

Designing with Fire Rated Glass

Presented by

 **SAFTIFIRST**[™]
FIRE RATED GLAZING SOLUTIONS



DESIGNING WITH FIRE RATED GLASS



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Learning Objectives

-  Clarify the difference between fire protective vs. fire resistive glazing products as it relates to protecting people and property
-  Review updated IBC and fire and safety requirements when designing for life safety, including the updated IBC Tables
-  Identify the correct, code-approved glazing products based on the application
-  Provide you with the latest fire rated glazing product information



DESIGNING WITH FIRE RATED GLASS

Fire rated glazing: New solutions for fire rated applications

Old solution



Opaque - No Views

VS.

New solution



Transparent – Maximum Views



DESIGNING WITH FIRE RATED GLASS

Fire Protective
vs.
Fire Resistive





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Two things you should know before selecting a fire-rated glass product

- 🔥 Glazing fire test standards fall into two basic categories: *fire protective* standards or *fire resistive* standards.
- 🔥 Fire-rated glazing applications such as windows, doors, and walls, are rated to these fire test standards (*fire protective* and *fire resistive*).

Windows and Doors



Fire Protective



Walls



Fire Resistive



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IBC Now Distinguishes Between **Fire Protective** (or Fire Protection) and **Fire Resistive** (or Fire Resistance)

Window / Door Test
FIRE PROTECTIVE
NFPA 257/252



Contains flame and smoke
45 minutes and under

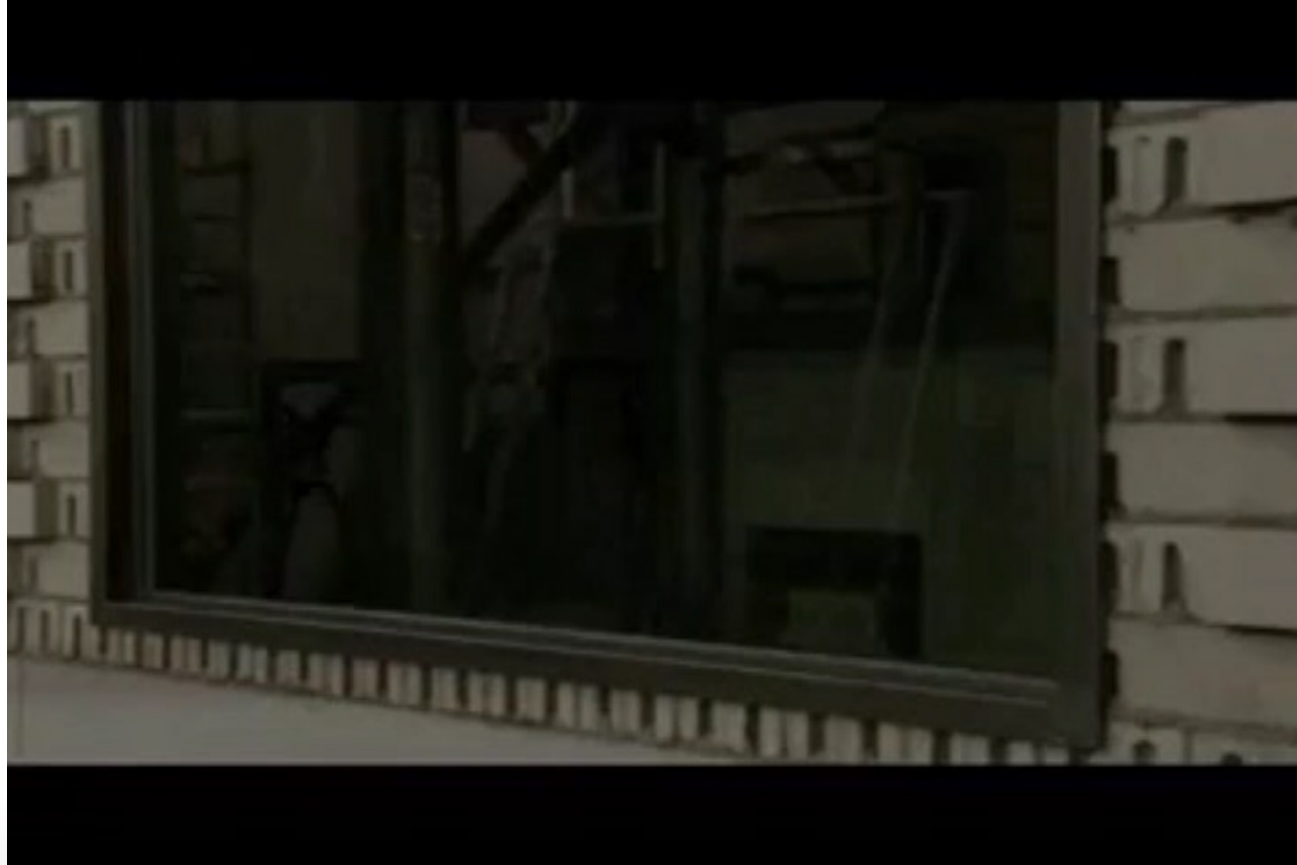
Wall Test
FIRE RESISTIVE
ASTM E119/NFPA 251



Contains flame and smoke AND
blocks radiant heat for applications
over 45 minutes



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Fire Endurance Test

Determines the time a glazing product can withstand fire and extreme heat (up to 1900°F+). If the glass remains in frame with no through openings and limits flame, it is certified for an endurance rating, 20 minutes to 3 hours. Fire resistance rated must also limit temp rise to average of 250F degrees.



Hose Stream Test

After the fire endurance test, water is delivered via hose stream from 20 feet away at 30 psi. ASTM E119 requires no glazing loss, NFPA 257 allows for 30% loss of glazing around the perimeter and 5% loss at center. Most, not all, fire rated glazing applications require a hose stream test.





Hose Stream Test



What it IS

Developed in the 1890s as a measure of structural integrity of floor materials and cast or wrought iron in building walls during an intense fire. Weights were once used to measure the assembly's ability to withstand impact.



What it is NOT

NOT intended or designed to test the thermal stress performance of glazing materials.

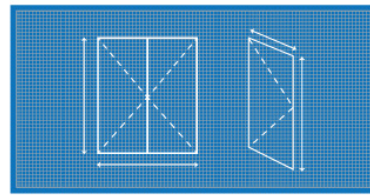
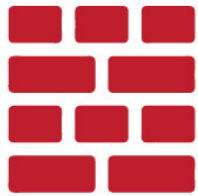
NOT intended to replicate or determine the effects of firefighting tactics, even if the hose stream apparatus is adapted from fire fighting equipment.

NOT a sprinkler test.

NOT a measure of radiant heat performance.



104.11 - Alternative materials, design & methods of construction and equipment







The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.



