

# Protect Your Openings – Fire Doors and Fire Windows



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Creative Technology Inc.



February 29, 2024

## Rich Walke Creative Technology Inc.

- “Recently” retired from UL after 43 years
- 29 years conducting and supervising investigations relating to reaction to fire, fire-resistance-rated construction, firestop systems, joint systems and perimeter fire containment systems
- Developed test method and test equipment for testing joint systems and perimeter fire containment systems
- 14 years in the UL Codes and Regulatory Services Department
- Member of ICC Fire Safety Committee during the 2018 and 2021 code development cycles
- Past member of NFPA 101/5000 Fire Protection Features Committee and NFPA 220/221/5000 Technical Committee
- Founded Creative Technology Inc. (CTI) after retiring from UL



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## Learning Objectives

- At the end of this program, participants will be able to:
  1. Understand the requirements of the 2021 International Building Code for the protection of fire door and fire window assemblies
  2. Understand the installation requirements of NFPA 80 and 105 as required by the 2021 International Building Code

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## Learning Objectives Cont.

3. Understand the various resources available for demonstrating compliance with the requirements of the 2021 International Building Code
4. Understand the maintenance requirements of NFPA 80 and 105 as required by the International Fire Code

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## Agenda

- Welcome and Introductions
- Fire-Resistance-Rated Construction
- Breaches in Fire-Resistance-Rated Construction
- Opening Protectives
  - Introductory Comment
  - Fire Door Assemblies
  - Fire Window Assemblies
  - IBC Marking Requirements for Glazing
  - Installation Standards

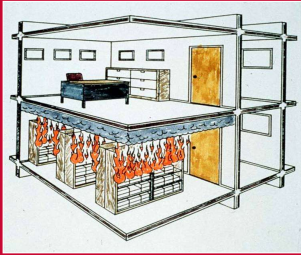
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## Agenda Cont.

- Navigating the UL Product iQ Online Directory
- Navigating the Intertek Online Directory
- International Fire Code Maintenance Requirements
- Summary and Closing

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## Fire-Resistance-Rated Construction



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## Fire Resistance

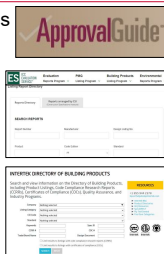
- Expressed as an Hourly Time Period
- Ratings range from 1/2 to 4 hours
- Contain Fire to Room or Floor of Origin, and Maintain Structural Fire Resistance



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## Where Do You Find the Most Current Designs?

- Online Directories from the testing laboratories
    - FM Approvals
    - ICC NTA
    - Intertek
    - UL Solutions
- Design Selection & Analysis...Not as easy as it looks...*



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## UL Product Categories

- UL Product iQ at [www.ul.com/piq](http://www.ul.com/piq)
- **BXUV** – Fire Resistance Ratings – ANSI/UL 263
  - Includes approximately 2050 individual designs
  - Proprietary products specified in these designs are covered in 58 individual product categories

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## Breaches in Fire-Resistance-Rated Construction

- Penetrations (Section 714)
- Joints and Voids (Section 715)
- **Opening Protectives (Section 716)**
- Ducts and Air Transfer Openings (Section 717)

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## Breaches in Fire-Resistance-Rated Construction Cont.

Do breaches really impact the performance of a fire-resistance-rated assembly?

Absolutely!!!



IFC



Warrington

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## Opening Protectives

- Fire Door Assemblies
  - Fire Door Frames
  - Fire Doors
  - Hardware
  - Glazing within Fire Doors
- Fire Window Assemblies
  - Fire Window Frames
  - Glazing



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## Introductory Comments



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## Fire Door and Fire Window Related Definitions

- Opening Protective – A *fire door assembly*, fire shutter assembly, *fire window assembly* or glass-block assembly in a fire-resistance-rated wall or partition. (IBC)

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## Definitions Cont.

- Fire Door Assembly – Any combination of a *fire door*, frame, hardware, and other accessories that together provide a specific degree of fire protection to the opening. (NFPA 80)
- Fire Window Assembly – A window or glass block assembly having a fire protection rating. (NFPA 80)

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## Definitions Cont.

- Fire Protection Glazing – Glazing that has a fire-protection rating. (NFPA 80)
- Fire Protection Rating – The period of time that an opening protective assembly will maintain the ability to confine a fire as determined by tests prescribed in Section 716. Ratings are stated in hours or minutes. (IBC)
  - Passage of Flames
  - Structural Integrity

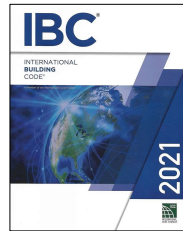
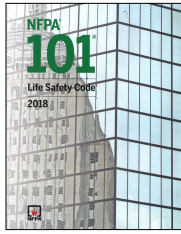
17

## Definitions Cont.

- Fire Resistance Glazing – Glazing that has a fire resistance rating. (NFPA 80)
- Fire Resistance Rating – The time, in minutes or hours, that materials or assemblies have withstood a fire exposure as established in accordance with the test procedures of ASTM E119. (NFPA 80)
  - Passage of Flames
  - Heat Transmission
  - Structural Integrity

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## Codes



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## Component Approach Used for Fire Door and Fire Window Assemblies

- Both documents prescribe a component approach for fire door and fire window openings
- The IBC and NFPA 101 by referencing NFPA 80 require fire door components to be Listed and Labeled
- Approval of the finished opening protective relies on Listing and ratings of individual components with final decision up to the Code Official

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## Opening Protectives Fire Door Assemblies

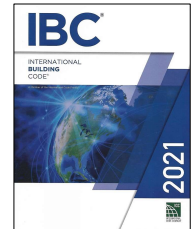
- Fire Door Assemblies
  - Fire Door Frames
  - Fire Doors
  - Hardware
  - Glazing within Fire Doors



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## Fire Door Assemblies

### Code Requirements



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## Code Requirements Cont.

- Section 716 of the 2021 IBC
- **716.1.2.1** – Glazing in and around fire doors must meet safety glazing criteria
  - Wired glass not permitted in or around fire doors
- **716.2.1.1** – Side-hinged or pivoted swinging doors shall be tested to UL 10C or NFPA 252

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## Code Requirements Cont.

- **716.2.1.2** – Other types of doors shall be tested to UL 10B or NFPA 252
- **Table 716.1(2)** – Establishes requirements for rating on door based on required vertical assembly rating

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**TABLE 716.1(2)**  
**OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS**

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE <sup>a</sup>	FIRE-RATED GLAZING MARKING DOOR VISION PANEL <sup>b</sup>	MINIMUM SIDE LIGHT/TRANSOM ASSEMBLY RATING (hours) <sup>c</sup>		FIRE-RATED GLAZING MARKING SIDE-LIGHT/TRANSOM PANEL		
					Fire protection	Fire resistance	Fire protection	Fire resistance	
	4	3	See Note a	D-H-W-240	Not Permitted	4	Not Permitted	W-240	
	3	3 <sup>d</sup>	See Note a	D-H-W-180	Not Permitted	3	Not Permitted	W-180	
Fire walls and fire barriers having a required fire-resistance rating greater than 1 hour	2	1½	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	2	Not Permitted	W-120	
	1½	1½	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	1½	Not Permitted	W-90	
Double fire walls constructed in accordance with NFPA 221	4	3	3	See Note a	D-H-W-180	Not Permitted	3	Not Permitted	W-180
	3	2	1½	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	2	Not Permitted	W-120

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### Code Requirements Cont.

