glass can shatter and vacate the frame, allowing for fire or smoke to spread. The Hose Stream Test is to verify the integrity of the complete glass, frame and door system.
- **NFPA 257 states**, “The Hose Stream Test provides a method for evaluating the integrity of constructions and assemblies and for eliminating inadequate materials or constructions. The cooling, impact, and erosion effects of the Hose Stream provide tests of the integrity of the specimen being evaluated.” In the United States, the Hose Stream Test is required for all fire ratings of 45 minutes or greater. Canada requires the test for all fire ratings. The Hose Stream Test is an integral part of many Fire Testing standards such as **ASTM E 119**.
- Building and Fire Codes are very clear on why the Hose Stream Test is critical, and recent proposals to eliminate the test have been soundly defeated. The **International Code Council (ICC)** has re-affirmed the importance of the Hose Stream Test for life and property safety, on many occasions. Responding to proposals by a product manufacturer to lessen or eliminate the test requirements, in 2006 the ICC’s Fire Safety Code Development Committee stated that these actions “...would reduce the level of life safety which the code has generally required and provided.” The Committee went on to note that the issue has been debated a number of times and that “it has always been defeated.” (2006 ICC Public Hearing Results, FS121-06/07 and FS107-06/07). In a more recent round of code reviews, in February 2008, the ICC rejected additional proposals to change the Hose Stream Test requirements.

Is fire-rated glass really necessary if I use sprinklers?

- **IBC 2012** clarifies that fire ratings must be based solely on a material’s own performance. In section 703.4, “...the fire-resistance rating of a building element, component or assembly shall be established without the use of automatic sprinklers or any other fire suppression system...”
- While sprinklers help to save lives, they are no substitute for the use of passive fire-rated glazing materials. If sprinklers do not activate due to faulty manufacturing, loss of water pressure, or any other reasons, fire-rated glass will still perform its critical function.

What about a fire rated product with several limitations on its use?

- Architects and designers should always be wary of product “listings” that carry what appear to be unusual limitations. Although NFPA standards are very clear that both the fire test and hose stream test are required, one fire-rated glazing material on the market indicates a fire rating of “60 minutes”, but then goes on to say, “This product does not meet the hose stream requirements of the test standards”. And, “This product protects from fire from one direction only. The identified face **MUST** be installed facing the direction of expected fire attack.” Such limitations should raise red flags, and prove how important it is to thoroughly check out products thoroughly to insure how a laboratory “listed” product may not be exactly what you thought it might be. This manufacturer also asks Architects and Specifiers to seek local exemptions to well established national testing requirements and building codes, in order to install this product in buildings.



Glossary of Terms

AUTHORITY HAVING JURISDICTION (AHJ) - The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

BUTYL - An adhesive used in earlier models for glass retention. It is a petroleum product that requires no curing or hardening. Butyl is available in rolls of approximately 15 feet. It is available in various thicknesses and shapes. It is not fire rated.

CERAMIC - Material known for its outstanding heat resistance. Used in certain fire-rated glazing materials, such as the FireLite family of products.

DOOR LOUVER / LOUVRE - May be identified as a louver, grille, door grille or louver grille. usually square or rectangular. Usually incorporates a perimeter frame on both sides of horizontal blades (core) that allows free air passage through the door louver.

FIRE WALL - A wall extending from foundation through to the roof to subdivide a building in order to restrict the spread of fire.

HEAT TRANSFER - (ASTM E-119 / UL 263) The degree to which an assembly (usually a door or wall) will transfer heat from one side to another.

INSULATING GLASS UNIT (OR I.G.U.) - Commonly known as a double glazed unit a construction consisting of two or more panes of glass spaced apart with spacer bars to form an airspace between the panes. An insulating unit does NOT normally have any fire resistance properties unless it incorporates at least one pane of fire resistant glass and is glazed into an appropriate fire tested system.

INTUMESCENT INTERLAYER - An interlayer which intumesces (expands and blocks heat transfer) in fire conditions, not only holding the laminated glass together, but also creating an effective barrier to smoke, flames and heat.

LABELED DOOR (OR FRAME) - A door or frame that conforms to all the applicable requirements - in respect to fire or impact resistance - of a nationally recognized testing authority and bears a label designating the fire rating.

LABELED - Equipment or materials that have been tested by an authorized agency (UL, WHI, etc.) must be labeled to show the acceptable level of use to the authority having jurisdiction. The label may be a permanently affixed tag, etched logo, or embossed stamp.

LAMINATED GLASS - Is produced by combining layers of glass with plastic (PVB) or resin (CIP) interlayers to form sandwiches of material with specific design properties. Product can be cut to size with standard cutting tool, in most cases.

OBSCURE GLASS - Mainly used for decoration, diffusion, or privacy. The design is pressed into the glass during the rolling process. There are many patterns available, including applied obscure films.

SIDE LIGHT - A wood or metal frame (may be fire rated) prepared for the application of glazing material to be attached alongside the door opening frame.

TEMPERATURE RISE - The ability of a door assembly to limit the temperature rise on the unexposed side of fire doors to 450 degrees F° during the first 30 minutes of the standard fire test. Door type frequently used for protection of exit stairwells, assuming a higher temperature would provide enough radiant heat to discourage, if not prevent, occupants from passing by the door during an emergency. Maximum visible light of 100 square inches, unless Temperature Rise Glass is used.

TEMPERED (TOUGHENED) - Glass which has been heated past its softening point and chilled rapidly to build in a surface compressive stress which gives it greatly increased strength and makes it break into small, non-sharp fragments if broken.

TRANSOM - An opening in a fire door frame above the door opening that is filled by a solid panel or with glazing material.

VISION PANEL - A lite, lite kit, window frame, door lite, vision panel, vision kit, vision lite, or window kit. All describe the same product, which is the metal or wood frame that holds the glass in place in the door. It is a pane of glass in a door that allows people to look through without needing to open the door. Usually square or rectangular, but can be manufactured in many different shapes including round, cross, triangle, half circle, hexagon or other such custom shapes.

Questions to Ask when Selling Glazing

- What is the Fire Rating of the Opening ?
- How much Visible Glass is required for each of the doors ?
- What is the Size of the Door ? (w x h)
- What is the Thickness of the Door ?
- How large of a Visible Lite Opening has the Door Manufacturer tested ?
- What is the Budget for Glass ?

Why We Sell Fire Rated Glass & Vision Panels!



Damage sustained to a portion of the building



Fire Door Where Fire Originated



The Same Fire Door kept this section of the building safe

More Questions? ... Visit www.anemostat.com for all your Door Glazing Solutions

Test Standards



Anemostat®
www.anemostat.com

1220 Watson Center Road
Carson, California 90745

Tel: 310.835.7500

Fax: 310.835.0448

door@anemostat.com