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A few reasons why AHJ's approve alternative 45-minute fire-rated glazing materials that don't pass the hose stream test:

-  The test does not realistically simulate the potential threat of thermal shock from sprinklers. The glazed assembly isn't subjected to streaming water until after being exposed to over 1,600 degrees Fahrenheit.
-  The hose stream test was removed from international test methods years ago and the British test method has not contained a hose stream test for over 40 years.
-  NFPA 251, UBC Sec. 7.108, and ASTM E119 all specifically exclude fire-rated constructions of less than one hour from the hose stream requirement.
-  Given that the hose stream is applied 20 feet away at 30 psi and typical corridors protected by fire rated glazing are 6 to 8 feet wide, the impact doesn't replicate the water-jet force from a fire hose in close quarters. No manufacturer of fire rated glazing has ever demonstrated their product's ability to withstand the hose stream's impact within such close proximity.



What is *radiant heat*?





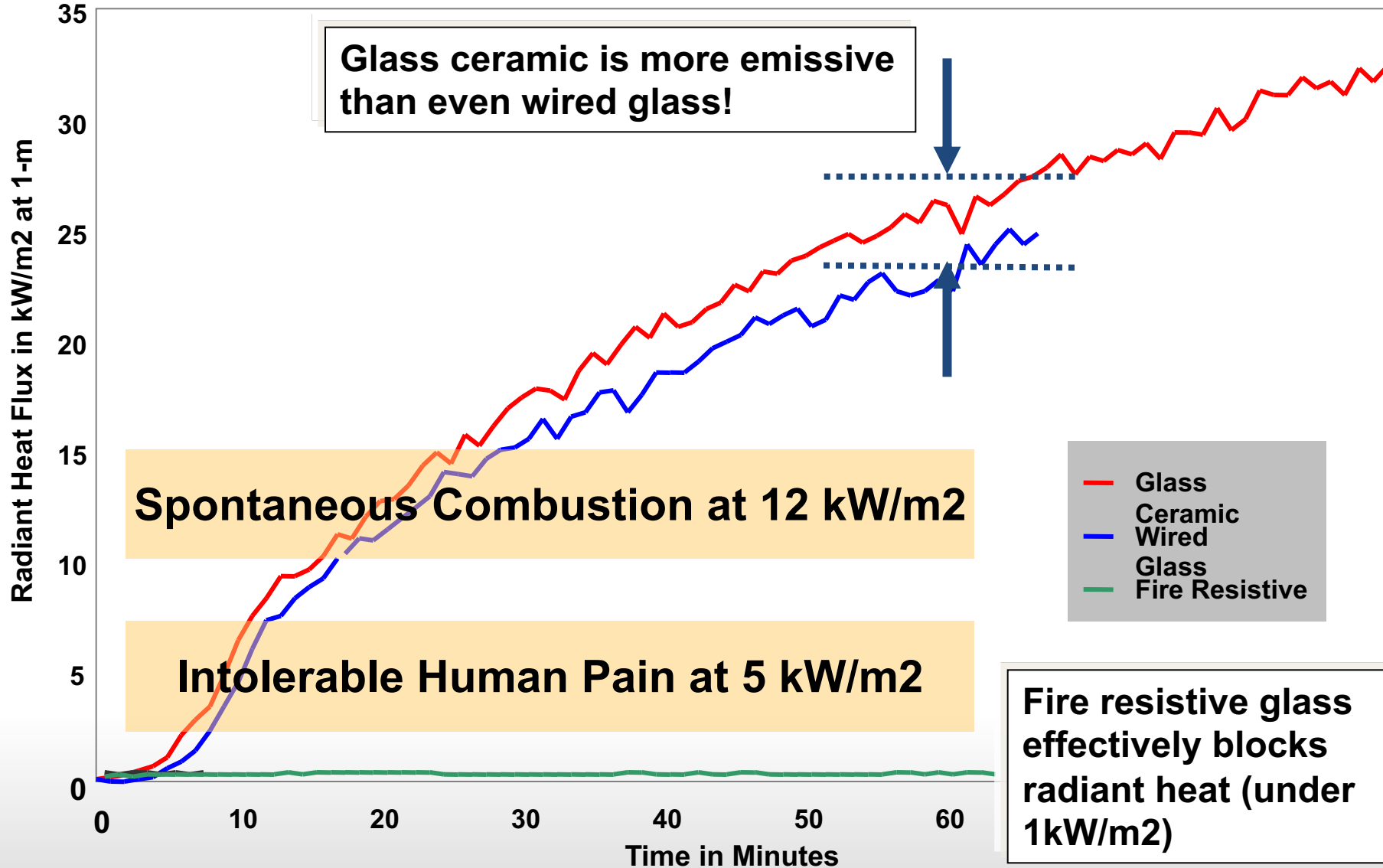
Radiant Heat Comparative Test

The purpose of the test was to monitor the time to failure of these glazing products and to measure the radiation emanating from each specimen. Mannequins were placed in front of each specimen to monitor the time to ignition of clothing as ignited by the radiation under non-piloted conditions.



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Radiant Heat Flux: Comparison at 60 minutes





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Fire Endurance Ratings *Do Not* Show Overall Performance

Just because a product has a 60 min. rating, it doesn't mean that it can be used in all 60 min. applications – check the test standard it meets.

Window / Door Test
FIRE PROTECTIVE
NFPA 257/252



Contains flame and smoke
45 minutes and under

Wall Test
FIRE RESISTIVE
ASTM E119/NFPA 251



Contains flame and smoke AND
blocks radiant heat for applications
over 45 minutes

ASK: Does the code require a fire protective or fire resistive product in the application?



What listings **DO** & **DO NOT** mean



DO: Confirm testing to specified test standard

Doors, sidelites, transoms, walls and windows



DO NOT: Confirm code approval for the application

The installation of glazing materials is intended to be in accordance with the local building code as determined by the Authority Having Jurisdiction

DO NOT: Tell the whole story

There are many other aspects to consider, such as type of glass, type of structure and occupancy, square footage limitations and location



Fire Rated Glazing Code Applications





Where can Fire Rated Glass be found?



Fire Doors

Vision panels, sidelites & transoms



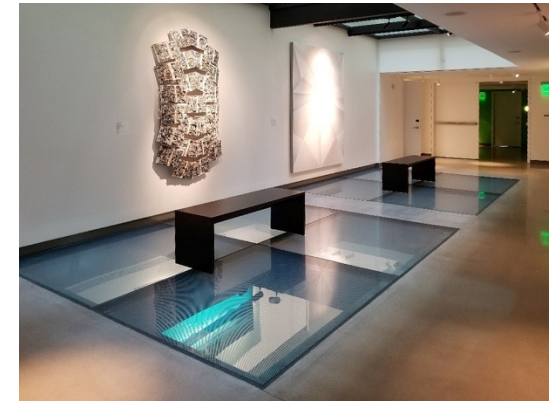
Fire Windows

Exterior windows & borrowed lites



Fire Resistive Barriers

Non load-bearing walls & load-bearing walls



Fire Resistive Floors

Non load-bearing & load-bearing



Glazing Marking Requirements

2018 IBC Table 716.1 (1) Marking Fire-Rated Glazing Assemblies

Fire Test Standard	Marking	Definition of Marking
ASTM E-119 or UL 263	W	Meets wall assembly criteria.
ASTM E-119 or UL 263	FC	Meets floor/ceiling 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 doors assembly hose stream test.
	T	Meets 450°F temperature rise criteria for 30 minutes.
	XXX	The time in minutes of the fire resistance or fire protection rating of the glazing assembly.