- **716.2.2.1.1** – Doors in corridors and smoke barriers required to have leakage rating of 3 cfm per sq ft of door opening when tested to UL 1784
- **716.2.2.3** – Doors in interior exit stairways, ramps and exit passageways shall have maximum transmitted temperature end point of not more than 450°F for 30 minutes

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### Code Requirements Cont.

- Exception: The temperature rise is not required when an *automatic sprinkler system* is installed
- **716.2.2.3.1** – Fire-protection-rated glazing in doors in interior exit stairways, ramps and exit passageways is limited to 100 sq in. Fire-resistance-rated glazing having a maximum transmitted temperature end point of not more than 450°F for 30 minutes is permitted up to area tested.

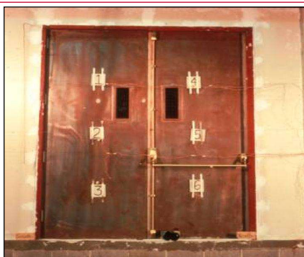
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### Code Requirements Cont.

- Fire-resistance-rated glazing must also be tested as part of door per UL 10B or 10C, as appropriate
- **716.2.5.1** – Maximum size of glazing in fire doors shall comply with NFPA 80, except where specifically limited in IBC
- **716.2.9** – Doors, along with their frames, glazing and hardware shall be labeled

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### Fire Testing of Door Assemblies



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### Fire Door and Shutter Assemblies – IBC Section 716

- IBC Referenced Standards
  - Side-hinged or pivoted swinging doors – UL 10C or NFPA 252 (positive pressure)
  - Tin-clad fire door assemblies – UL 10A, UL 14B, and UL 14C
  - Other types of doors – UL 10B or NFPA 252 (neutral pressure)

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### Fire Door Assembly Ready for Testing

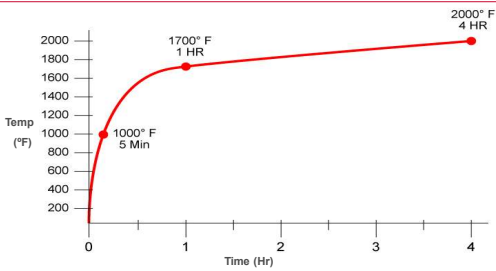


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### Time - Temperature Curve



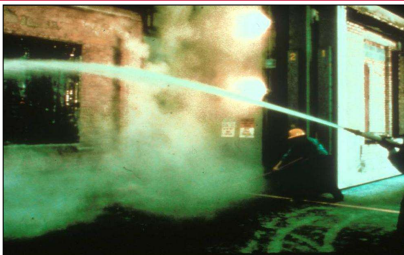
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### Fire Door / Window Assembly Under Test



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### Hose Stream Test



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### Conditions of Acceptance Fire Door Assemblies

- Flame Passage
- Hose Stream After Full Duration Fire Exposure



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## Fire Door Frames



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## Fire Door Frames

- Fire tested (as appropriate)
  - ANSI / UL 10B
  - ANSI / UL 10C
  - NFPA 252
- Evaluated
  - UL Outline of Investigation 63
  - UL Product iQ Online Directory

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## Fire Door Frames Cont.

- Can be hollow metal (steel), wood or wood covered composite
- Can contain sidelights, transom lights or panels
- Can have multiple openings for multiple doors
- Standard frames include single door, pairs of doors and double egress

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## Fire Door Frames Cont.

- Hollow metal frames can be welded or knock-down type
- Frames include mounting hardware specific to the type of wall in which it is intended to be installed
- All frames used in fire door openings required to be labeled
- Frames installed in accordance with supplied installation instructions

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## Where Can I Find The Most Current Listings?

### UL Product iQ



UL Category Code: [GTV](#)

INTERTEK DIRECTORY OF BUILDING PRODUCTS  
Listed Products, Code Compliance Research Reports (CCRRs), Certificates of Compliance (COCs), Quality Assurance, and Industry Programs

Company	Nothing selected
Listing Category	Nothing selected
ICC/Code	Nothing selected
Standard	Nothing selected
Keywords	Spec ID
CCRR #	COC #
Validation/Status	Design Document

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## Fire Doors



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### Types of Fire Doors

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- Swinging Type Fire Doors – Typically of wood, wood composite, hollow metal and steel composite constructions
- Specialty Doors – Typically passenger elevator doors, freight elevator doors, chute doors, rolling steel or curtain type fire doors

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### Swinging Doors

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- Wood Doors – Doors made entirely of wood or wood products
- Wood Composite Doors – Doors made of a man made low grade cement or gypsum material with wood veneers or overlays

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### Swinging Doors Cont.

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- Hollow Metal – Doors featuring a steel construction using vertical or horizontal ribs to strengthen the door. Door may be filled with honeycomb paper or insulation.
- Steel Composite – A steel door construction where the steel skins wrap a core material made of low grade cement, expanded polystyrene or expanded polyurethane

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### Specialty Doors

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- Passenger Elevator Entrance Doors
- Freight Elevator Doors
- Access Doors, Dumbwaiter Doors and Chute Doors
- Rolling Steel or Curtain Type Fire Doors
- Sliding Type Fire Doors

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### Hollow Metal Doors with Fire Exit Hardware

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### Wood Composite Fire Doors

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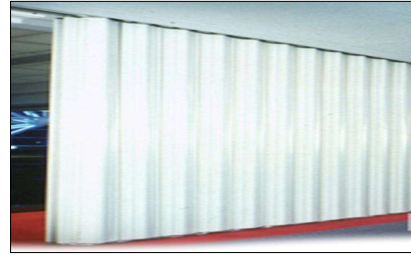


## Rolling Steel Fire Door



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## Horizontal Sliding Doors



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## Passenger Elevator Door



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## Where Can I Find The Most Current Listings?

UL Product IQ

UL Product IQ

CREATE A SEARCH NOW

INTERTEK DIRECTORY OF BUILDING PRODUCTS

Listed Products, Code Compliance Research Reports (CCRRs), Certificates of Compliance (COCs), Quality Assurance, and Industry Programs

Company: Nothing selected

Listing Category: Nothing selected

CS Code: Nothing selected

Standard: Nothing selected

Keywords: \_\_\_\_\_

Spec ID: \_\_\_\_\_

CORR #: \_\_\_\_\_

DOC #: \_\_\_\_\_

Trademark Name: \_\_\_\_\_

Design Document: \_\_\_\_\_

UL listed results include listings with code compliance research reports (CCRRs)  
UL listed results include listings with certificates of compliance (COCs)

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## Glazing in Fire Doors



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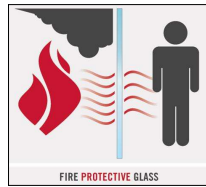
## Types of Glazing

- Fire-Rated Glazing
  - Fire-Protection-Rated Glazing Materials
  - Fire-Resistance-Rated Glazing Materials

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## Fire-Protection-Rated Glazing

- Fire-rated, thin glazing
- Traditional fire-rated material (wired glass, proprietary glass, etc.)
  - Traditional wired glass does not meet safety glazing requirements
- Allows significant radiant heat from unexposed side
- May or may not meet hose stream and temperature requirements

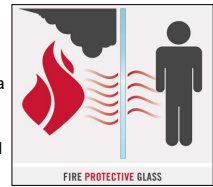


TGP Slide, Image

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## Fire-Protection-Rated Glazing Cont.