Fire Rated Door Assemblies





Fire Door Glazing Testing and Marking

-  Tested to NFPA 252/ UL 10B/ UL 10C for 20, 45, 60, 90, 180 minutes
-  Marked as "D"
-  May include an "H" if it meets hose stream or a "T" if it meets temperature-rise
-  Hose stream test not required for 20 min. door vision panels
-  May require a "W" marking where fire resistive glazing required



20 Minute Door Assemblies

Excerpt from 2018 IBC Table 716.1 (2) – Opening Fire Protection Assemblies and Markings

Type of Assembly	Required Wall Assembly Rating (Hours)	Minimum Fire Door and Fire Shutter Assembly Rating (Hours)	Door Vision Panel Size	Fire Rated Glazing Marking Door Vision Panel	Minimum Sidelite / Transom Assembly Rating (Hours)	Fire Rated Glazing Marking Sidelite / Transom Panel
					Fire Protection	Fire Protection
Fire partitions: Corridor walls	1	1/3 ^b	Maximum size tested	D-20	3/4 ^b	D-H-OH-45
	0.5	1/3 ^b	Maximum size tested	D-20	1/3	D-H-OH-20
Other fire partitions	1	3/4	Maximum size tested	D-H-45	3/4	D-H-45
	0.5	1/3	Maximum size tested	D-H-20	1/3	D-H-20
Exterior Walls	1	3/4	Maximum size tested	D-H-45	3/4	D-H-OH-45
Smoke barriers	1	1/3	Maximum size tested	D-20	3/4	D-H-OH-45



20 Minute Door Assemblies



Door Vision Panel: 20 minutes

- Hose stream test not required for 1-hour corridors and smoke barriers
- Marked "D"
- Maximum size tested



Sidelites/Transoms:

- 45 minute in 1-hour corridors and smoke barriers
- Marked "OH"
- Maximum size tested



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45 Minute Door Assemblies

Excerpt from 2018 Table 716.1 (2) – Opening Fire Protection Assemblies and Markings

Type of Assembly	Required Wall Assembly Rating (Hours)	Minimum Fire Door and Fire Shutter Assembly Rating (Hours)	Door Vision Panel Size	Fire Rated Glazing Marking Door Vision Panel	Minimum Sidelite / Transom Assembly Rating (Hours)	Fire Rated Glazing Marking Sidelite / Transom Panel
					Fire Protection	Fire Protection
Fire partitions: Corridor walls	1	1/3 ^b	Maximum size tested	D-20	3/4 ^b	D-H-OH-45
	0.5	1/3 ^b	Maximum size tested	D-20	1/3	D-H-OH-20
Other fire partitions	1	3/4	Maximum size tested	D-H-45	3/4	D-H-45
	0.5	1/3	Maximum size tested	D-H-20	1/3	D-H-20
Exterior Walls	1	3/4	Maximum size tested	D-H-45	3/4	D-H-OH-45
Smoke barriers	1	1/3	Maximum size tested	D-20	3/4	D-H-OH-45




b. Fire-resistance-rated glazing tested to ASTM E-119 in accordance with Section 716.1.2.3 shall be permitted, in the maximum size tested.



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45 Minute Door Assemblies

-  Fire Protection Rated Glazing in some 1 hour fire partitions, **some** 1 hour fire barriers, 1 hour exterior walls
-  **Door Vision Panel: 45 minutes**
 - Maximum size tested
-  **Sidelites/transoms: 45 minutes**
 - Maximum size tested



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60 Minute Door Assemblies

Excerpt from 2018 IBC Table 716.1 (2) – Opening Fire Protection Assemblies and Markings

Type of Assembly	Required Wall Assembly Rating (Hours)	Minimum Fire Door and Fire Shutter Assembly Rating (Hours)	Door Vision Panel Size	Fire Rated Glazing Marking Door Vision Panel	Minimum Sidelite / Transom Assembly Rating (Hours)		Fire Rated Glazing Marking Sidelite / Transom Panel
					Fire Protection	Fire Resistance	
Fire barriers having a required fire-resistance rating of 1 hour: Enclosures for shafts, exit access stairways, exit access ramps, interior exit ramps and exit passageway walls.	1	1	100 sq. in.	≤ 100 sq. in. = D-H-60 ≥ 100 sq. in. = D-H-T-60 or D-H-T-W-60	Not Permitted	1	W-60



90 Minute Door Assemblies

Excerpt from 2018 IBC Table 716.1 (2) – Opening Fire Protection Assemblies and Markings

Type of Assembly	Required Wall Assembly Rating (Hours)	Minimum Fire Door and Fire Shutter Assembly Rating (Hours)	Door Vision Panel Size	Fire Rated Glazing Marking Door Vision Panel	Minimum Sidelite / Transom Assembly Rating (Hours)		Fire Rated Glazing Marking Sidelite / Transom Panel	
					Fire Protection	Fire Resistance	Fire Protection	Fire Resistance
Enclosures for shafts, interior exit stairways and interior exit ramps	2	1-1/2	100 sq. in. ^c	≤100 sq. in. = D-H-90 ≥100 sq. in. = D-H-T-90 or D-H-T-W-90	Not Permitted	2	Not Permitted	W-120

c. Under the column heading "Fire rated glazing door vision panel," W refers to the fire-resistance rating of the glazing, not the frame.



60/90 minute Door Vision Panel with Fire Protective Glazing (Temperature-rise)



Filmed ceramic products, along with laminated ceramic, filmed wired glass and specialty tempered are all **fire protective products**, and therefore **limited to 100 sq. inches** in the door vision panel unless the building is fully sprinklered (per 2006/2009 IBC).

Fire protective glazing **CANNOT** be used in sidelites and transoms surrounding a 60/90 minute temperature- rise door.

Important Note! In the 2012/2015/2018 IBC, fire protective glazing used in the vision panel of a 60 minute door will always be limited to 100 sq. inches, whether the building is fully sprinklered or not.



60/90 minute Door Assemblies with Fire Resistive Glazing (Temperature-rise)







In order to **exceed 100 sq. inches** in the door vision panel, **fire resistive glazing tested to ASTM E-119** was used.

To meet code requirements for the sidelites and openings, **fire resistive glazing tested to ASTM E-119** was used.

Again, fire protective glazing **CANNOT** be used in sidelites and transoms surrounding a 60/90 minute temperature-rise door! Fire resistive glazing must be used.



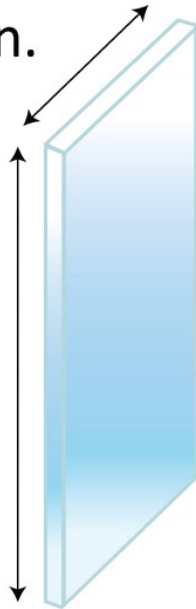
All Glazing in Doors, Sidelites and Hazardous Locations must meet CPSC Safety Standards

-  A federal safety glazing minimum standard established in 1977 to protect people from injuries due to accidental impact with glazing
-  Two categories were established:
 -  CPSC 16 CFR 1201 Cat. I
 -  CPSC 16 CFR 1201 Cat. II



CPSC 16 CFR 1201 CAT. I

Less than
1296 sq. in.



Impact of
**150 foot
pounds**
(small child)

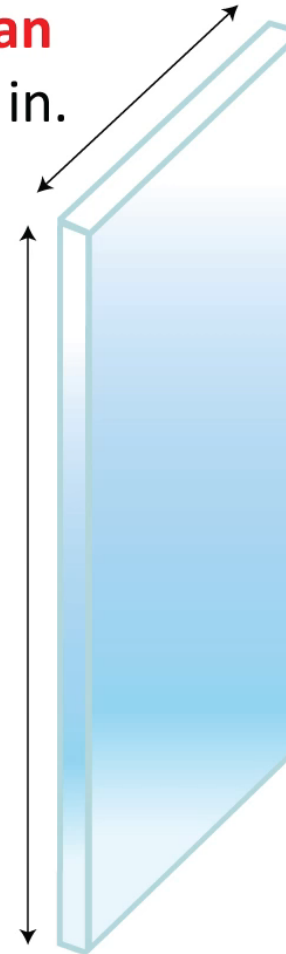
Cat. I = for small glazing areas
(less than 1296 square inches)
to survive impact of 150 foot
pounds - a small child.



CPSC 16 CFR 1201 CAT. II

Cat. II = for large glazing areas
(more than 1296 square inches)
to survive impact of 400 foot
pounds - an adult.

More than
1296 sq. in.



Survives
impact of
400 foot
pounds
(an adult)





Fire Rated Openings/Windows





Fire Window/Openings Testing and Marking



-  Tested to NFPA 257 / UL 9
-  Marked as “OH” for openings meeting the hose stream test.

Note: Fire windows and openings are **FIRE PROTECTIVE** and are usually rated up to 45 minutes and is limited to 25% of the wall area. If the size exceeds 25% of the wall area, **FIRE RESISTIVE** glazing must be used.



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Fire Window Application - Interior

2018 IBC Table 716.1 (3) – Fire Window Assembly Fire Protection Ratings

TYPE OF WALL ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (Hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (Hours)	FIRE RATED GLAZING MARKING
Interior walls			
Fire Walls	All	NP ^a	W-XXX ^b
Fire barriers	>1 1	NP ^a NP ^a	W-XXX ^b W-XXX ^b
Atrium separations (Section 707.3.6) Incidental use areas (Section 707.3.7) Mixed occupancy separations (Section 707.3.9)	1	3/4	OH-45 or W-60
Fire partitions	1 0.5	3/4 1/3	OH-45 or W-60 OH-20 or W-30
Smoke barriers	1	3/4	OH-45 or W-60
Exterior walls	>1 1 0.5	1-1/2 3/4 1/3	OH-90 or W-XXX ^b OH-45 or W-60 OH-20 or W-30
Party wall	All	NP	Not Applicable



Fire Window Application - Interior



The openings in this 1 hour exit corridor are under 25% of the wall area; therefore, 45 min. fire protective windows were allowed



The glazing used in this 1 hour exit corridor exceeds 25% of the wall area; therefore, 60 min. fire resistive glazing tested to ASTM E-119 was used in this application



Fire Protective Window Application - Exterior

Excerpt from 2018 IBC Table 716.1 (3) – Fire Window Assembly Fire Protection Ratings

TYPE OF WALL ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (Hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (Hours)	FIRE RATED GLAZING MARKING
Exterior walls	>1 1 0.5	1-1/2 3/4 1/3	OH-90 or W-xxx ^b OH-45 or W-60 OH-20 or W-30

- 🔥 20-minute fire protective windows where permitted in 30-min. exterior walls
- 🔥 45-minute fire protective windows where permitted in a 1-hour exterior walls
- 🔥 90-minute fire protective windows where permitted in 2-hour exterior walls
- 🔥 Refer to Table 705.8: Maximum Area of Exterior Wall Openings Based on Fire Separation Distance and Degree of Opening Protection



Fire Window Application - Exterior

The openings in this 1-hour wall are under wall area limits; therefore, 45-minute fire protective windows were allowed



The glazing used in this 2-hour wall exceeds FSD wall area limits; therefore, 2-hour fire resistive glazing tested to ASTM E-119 was used





Fire Rated Walls/ Window-walls





Fire Walls/ Window-Walls Testing & Marking



-  Tested to ASTM E-119 / UL 263 / NFPA 251
-  Marked as “W” indicating that it meets the wall criteria

Note: Fire walls/window-walls are **fire resistive** rated 60 minutes and above, permitted to maximum size tested



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Fire Resistive Wall/Window-Wall

Table 716.1 (3) – Fire Window Assembly Fire Protection Ratings

TYPE OF WALL ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (Hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (Hours)	FIRE RATED GLAZING MARKING
Interior walls			
Fire Walls	All	NP ^a	W-XXX ^b
Fire barriers	>1 1	NP ^a NP ^a	W-XXX ^b W-XXX ^b
Atrium separations (Section 707.3.6) Incidental use areas (Section 707.3.7) Mixed occupancy separations (Section 707.3.9)	1	3/4	OH-45 or W-60
Fire partitions	1 0.5	3/4 1/3	OH-45 or W-60 OH-20 or W-30
Smoke barriers	1	3/4	OH-45 or W-60
Exterior walls	>1 1 0.5	1-1/2 3/4 1/3	OH-90 or W-XXX ^b OH-45 or W-60 OH-20 or W-30
Party wall	All	NP	Not Applicable

NP – Not Permitted

- a. Not permitted **except fire resistance rated glazing assemblies tested to ASTM E-119 or UL 263**, as specified in Sec. 716.1.2.3.
- b. xxx – the fire rating duration period in minutes, which shall be equal to the fire-resistance rating required for the wall assembly



2 Hour Fire Barriers (exit enclosures/passageways)

*Up to 100 square inches:
Safety wired glass
specialty protective safety
ceramic*

*Maximum size tested:
90 minute fire resistive*



120-minute fire resistive

120-minute fire resistive

No 90-minute fire protection rated sidelites or transoms are allowed! (NFPA 80 (2013) 6.3.3.4; IBC (2012) Sec. 716.5.6)



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1 or 2-Hour Exterior Walls



Property Line



Areas adjacent to parking garages, etc.