- Used as Opening Protectives
  - Fire Doors: 20 minutes to 3 hrs
  - Fire Windows: 20 to 90 minutes
  - May not exceed 25% of the common area of a fire-resistance-rated wall
  - Size shall comply with IBC and NFPA 80, but may not exceed manufacturers tested sizes



TGP Slide, Image

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## Definition Fire-Protection Rating

- Fire-protection rating – The period of time that an opening protective assembly will maintain the ability to confine a fire as determined by tests prescribed in Section 716. Ratings are stated in hours or minutes. (IBC)
  - Passage of Flames
  - Structural Integrity

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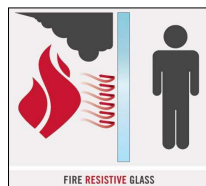
## Standards Fire-Protection-Rated Glazing

- ANSI / UL 10B (Fire Door Assemblies)
- ANSI / UL 10C (Fire Door Assemblies)
- NFPA 252 (Fire Door Assemblies)

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## Fire-Resistance-Rated Glazing

- “Thick” glazing
- Stops fire **AND** radiant heat
- Classified as a “wall” rather than an opening (window)
- Meets same requirements as a gypsum or CMU wall
- When use in walls, both glass and frame must block passage of heat

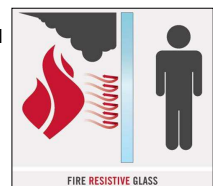


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## Fire-Resistance-Rated Glazing Cont.

- When used in doors, must also meet requirements of hose stream after full fire exposure



TGP Slide, Image

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## Definition Fire-Resistance Rating

- Fire-resistance rating – The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703. (IBC)
  - Passage of Flames
  - Heat Transmission
  - Structural Integrity

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## Standards Fire-Resistance-Rated Glazing

- ANSI / UL 263
- ASTM E119

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## Further Differentiation on Types of Glazing

- Fire-Protection-Rated Glazing Materials
  - Non Temperature Rated without Hose Stream
  - Non Temperature Rated with Hose Stream
  - Temperature Rated (450°F for 30 min) with Hose Stream
- Fire-Resistance-Rated Glazing Materials (250°F / 325°F for full duration of rating)
  - Glazing used in walls
  - Glazing used in walls and fire door applications

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## What Glazing is Required????

- Table 716.1(2) defines the specific glazing required for each fire door application

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## IBC Glazing Marking Requirements

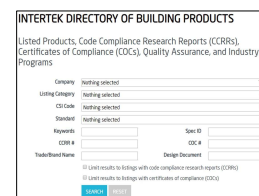
- 2006 and later IBC contain requirements for marking glazing with respect to its fire performance
- Requirement in 2012 and later IBC have changed
- 2012 and newer IBC requirements define marking required for each code application of glazing
- Will cover new marking requirements later in day

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## Where Can I Find The Most Current Listings?



UL Category Code: **KCMZ**  
and **CCET**



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## Opening Protectives Fire Windows Assemblies

### Fire Window Assemblies

- Fire Window Frames
- Glazing



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## Fire Window Assemblies

### Code Requirements



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## Code Requirements

- Section 716.3 of the 2021 IBC
- **716.3.1** – Fire window assemblies shall be constructed of components which comply with Section 716.3.1.1 and 716.3.1.2
- **716.3.1.1** – Fire-protection-rated glazing used in fire window assemblies shall be tested to positive pressure UL 9 or NFPA 257 test. Must meet fire and full duration hose stream requirements.

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## Code Requirements Cont.

- **716.3.1.2** – Nonsymmetrical glazing systems shall be tested from both faces
- **716.3.2** – Fire window assemblies shall have a fire-protection rating as specified in Table 716.1(3)

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**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	All	NP <sup>a</sup>	W-XXX <sup>b</sup>
Fire walls	>1	NP <sup>a</sup>	W-XXX <sup>b</sup>
Fire barriers	1	NP <sup>a</sup>	W-XXX <sup>b</sup>
Atrium separations (Section 707.3.6), Incidental use areas (Section 707.3.7), Mixed occupancy separations (Section 707.3.9)	1	1/4	OH-45 or W-60
Fire partitions	1	1/4	OH-45 or W-60
	0.5	1/4	OH-20 or W-30
Smoke barriers	1	1/4	OH-45 or W-60
	>1	1 1/2	OH-90 or W-XXX <sup>c</sup>
Exterior walls	1	3/4	OH-45 or W-60
	0.5	1/3	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 E119 or UL 263, as specified in Section 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.  
c. Fire protection-rated glazing is not permitted for fire barriers required by Section 1207 of the International Fire Code to enclose energy storage systems. Fire-resistance-rated glazing assemblies tested to ASTM E119 or UL 263, as specified in Section 716.1.2.3, shall be permitted.

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## Code Requirements Cont.

- **716.3.2.1** – Fire-protection-rated glazing used in fire window assemblies in interior fire barriers and fire partitions limited to assemblies with max 1 hr rating
- Where permitted, fire-protection-rated glazing in 1 hr fire barriers shall have a 3/4 hr rating
- Fire windows only permitted in fire barriers used to separate atriums, incidental use areas and mixed occupancies

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### Code Requirements Cont.

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- Fire-protection-rated glazing in 1 hr fire partitions shall have a 3/4 hr rating
- Fire-protection-rated glazing in 1/2 hr fire partitions shall have a 1/3 hr rating
- Total area of openings shall not exceed 25% of a common wall area

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### Code Requirements Cont.

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- **Table 716.1(3)** – Fire window assemblies in 1 hr smoke barriers shall have a 3/4 hr fire-protection rating

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### Code Requirements Cont.

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- **Table 716.1(3)** – Glazing used in exterior wall assemblies required to have a fire-resistance rating:
  - 1-1/2 hr fire-protection-rated glazing required when wall rating exceeds 1 hr
  - 3/4 hr fire-protection-rated glazing required when wall rating is 1 hr
  - 1/3 hr fire-protection-rated glazing required when wall rating is 1/2 hr

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### Code Requirements Cont.

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- **716.3.4.1** – Maximum size of fire-protection-rated glazing shall comply with NFPA 80
- **716.3.5** – Glazing shall be labeled

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### Fire Window Frames

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### Fire Window Frames Cont.

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- The same type of frames discussed under fire door assemblies are used in fire window frames
- All frames used in fire window openings required to be labeled
- Frames installed in accordance with supplied installation instructions

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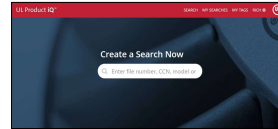
## Fire Window Frames Cont.

- Fire tested (as appropriate)
  - ANSI / UL 9 (Window Assemblies)
  - NFPA 257 (Window Assemblies)
- Evaluated
  - UL Outline of Investigation 63
  - UL Fire Resistance Directory

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## Where Can I Find The Most Current Listings?

### UL Product iQ



UL Category Code: [GVTV](#)

INTERTEK DIRECTORY OF BUILDING PRODUCTS

Listed Products, Code Compliance Research Reports (CCRRs), Certificates of Compliance (COCs), Quality Assurance, and Industry Programs

Company	Nothing selected
Listing Category	Nothing selected
UL Code	Nothing selected
Product	Nothing selected
Keywords	
CCRR #	Search ID
Table/Board Name	OC #
	Design Document

Only results to listings with code compliance research reports (CCRRs)  
 Only results to listings with certificates of compliance (COCs)

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## Glazing in Fire Windows



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## Glazing in Fire Windows Cont.

- Table 716.1(3) – Requires fire window assemblies to be glazed with fire-protection-rated glazing
- Fire-resistance-rated glazing shall be utilized where
  - Required size of glazing exceeds code allowance
  - Code does not permit openings protected with fire-protection-rated glazing

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## Standards Fire-Protection-Rated Glazing

- UL 9 (Window Assemblies)
- NFPA 257 (Window Assemblies)

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## Conditions of Acceptance Fire-Protection-Rated Glazing

- Flame Passage
- Hose Stream after Full Duration Fire Exposure
  - Limited Openings (Max 5% Fall-Out) Permitted

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## Standards Fire-Resistance-Rated Glazing

- UL 263
- ASTM E119

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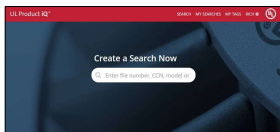
## Conditions of Acceptance Fire-Resistance-Rated Glazing

- Flame Passage
- 250°F / 325°F Temperature Rise
- Hose Stream on Duplicate Test Sample Exposed to Fire for Reduced Time Frame

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## Where Can I Find The Most Current Listings?

### UL Product iQ



UL Category Code: **KCMZ**  
and **CCET**

**INTERTEK DIRECTORY OF BUILDING PRODUCTS**  
Listed Products, Code Compliance Research Reports (CCRRs), Certificates of Compliance (COG), Quality Assurance, and Industry Programs

Company:  Nothing selected

Listing Category:  Nothing selected

CS/CR:  Nothing selected

Standard:  Nothing selected

Keywords:  Spec ID:

COG #:  COG #:

Trademark/Name:  Design Document:

Limit results to listings with code compliance research reports (CCRRs)  
 Limit results to listings with certificates of compliance (COG)

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## IBC Marking Requirements for Glazing



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## 2021 IBC Marking Requirements for Glazing

TABLE 716.1(1)  
MARKING FIRE-RATED GLAZING ASSEMBLIES

FIRE TEST STANDARD	MARKING	DEFINITION OF MARKING
ASTM E119 or UL 263	W	Meets wall assembly criteria
ASTM E119 or UL 263	FC	Meets floor/ceiling criteria <sup>a</sup>
NFPA 257 or UL 9	OH	Meets fire window assembly criteria including the hose stream test
	D	Meets fire door assembly criteria
NFPA 252 or UL 10B or UL 10C	H	Meets fire door 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

For SI: °C = (°F) - 32 / 1.8.  
<sup>a</sup> See Section 2409.1

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## 2009 IBC Marking Requirements for Glazing

- For fire-protection-rated glazing used in Fire Door Assemblies, glazing marked: **D – H or NH – T or NT – XXX**, where:
  - D indicates glazing meets the door assembly criteria
  - H or NH indicates if glazing meets hose stream test or not
  - T or NT indicates if glazing meets 450°F temperature rise for 30 minutes or not
  - XXX indicates fire-protection rating in minutes

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### 2021 IBC Marking Requirements for Glazing Cont.

- For fire-protection-rated glazing used in Fire Door Assemblies, glazing marked: D – H – T – XXX, where:
  - D indicates glazing meets the door assembly criteria
  - H indicates the glazing meets the hose stream test
  - T indicates the glazing meets 450°F temperature rise for 30 minutes
  - XXX indicates fire-protection rating in minutes

### 2021 IBC Marking Requirements for Glazing Cont.

- For fire-resistance-rated glazing used in Fire Door Assemblies, glazing marked: D – H – T – W – XXX, where:
  - D indicates glazing meets the door assembly criteria
  - H indicates the glazing meets the hose stream test
  - T indicates the glazing meets 450°F temperature rise
  - W indicates the glazing meets the wall assembly criteria
  - XXX indicates fire-protection rating in minutes

### 2021 IBC Marking Requirements for Glazing Cont.

- For glazing used in Fire Window Assemblies, glazing marked: OH – XXX, where:
  - OH indicates glazing indicates glazing meets the fire window criteria including the hose stream test
  - XXX indicates fire-protection rating in minutes

### 2021 IBC Marking Requirements for Glazing Cont.

- For fire-resistance-rated glazing used as a wall, glazing marked: W – XXX, where:
  - W indicates glazing meets the wall assembly criteria
  - XXX indicates fire-resistance rating in minutes

TABLE 716.102  
OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VIEW PANEL SIZE <sup>1</sup>	FIRE RATED GLAZING MARKING DOOR VIEW PANEL <sup>2</sup>	MINIMUM WINDLIGHT RATING (hours)		FIRE RATED GLAZING MARKING SIDE-LIGHT/TRANSOM PANEL		
					Fire protection	Fire resistance	Fire protection	Fire resistance	
Fire walls and fire barriers having a required fire resistance rating greater than 1 hour	4	3	See Note a	D-H-W-240	Not Permitted	4	Not Permitted	W-240	
	3	3 <sup>1/2</sup>	See Note a	D-H-W-180	Not Permitted	3	Not Permitted	W-180	
	2	1 1/2	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	2	Not Permitted	W-120	
	1 1/2	1 1/2	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	1 1/2	Not Permitted	W-90	
Double fire walls constructed in accordance with NFPA 221	4	3	3	See Note a	D-H-W-180	Not Permitted	3	Not Permitted	W-180
	3	2	1 1/2	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	2	Not Permitted	W-120

### Installation Standards

Both the IBC and the NFPA Life Safety Code reference NFPA 80, Standard for Fire Doors and other Opening Protectives, and NFPA 105, Standard for Smoke Door Assemblies and Other Opening Protectives





## NFPA 80 - Scope

- **1.1\* Scope.** This standard regulates the installation and maintenance of assemblies and devices used to protect openings in:
  - walls,
  - floors,
  - and ceilings**“against the spread of fire and smoke within, into or out of buildings.”**

97

## NFPA 80 Requirements - General

- **4.1.3 Appurtenances.**
  - **4.1.3.1** Preparation of fire door assemblies for locks, latches, hinges, remotely operated or remotely monitored hardware, concealed closers, glass lights, vision panels, louvers, astragals and split astragals, and the application of plant-ons and laminated overlays shall be performed in accordance with the manufacturer's inspection service procedure and under label service.