Dynamic Testing for Exterior Wall Applications





Fire Resistive Glazing in Exterior Applications with Dynamic Curtain Wall Testing



Framing Mock-up



Dynamic CW Testing
(AAMA 501.1-05)



Air Infiltration Chamber
(ASTM E-283-04)

Ensures that the building envelope is air and water tight



Dynamic Testing for Exterior Wall Applications



Thermal Cycling and Condensation Evaluation



Fire Resistive Glazing in Exterior Applications with Dynamic Curtain Wall Testing



Also tested for:

- Static Pressure Water Resistance (ASTM E 331-00)
- Structural Performance (ASTM E 330-2)
- Seismic Movement (AAMA 501.4-09)
- Thermal Cycling and Condensation Evaluation
- Interstory Vertical Displacement



IBC and Special Purpose Deluge Sprinklers





DESIGNING WITH FIRE RATED GLASS

Using special purpose deluge sprinklers with fixed glazing assemblies in 1-2 hour fire resistive assemblies is considered an **alternative assembly** – therefore, **it requires prior AHJ approval**







Architects and building owners assume **all the costs and liabilities** for applying for AHJ approval

Design limitations must also be considered



Additional Costs



Architects are responsible for obtaining AHJ approval. This includes:

-  Preparing documented proof that the design and installation requirements are met
-  Hydraulic calculations for each installation
-  Ensuring an automatic, dedicated water supply capable of supplying 1 or 2 hours of water, depending on the rating of the wall
-  Upgrading the pumps and pipes to maintain the prescribed water pressure for each installation



Additional Costs (continued)




Other costs that architects and building owners must consider:

-  Ongoing maintenance for special purpose deluge sprinklers
-  Alternative assemblies that use laminated ceramic with special purpose deluge sprinklers are more expensive than readily available and approved fire resistive glazing assemblies.








Safety and Liability Issues

Studies have shown that sprinklers can and have failed. Sprinkler system breakage puts building occupants at risk when it is needed the most.

-  No sprinkler manufacturer or installer will guarantee that it will work 100% of the time.
-  When sprinklers fail to operate, non-rated glass will be useless in preventing fire, smoke and dangerous radiant heat. Laminated ceramic may stay in the opening, but won't control radiant heat transmission.
-  Sprinkler failure puts building occupants and firefighters in real danger








Design Limitations

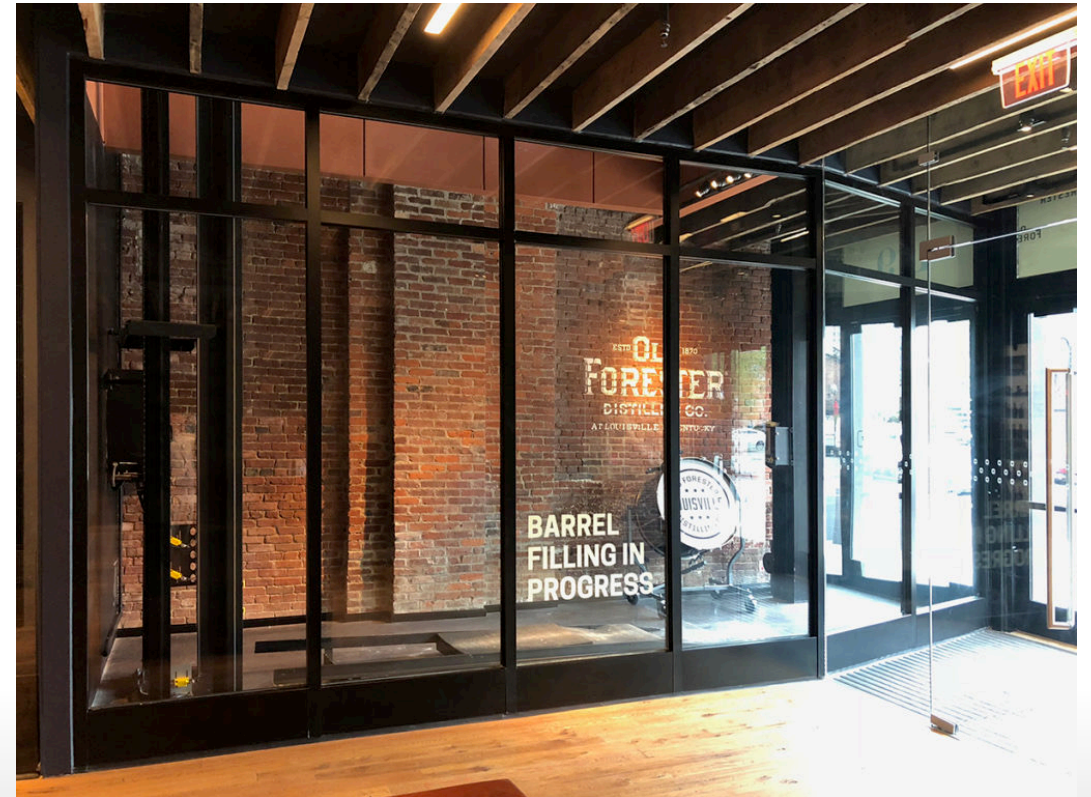
-  Fixed glazed assemblies cannot exceed 13 ft. in height
-  Horizontal mullions are not allowed
-  3-ft. opaque ponywall is required when using non-rated tempered or heat strengthened glazing
-  If the assembly uses laminated ceramic to eliminate the pony wall requirement, it is still limited a height of 96" due to its sheet size – and again, horizontal mullions are not allowed.
-  Amber tints are typical with ceramics, even after polishing



DESIGNING WITH FIRE RATED GLASS

In contrast, 1-2 hour fire resistive glazing that meets ASTM E-119/UL 263:

-  Does not need prior AHJ approval
-  Does not have any hidden costs
-  Works 24/7 because it does not need outside mechanical triggers the way sprinklers do
-  Maintenance-free
-  Does not have the same design limitations





Fire Protective Glazing Types





Window / Door / Sidelite **FIRE PROTECTIVE**









Compartmentalize
smoke and flames

Fire Protective Glazing is defined as:

Glazing tested as part of a fire protection rated assembly in accordance with NFPA 252, the standard method of test of fire door assemblies, or NFPA 257, the standard on fire test for window and glass block assemblies



Types of Fire Protective Glazing Materials

-  Specialty tempered
-  Specialty fire protective
-  Heat reflective specialty tempered
-  45 min. fire resistive
-  Safety wired and traditional wired*
-  Safety ceramics and ceramics*