98

## NFPA 80 Requirements - General

- **4.1.3.2\*** The following job site preparation shall be permitted:
  1. Holes for surface-applied hardware, function holes for mortise locks, and holes for labeled viewers
  2. A maximum 3/4 in. (19 mm) wood and composite door undercutting
  3. Installation of protection plates (see 6.4.5)

99

## NFPA 80 Requirements - General

- **4.1.3.2.1** Surface-applied hardware shall be applied to the door or frame without removing material other than drilling round holes to accommodate cylinders, spindles, similar operational elements, and through-bolts in doors.
- **4.1.3.2.2** The holes described in 4.1.3.2.1 shall not be permitted to exceed a diameter of 1 in. (25.4 mm), with the exception of holes for cylinders, unless otherwise permitted by 4.1.3.2.3.
- **4.1.3.2.3** Holes larger than 1 in. are permitted based upon door and door hardware manufacturer's listings.

100

## NFPA 80 Requirements - General

- **4.1.4 Signage.** Signage is permitted as follows, or in accordance with the manufacturer's listing:
  - **4.1.4.1** Max 5 % of door area
    - **4.1.4.2.1** Signage secured with adhesive
    - **4.1.4.2.2** Mechanical attachments such as screws or nails shall not be permitted
  - **4.1.4.3** Signage shall not be installed on glazing
  - **4.1.4.4** Signage shall not interfere with operation of door

101

## NFPA 80 Requirements - General

- **4.2 Listed and Labeled Products.**
  - **4.2.1\*** Listed items shall be labeled
  - **4.2.3** Labels shall be applied in locations that are visible after installation
  - **4.2.6** Specification of items of a generic nature, such as hinges, that are not labeled shall comply with the specifications contained in this standard

102

### NFPA 80 Requirements Swinging Doors - Frames

---

- **6.3.1.7\* Clearances.**
- **6.3.1.7.1\*** Clearances dimensions between doors and frames and meeting stiles of paired doors shall be measured on the pull side of the assemblies.
- **6.3.1.7.2\*** The clearances between the top and vertical edges of hollow metal doors and the frame, and the meeting stiles of doors swinging in pairs, shall be 1/8 in. ± 1/16 in.

103

### NFPA 80 Requirements Swinging Doors - Frames

---

- **6.3.1.7.5\*** Door leaves constructed of other materials shall not have clearances greater than 1/8 in. between the top and vertical edges of doors and meeting stiles of paired doors unless otherwise permitted by the door frame, door, and latching hardware manufacturers' published listings.

104

### NFPA 80 Requirements Swinging Doors - Hinges

---

- **6.4.3.4 Shimming.** When required to meet the clearances stated in 6.3.1.7, the shimming of hinges using **steel** shims shall be permitted.

105

### Navigating the UL Online Directory

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UL Product iQ



106

### Product Categories Doors

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- Door and window related products are listed in individual product categories (CCNs)
- There are approximately 55 product categories that are fire door related
- Each product category describes some generic family of products (e.g. Swinging Type Fire Doors)

107

### Product iQ – UL's New Online Directory

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- Replaces the old Online Certifications Directory which was developed in 1999
- Identifies Certified products, designs, systems, assemblies and constructions
- Helps you achieve code compliance
- Is continuously updated
- Requires registration to create user account
- Basic Service – no charge for use

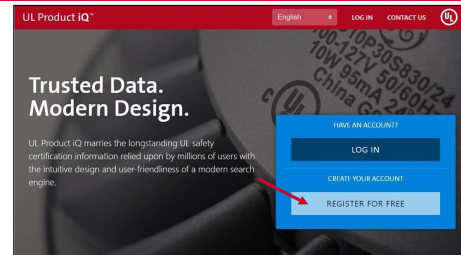
108

## Product iQ – UL’s New Online Directory

- Paid Subscription Service provides more features
  - Save Searches
  - Tags and Groups
  - Confirmation Letters
- <https://iq.ulprospector.com/en/>
- Vanity addresses
  - [www.ProductIQ.UL.com](http://www.ProductIQ.UL.com)
  - [www.UL.com/ProductIQ](http://www.UL.com/ProductIQ)
  - [www.UL.com/PIQ](http://www.UL.com/PIQ)

109

## UL Product iQ Cont. (www.UL.com/PIQ)



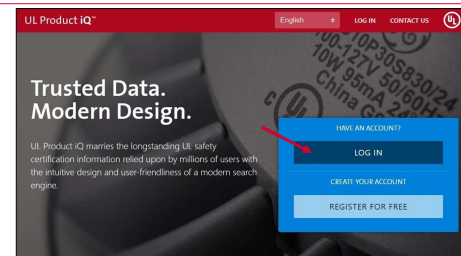
110

## UL Product iQ Cont.

The screenshot shows the registration form on the UL Product iQ website. It includes fields for 'First Name', 'Last Name', 'Company Email', 'Company Name', and 'Job Title'. There is a 'Helpful Hints' section on the right side of the form. The form is titled 'CREATE YOUR ACCOUNT'.

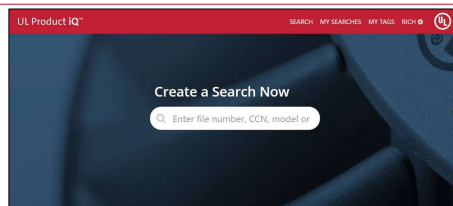
111

## UL Product iQ Cont.



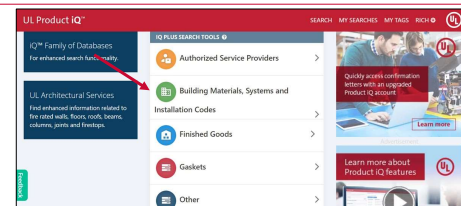
112

## UL Product iQ Cont. Smart Search



113

## UL Product iQ Cont. iQ Plus Search



114

## UL Product iQ Cont.

**UL Product iQ** SEARCH MY SEARCHES MY TAGS RICH

**Building Materials and Systems**

Search for design, systems, assemblies, and products that include, or are related to, highly fire-resistance ratings.

**Dispersers**  
The category Dispersers for the Barter and Brine applications covers the dispersers, smoke detectors, lighting and control, contributions for fire spread detectors that manage water, vapors, and control systems.

**Electrical Circuit Protection Systems (ECPS)**  
Electrical Circuit Protection Systems consist of components and materials that are intended for installation in a location to provide electrical circuit protection when exposed to the disruption of electrical circuit integrity under fire conditions.

**Fire Door and Fire Window Related Certifications**  
Fire door assemblies and window assemblies are protective shields and fire ratings for fire door assemblies and fire window assemblies that are more complex than those typically associated with these assemblies.

**Fire Rated Roofs, Walls, Floors, Beams and Columns**  
This category covers non-imp, non-ventilating, flame-retardant, walls and partitions investigated for a hourly fire-resistance rating.

**Fire-rated Glass Door Assemblies**

**Fire-resistance Ratings of Structural Steel Used in Petrochemical Facilities**  
This category covers hourly fire-resistance ratings of steel columns intended for use in petrochemical facilities investigated using a small scale test apparatus.