**Can be used in windows only in non-safety applications*



Performance Features of Specialty Tempered



20 minute fire protective ratings



Sizes greater than 9 square foot up to maximum size tested



Impact safety rated to Cat. II



Tempered glass – 6 times stronger than annealed or wired glass



Performance Features of Specialty Fire Protective



45 minute fire protective ratings **with hose stream**



Available in large sizes for doors, sidelites, transoms and openings



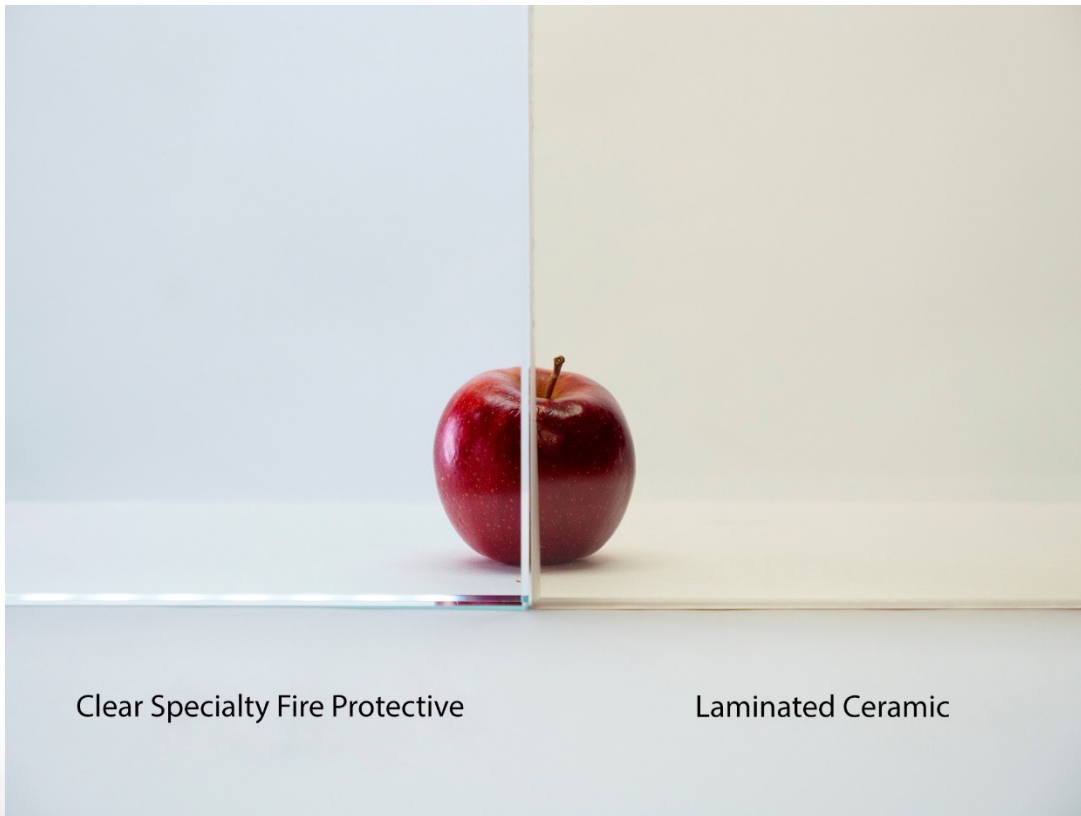
Impact safety rated to Cat. II without using films or laminates






Fast lead times and USA-made









Performance Features of Specialty Fire Protective



-  Clear glazing without wires or tints. Available in low-iron glass for unmatched optical clarity.
-  Highest tested STC/OITC ratings in standard hollow metal frames
-  Most affordable 45 minute glazing – approx. half the price ceramics.







Performance Features for Heat Reflective Specialty Tempered

-  Substantially reduces the dangers of radiant heat by reflecting heat back towards the fire source
-  Survives thermal shock from sprinklers
-  Impact safety rated to Cat. II
-  Sizes greater than 9 square feet up to maximum size tested
-  USA – low cost – readily available
-  Tempered glass – 6 times stronger than annealed or wired glass





Performance Features for Heat Reflective Specialty Tempered

-  Can be used in 20 minute doors without limitations
-  AHJ approval is required for 45 and 60 minute applications
-  Performance and testing information needed for AHJ approval can be obtained from the manufacturer and submitted to the building official for review
-  See GSA Technical Preservation Guidelines Fire Safety Retrofitting





Performance Features of Wired & Safety Wired Glass



Traditional wired glass is weaker than annealed













Safety wired glass meets CPSC impact safety requirements



Filmed version meets Cat. II (exceeds 9 square feet up to max size tested)



Performance Features of Ceramics & Safety Ceramics

-  Slightly tinted, some distortion
-  Thin/lightweight
-  Size limitations – 25% of wall area
-  Cannot be used in doors or sidelites
-  No radiant heat protection
-  Expensive
-  Not safety-rated unless laminated or filmed
-  Half as strong as annealed
-  Significantly weaker than tempered products
-  Unable to temper



Performance Features of Ceramics & Safety Ceramics



45 minute safety ceramic door lite and 45 minute non-safety ceramic in transom








90 minute safety ceramic door lites limited to 100 square inches in 90 minute pair doors



Performance Features of Specialty Fire Protective up to 100 sq. in.

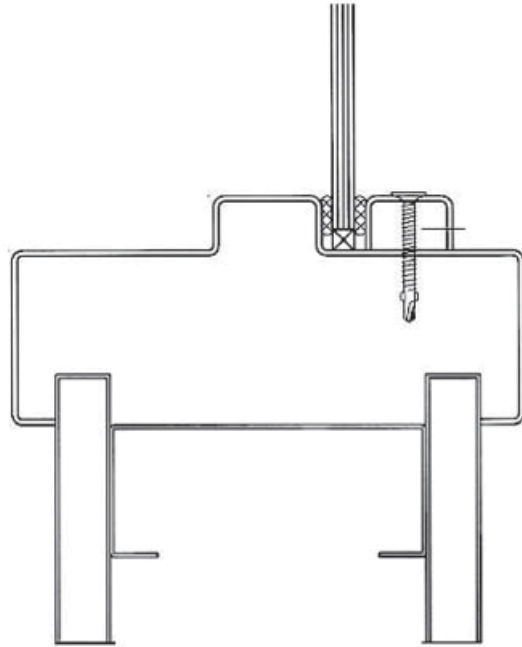


-  Clear appearance
-  No wires or amber tints
-  Meets all the fire and safety impact requirements for 45-90 minute temperature rise doors up to 100 sq. in. only
-  Affordable
-  Made in the USA

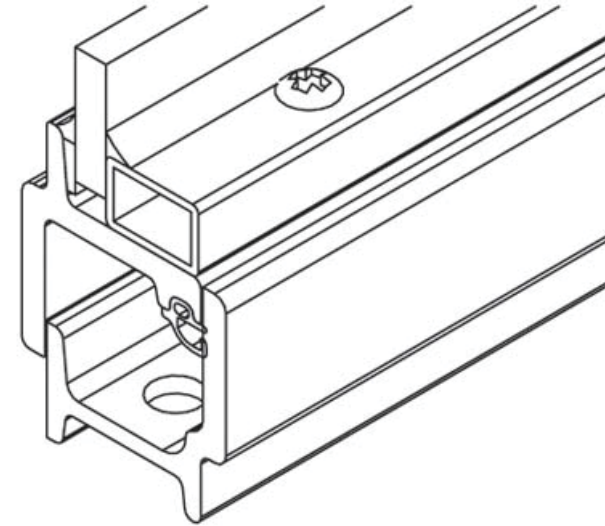
Vision lites in 90 minute temperature rise doors up to 100 square inches



Fire Protective Framing



Hollow metal section



Hot rolled steel section

Non-compliant as a fire wall assembly!



Fire Resistive Glazing Types





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Fire Resistive Glazing Types is defined as:

Glazing tested as part of a fire resistance-rated assembly in accordance with ASTM E-119 or NFPA 251 (standard method of tests of fire endurance of building construction and materials).

ASTM E119



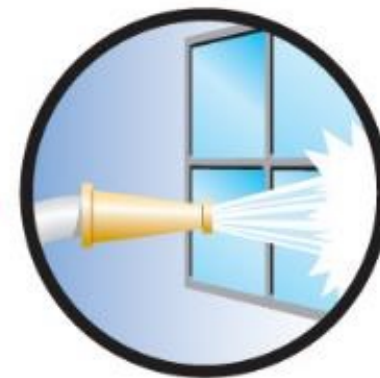
Fire Endurance Test

+



Radiant Heat Test

+

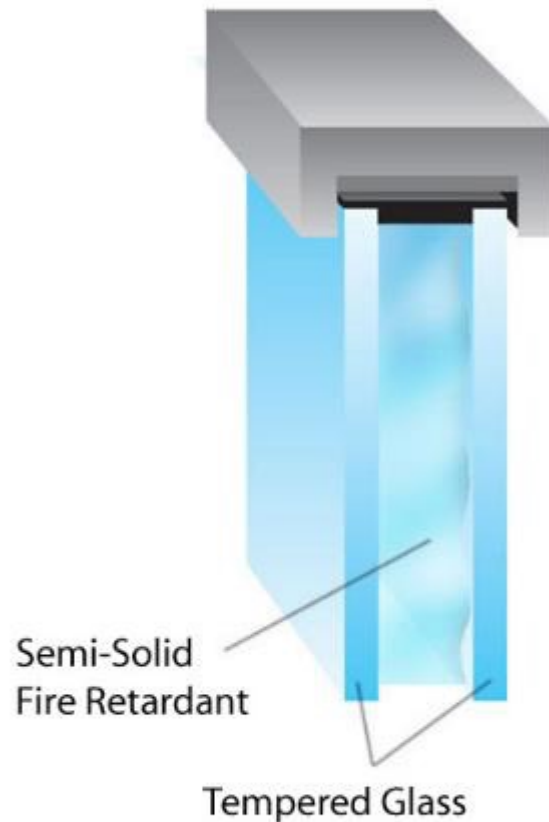


Hose Stream Test

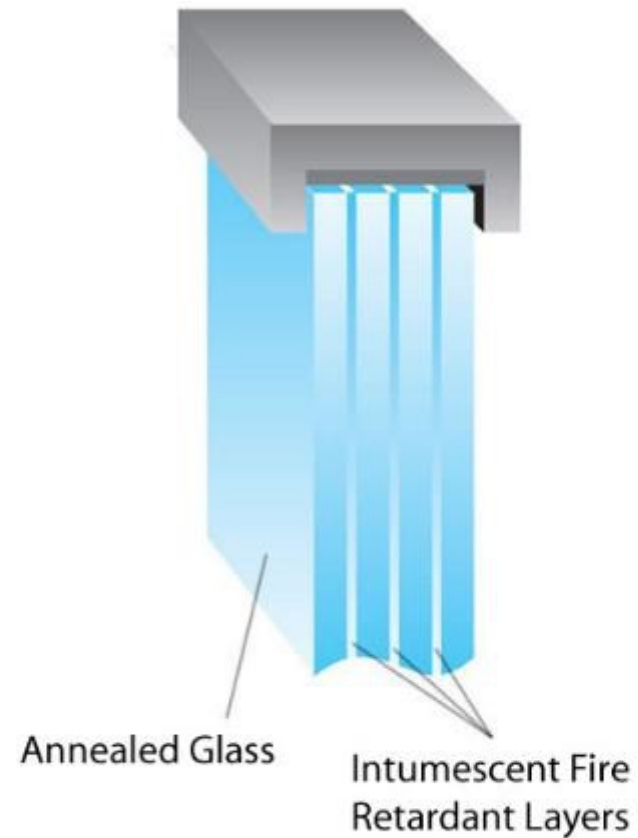


Fire-rated glass products that meet fire resistive (wall) requirements

Fire Retardant Filled Glass



Multi-Laminate Fire Retardant Glass





Fire Resistive Glazing – Test Example



Glass exposed to fire



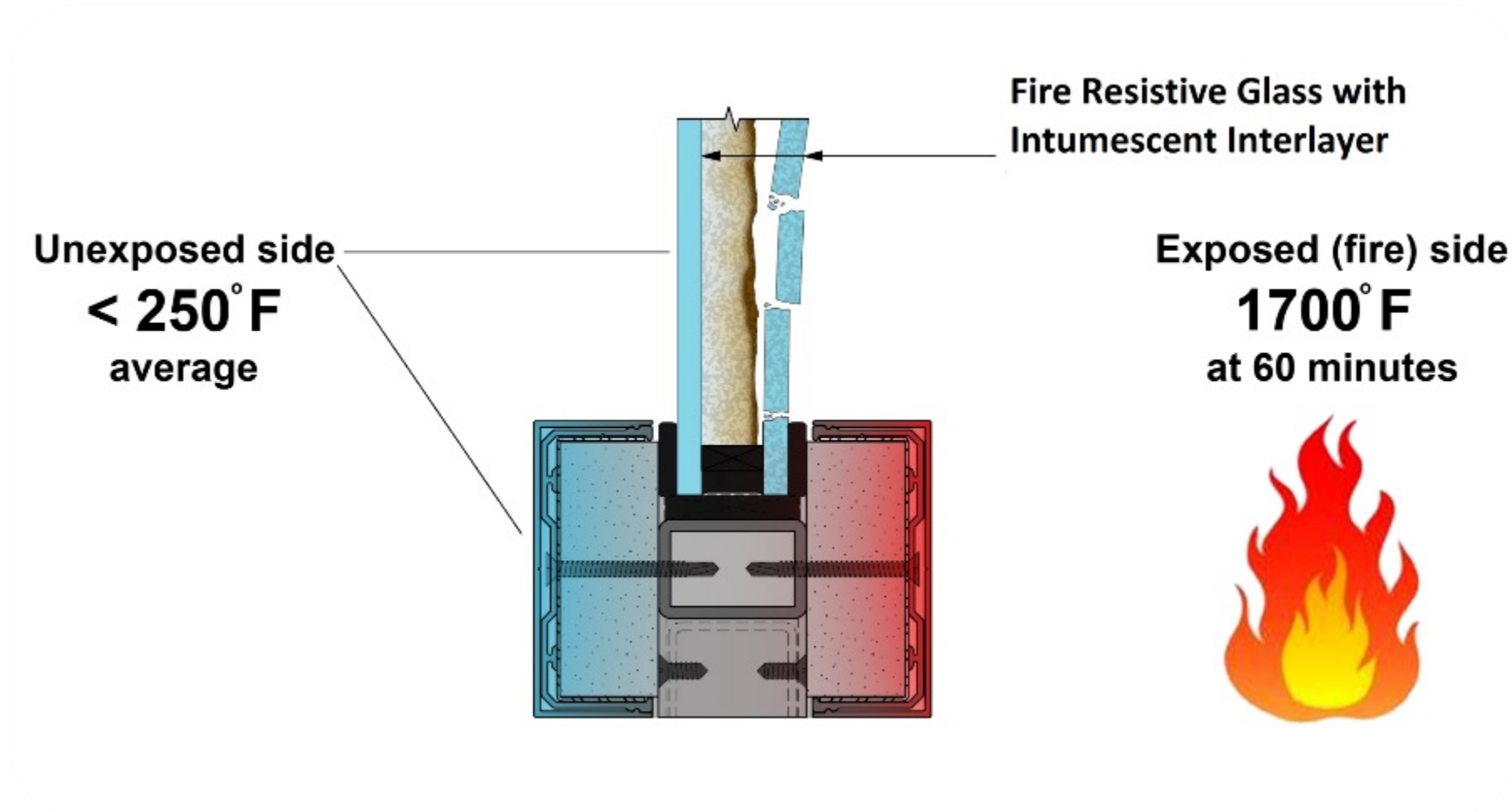
Fire retardant forms into absorbing char