115

## UL Product iQ Cont.

**UL Product iQ** SEARCH MY SEARCHES MY TAGS RICH

**Firestop Systems**

This category covers firestop systems, which are passive construction consisting of a wall or floor assembly, a penetrating item passing through an opening in the wall or floor assembly, and the firestop designed to prevent the spread of fire.

**Firestop Systems for Canada**

This category covers firestop systems, which are passive construction consisting of a wall or floor assembly, a penetrating item passing through an opening in the wall or floor assembly, and the firestop designed to prevent the spread of fire.

**Insulation Code Search**  
Search for UL Certified products by manufacturer code. Enter your model number code and search for specific UL Certified products for your intended installation.

**Joint Systems**

This category covers joint systems, which are specific construction consisting of adjacent fire-rated walls and/or floor assemblies and the means designed to prevent the spread of fire through a joint opening between the wall and/or floor.

**Technical Fire-Resistant Systems**  
A general fire-resistant system is a specific construction consisting of a floor with a tested fire-resistance rating or a specific tested wall with a fire-resistance rating and the fire material installed between the floor and the ceiling wall.

**Qualified Firestop Contractors (BFT)**

**Roof Deck Constructions**  
This category covers roof deck constructions investigated as to the spread of fire on the underside and resistance to wind uplift forces.

**Supplier Identification Number**

116

## UL Product iQ Cont.

**UL Product iQ** SEARCH MY SEARCHES MY TAGS RICH

**Special Barrier Systems (SBS)**

This category covers special barrier systems consisting of membranes and panels designed for installation on exterior or interior walls and ceilings to prevent the migration of vapors from the industrial process. This system is investigated in accordance with the requirements.

**UL Evaluation Reports**

**Ventilation Duct Assemblies**  
This category covers the fire-resistance performance of ventilation duct assemblies. These assemblies are investigated only required to be tested to meet the intent of the test and are comparison to another without the aid of the detectors.

**Weather-Resistive Building Products**  
This category covers weather-resistive building products intended to protect the exterior envelope of structures in the event of hurricane or typhoon.

**Other**

**NO DATABASE INFO**

229327 Document Count | 15 Jan, 2019 Last Update | 68474 Complete Count

117

## UL Product iQ Cont.

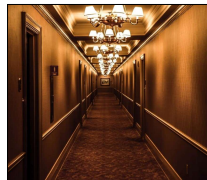


118

## UL Product iQ Cont.

Smart Search for a design if design number is known

- Design No. L501



119

## UL Product iQ Cont.

**UL Product iQ** SEARCH MY SEARCHES MY TAGS RICH

Create a Search Now

SEARCH L501

KEYWORD

L501 Find all information for L501

DESIGN NUMBER

L501

**IQ™ Family of Databases** For enhanced search functionality

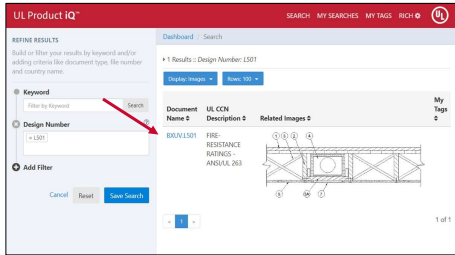
**IQ PLUS SEARCH TOOLS**

Authorized Service Providers

Tools to give you greater control and flexibility

120

## UL Product iQ Cont.



121

## UL Product iQ Cont.

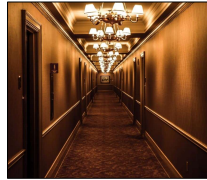


122

## UL Product iQ Cont.

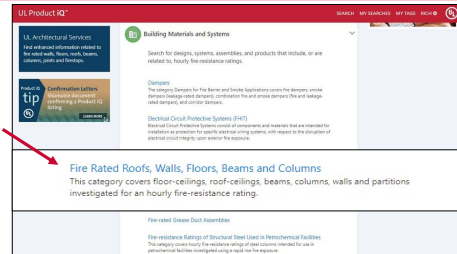
iQ Plus Search under Building Materials and Systems for fire rated wall design based on specific parameters

- Wood stud/gypsum board wall assembly
- 2 hour rating
- Gypsum board supplied by the United States Gypsum Company



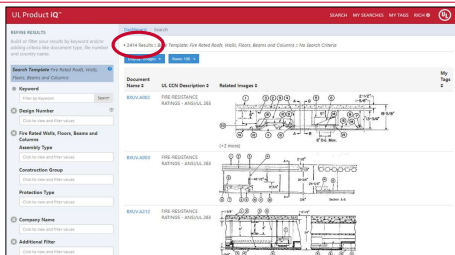
123

## UL Product iQ Cont.



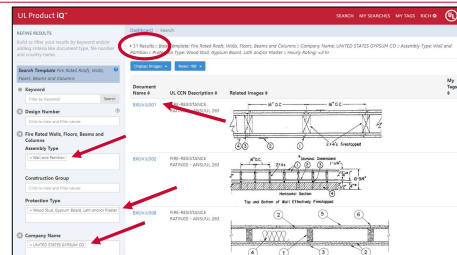
124

## UL Product iQ Cont.



125

## UL Product iQ Cont.



Also added 2 hr as required rating

126

## UL Product IQ Cont.

Design No. US81  
October 22, 2011

Bearing Wall Rating — 2 Hr.  
Finish Rating — 60 Min.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — see Guide 5503 or 5507.

\* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

1. **Nailheads** — Exposed or covered with joint compound.

2. **Joints** — Exposed joints covered with joint compound and paper tape. Joint compound and paper tape may be omitted where square edge boards are used. An alternate non-2x2 to 2x4 gypsum veneer paper may be applied to the entire surface of classified veneer baseboard with the joints reinforced with paper tape.

3. **Nails** — 6d cement coated nails 1-7/8 in. long, 0.0915 in. shank diam., 1/4 in. diam heads, and 6d cement coated nails 2-3/8 in. long, 0.112 in. shank diam, 3/16 in. diam heads.

127

## UL Product IQ Cont.

Smart Search for a swinging fire door manufactured by Calder Door



128

## UL Product IQ Cont.

Create a Search Now

Calder Door

SEARCHED: Calder Door

Family of Databases | PLUS SEARCH TOOLS | Authorized Service Providers

129

## UL Product IQ Cont.

REFINE RESULTS

Keyword: Calder Door

UL Category Control Number: GDCR15562

Company Name: GDCNR15562

File Number: GDFNR15568

Country Name: US

Document Name #	UL CEN Description #	Related Images #	My Type #
GDCR15562	SWINGING-TYPE FIRE DOORS		
GDCNR15562	FISHERS OF FIRE DOORS		
GDCNR15562	SWINGING-TYPE FIRE DOORS, POSITIVE-PRESSURE TESTED		
GDFNR15568	FIRE DOOR AND FIRE WINDOW FRAMES		
GDFNR15568	FISHERS OF FIRE DOOR FRAMES AND FIRE WINDOW FRAMES		

Tip: Organize your personal workspace with custom tags.

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## UL Product IQ Cont.