Glass temperature remains low, radiant heat is blocked



Fire Resistive Framing





Fire Resistive Glazing & Framing Applications



*Wall/Window systems
up to 2 hours*



DESIGNING WITH FIRE RATED GLASS

Property Line *(with energy efficient and sound reducing make-ups)*

*Some assemblies and make-ups
available in **NFRC CMAST***





DESIGNING WITH FIRE RATED GLASS

Stairwell Enclosures





DESIGNING WITH FIRE RATED GLASS

Elevator Enclosures





DESIGNING WITH FIRE RATED GLASS

Hurricane





DESIGNING WITH FIRE RATED GLASS

Ballistic/Security





DESIGNING WITH FIRE RATED GLASS

Blast





DESIGNING WITH FIRE RATED GLASS

Butt-Glazed Walls





DESIGNING WITH FIRE RATED GLASS

Fire Rated Decorative Art Glass





DESIGNING WITH FIRE RATED GLASS

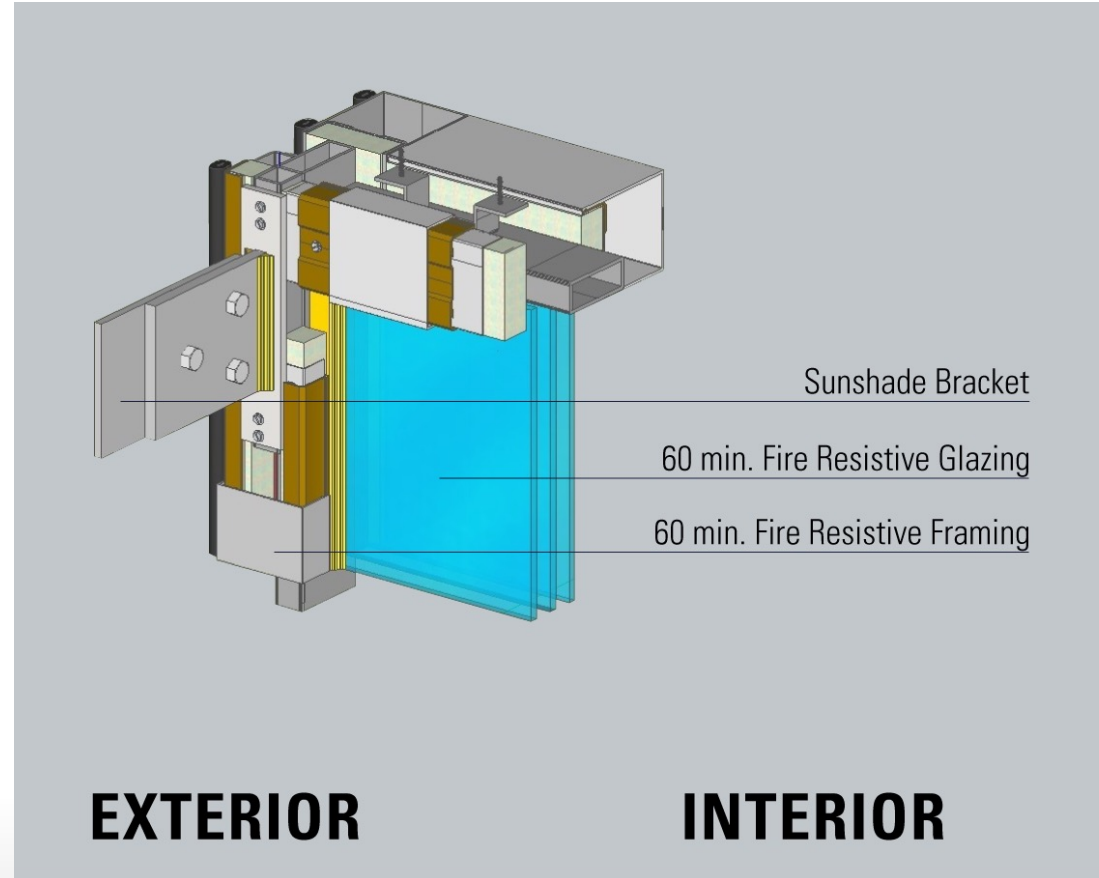
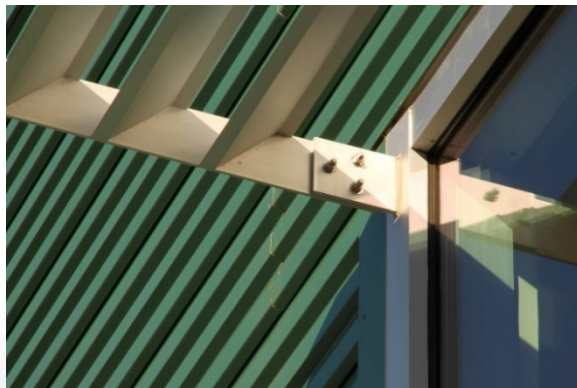
Sunshades





DESIGNING WITH FIRE RATED GLASS

Sunshades





DESIGNING WITH FIRE RATED GLASS

Fire Resistive Floors





Summary & Questions





3 requirements to consider when choosing **Fire Rated Glass** for your application

1

LENGTH OF FIRE RATING?

What is the fire endurance rating, or time rating for the application?



2

FIRE PROTECTIVE OR FIRE RESISTIVE?

Do you need to protect people and property from radiant heat?

OVER 45 MIN. = FIRE RESISTIVE



3

IMPACT SAFETY

Is the application in an area where human impact is a concern?





TRUE or FALSE?

All fire endurance testing for glazing comes from the same test standard.

FALSE

There are different standards used for different applications:

Window & Doors are tested to NFPA 257/NFPA252. Test is primarily for products listed **45 minutes or less** and therefore **the protection from radiant heat transfer is not measure or required**

Walls are tested to ASTM E-119 and **require the blocking of radiant heat**



TRUE or FALSE?

Fire protective glazing that is listed for use in 60 and 90 minute sidelites/transoms are permitted in door openings requiring 60 and 90 minute opening protection.

FALSE

Fire protective glazing listed for use in 60 and 90 minute sidelite/transom assemblies are not permitted in door openings requiring greater than 45 minute protection.

90 minute ceramic glazing listed for use in rated 90 minute sidelites and transoms are not permitted wall where door rating requirement is 90 minutes



120 minute fire resistance glazing is permitted in 2 hour



TRUE or FALSE?

Do current building codes allow local jurisdictions to approve of alternative fire protection methods and materials?

TRUE

ICC model building and fire codes adopted throughout the United States include provisions for the approval of alternative materials and methods meeting equivalent characteristics of quality, strength, effectiveness, fire resistance, durability and safety.



Questions?

For more information, visit

www.safti.com 

or call toll-free at

 888.653.3333