See General Information for Swinging-type Fire Doors, Positive-pressure Tested

CALDER DOOR & SPECIALTY CO  
1006 LUCAS RD  
PO BOX 4621  
LANCASTER, PA 17604-4621 USA

Model Rating	Door	Type	Opening	Min. Size	Max. Size	Hardware	Accessories	Temp. Rating	Smoke Control
				W	H			(°C)	
3 hour	Steel Covered Composite	Single	A	4'-0"	8'-0"	Cylindrical Mortise Door Viewer, Glazing Louver			S
3 hour	Steel Covered Composite	Single	A	4'-0"	8'-0"	Mortise Fire Exit, Rim Bolt, Surface Vertical Rod Bolt			S
3 hour	Steel Covered Composite	Pair w/ Atragral	A	8'-0"	8'-0"	Cylindrical Mortise Door Viewer, Glazing Louver			S
3 hour	Steel Covered Composite	Pair w/ Atragral	A	8'-0"	8'-0"	Connected Vertical Rod Bolt, Mortise Fire Exit, Rim Bolt, Surface Vertical Rod Bolt			S

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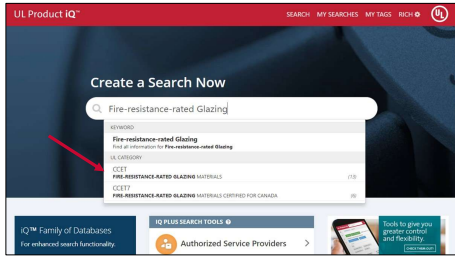
## UL Product IQ Cont.

Smart Search for a fire-resistance-rated glazing manufactured by Vetrotech Saint-Goban



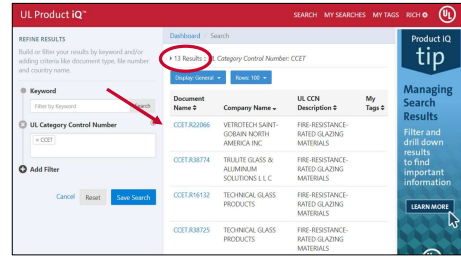
132

## UL Product iQ Cont.



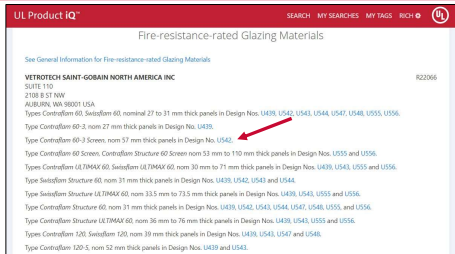
133

## UL Product iQ Cont.



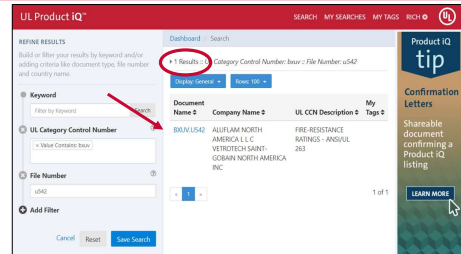
134

## UL Product iQ Cont.



135

## UL Product iQ Cont.



136

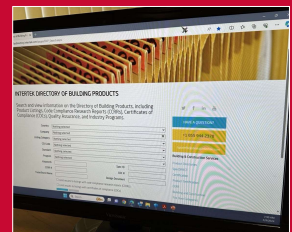
## UL Product iQ Cont.



137

## Navigating the Intertek Online Directory

### Intertek Directory of Building Products



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## Intertek Directory of Building Products

- Identifies Certified products, designs, systems, assemblies and constructions
- Helps you achieve code compliance
- Is continuously updated
- <https://bpdirectory.intertek.com>

139

## Intertek Directory of Building Products

**INTERTEK DIRECTORY OF BUILDING PRODUCTS**

Search and view information on the Directory of Building Products, including Product Listings, Code Compliance Research Reports (CCRRs), Certificates of Compliance (COCs), Quality Assurance, and Industry Programs.


**RESOURCES**  
 +1 855 944 2378  
[info@bpdirectory.intertek.com](mailto:info@bpdirectory.intertek.com)  
 Intertek BSC  
 Product Directories  
 AIA Resources  
 SpecIMC®  
 Fire Door Categories

Company: Nothing selected  
 Listing Category: Nothing selected  
 CSI Code: Nothing selected  
 Standard: Nothing selected

Keywords: \_\_\_\_\_ Spec ID: \_\_\_\_\_  
 CCRR #: \_\_\_\_\_ COC #: \_\_\_\_\_  
 Trade/Brand Name: \_\_\_\_\_ Design Document: \_\_\_\_\_

Limit results to listings with code compliance research reports (CCRRs)  
 Limit results to listings with certificates of compliance (COCs)

**SEARCH** **RESET**



140

## Intertek Directory of Building Products

Search for a 90 minute fire door / frame assembly manufactured by Global Security Glazing, LLC



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## Intertek Directory of Building Products

**INTERTEK DIRECTORY OF BUILDING PRODUCTS**

Search and view information on the Directory of Building Products, including Product Listings, Code Compliance Research Reports (CCRRs), Certificates of Compliance (COCs), Quality Assurance, and Industry Programs.

Company: Nothing selected  
 Listing Category: CATEGORY D - DOOR/FRAME ASSEMBLIES  
 CSI Code: Nothing selected  
 Standard: UL 10C1

Keywords: \_\_\_\_\_ Spec ID: \_\_\_\_\_  
 CCRR #: \_\_\_\_\_ COC #: \_\_\_\_\_  
 Trade/Brand Name: \_\_\_\_\_ Design Document: \_\_\_\_\_

Limit results to listings with code compliance research reports (CCRRs)  
 Limit results to listings with certificates of compliance (COCs)

**SEARCH** **RESET**

142

## Intertek Directory of Building Products

**INTERTEK DIRECTORY OF BUILDING PRODUCTS**

Search and view information on the Directory of Building Products, including Product Listings, Code Compliance Research Reports (CCRRs), Certificates of Compliance (COCs), Quality Assurance, and Industry Programs.

Company: Nothing selected  
 Listing Category: CATEGORY D - DOOR/FRAME ASSEMBLIES  
 CSI Code: Nothing selected  
 Standard: UL 10C1

Keywords: \_\_\_\_\_ Spec ID: \_\_\_\_\_  
 CCRR #: \_\_\_\_\_ COC #: \_\_\_\_\_  
 Trade/Brand Name: \_\_\_\_\_ Design Document: \_\_\_\_\_

Limit results to listings with code compliance research reports (CCRRs)  
 Limit results to listings with certificates of compliance (COCs)

**SEARCH** **RESET**

Company	Listed Product	Spec ID	Standard	More
A & A Sheet Metal Products, Inc.	A & A Sheet Metal Products Inc. SECURALL 2 90min Fire Rated Single Door and Frame Assembly	39574	CAN / ULC S104 (2015); NFPA 252 (2017); UL 10C1 (2016)	

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## Intertek Directory of Building Products

Company	Listed Product	Spec ID	Standard	More
Global Security Glazing, LLC	INFERNOGARD™ Fire Rated Door System 90 Minute	56532	CAN / ULC S104 (2015); NFPA 252 (2017); UL 10(c) (2016)	
Halspan Limited	Halspan Prima / Prima Plus 20 Minute without Hose Stream Wood Fire Door Assemblies	33316	UL 10(c) (2009)	<b>COC #:</b> <a href="#">WH18-23137127</a>
Halspan Limited	Halspan Universal, Plus 20 Minute without Hose Stream Wood Fire Door Assemblies	33315	UL 10(c) (2009)	<b>COC #:</b> <a href="#">WH18-23137128</a>
Hope's Windows, Inc.	Hope's windows 5000 Series 45 Minute Door/Frame Assemblies	29949	CAN / ULC S104 (2015); NFPA 252 (2017); UL 10(c) (2016)	

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## Intertek Directory of Building Products

INFERNOGARD™ Fire Rated Door System 90 Minute  
Company: Global Security Glazing, LLC

Rating:	Application:	Maximum Size of Openings:
60 Minute	Singles	4'0" wide x 8'0" high
	Pairs	8'0" wide x 8'0" high
90 Minute	Singles	4'0" wide x 8'0" high
	Pairs	8'0" wide x 8'0" high

Glazing Markings: D-H-T-60 and D-H-T-90  
\*Component Bearing the Warnock Hersey Certification Mark

Limitations:  
Surface Mounted Vertical Rod Fire Exit Hardware, Pivot Hinges, Offset Hinges  
Panels - 4,952 sq. in. (1 hour), 4,876 sq. in. (1-1/2 hour)  
Temp Rise - 250°F for full duration. Door and frame to be installed as a unit.  
Listed fire-rated open cell glazing tape is allowed for use with INFERNOGARD™ Glazing such that it is approved for fire-rated durations equal to or greater than the respective INFERNOGARD™ Glazing product it is used with.  
Due to the thickness of the INFERNOGARD™ products, the vision fill and door assembly must be fire rated and tested and labeled for use with the rated glazing which are at least of equivalent thickness to the respective INFERNOGARD™ products used.

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## Fire Code Maintenance Requirements

- NFPA 101
  - NFPA 1
  - International Fire Code
- States Minimum Requirements
  - States Minimum Frequency



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## 2021 International Fire Code Maintenance

### SECTION 701 GENERAL

- **701.1 Scope.** The provisions of this chapter shall govern the **inspection and maintenance of the materials, systems and assemblies used for structural fire-resistance, fire-resistance-rated construction separation of adjacent spaces and construction** installed to resist the passage of smoke to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings. New buildings shall comply with the *IBC*.



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## 2021 International Fire Code Maintenance

### SECTION 701 GENERAL

- **701.5 Maintaining protection.** Materials, systems and devices used to repair or protect breaches and openings in **fire-resistance-rated construction** and construction installed to resist the passage of **smoke** shall be maintained in accordance with Sections 703 through 707.



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## 2021 International Fire Code Maintenance

### SECTION 701 GENERAL

- **701.6 Owner's responsibility.** The **owner shall maintain an inventory** of all required fire-resistance-rated construction, construction installed to resist the passage of smoke and the construction included in Sections 703 through 707 and Sections 602.4.1 and 602.4.2 of the IBC. **Such construction shall be visually inspected by the owner annually and properly repaired, restored or replaced where damaged, altered, breached or penetrated.**



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## 2021 International Fire Code Maintenance

### SECTION 701 GENERAL

- **701.6 Owner's responsibility Cont.** **Records of inspections and repairs shall be maintained.** Where concealed, such elements shall not be required to be visually inspected by the *owner* unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space.



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## 2021 International Fire Code Maintenance

### SECTION 705 DOOR AND WINDOW OPENINGS

- **705.1 General.** Where required when the building was originally constructed, opening protectives installed in *fire-resistance-rated* assemblies, *smoke barriers* and *smoke partitions* shall be inspected and maintained in accordance with this section.



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## 2018 International Fire Code Maintenance

### SECTION 705 DOOR AND WINDOW OPENINGS

- **705.2 Inspection and maintenance.** Opening protectives in *fire-resistance-rated* assemblies shall be inspected and maintained in accordance with NFPA 80. *Opening protectives* in *smoke barriers* shall be inspected and maintained in accordance with NFPA 80 and NFPA 105. Openings in smoke partitions shall be inspected and maintained in accordance with NFPA 105. Fire doors and smoke and draft control doors shall not be blocked, obstructed, or otherwise made inoperable. Fusible links shall be replaced promptly whenever fused or damaged. *Opening protectives* and smoke and draft control doors shall not be modified.



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## 2021 International Fire Code Maintenance

### SECTION 705 DOOR AND WINDOW OPENINGS

- **705.2 Labeling requirements.** Where approved by the *fire code official*, the application of field-applied labels associated with the maintenance of *opening protectives* shall follow the requirements of the *approved* third-party certification organization accredited for *listing* the opening protective.



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## 2021 International Fire Code Maintenance

### SECTION 705 DOOR AND WINDOW OPENINGS

- **705.2.3 Hold-open devices and closers.** Hold-open devices and automatic door closers, where provided, shall be maintained. During the period that such device is out of service for repairs, the door it operates shall remain in the closed position.



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## NFPA 80/105 Maintenance Requirements

The 2021 International Fire Code references NFPA 80-19, Standard for Fire Doors and Other Opening Protectives, and NFPA 105-19, Standard for Smoke Door Assemblies and Other Opening Protectives for the maintenance of Opening Protectives



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## NFPA 80 Requirements – Care and Maintenance

### • 5.1.1 Application.

- **5.1.1.1\*** This chapter shall cover the inspection, testing, and maintenance of fire doors, fire shutters, fire windows, and opening protectives other than fire dampers, fabric fire safety curtains, and fire protective curtain assemblies.
- **5.1.1.2** The requirements of this chapter shall apply to new and existing installations.

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NFPA 80 Requirements –  
Care and Maintenance Cont.

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- **5.1.3 Replacement.**
- **5.1.3 Replacement.** Where it is necessary to replace fire doors, shutters, windows or their frames, glazing materials, hardware, and closing mechanisms, replacements shall meet the requirements for fire protection and shall be installed and tested as required by this standard for new installations.

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NFPA 80 Requirements –  
Care and Maintenance Cont.

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- **5.1.6 Removal of Door or Window.** Where a fire door or fire window opening no longer functions as an opening, or the door or window is removed and not replaced, the opening shall be filled to maintain the required rating of the wall assembly.

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NFPA 80 Requirements –  
Care and Maintenance Cont.

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- **5.2.4 Periodic Inspection and Testing**
- **5.2.4.1\*** Periodic inspections and testing shall be performed not less than annually.
- **5.2.4.2** Requires inspection to same criteria as original acceptance testing.
- **5.2.4.3** Inspection shall include an operational test for automatic-closing doors and windows to verify that the assembly will close under fire conditions.

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NFPA 80 Requirements –  
Care and Maintenance Cont.

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- **5.5 Maintenance**
- **5.5.7** When fastener holes are left in a door or frame due to changes or removal of hardware or plant-ons, the holes shall be repaired by the following methods:
  - Install steel fasteners that completely fill the holes
  - Fill the screw or bolt holes with the same material as the door or frame
  - Fill holes with material listed for this use in accordance with the manufacturer's instructions

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Thank You for Attending!!!

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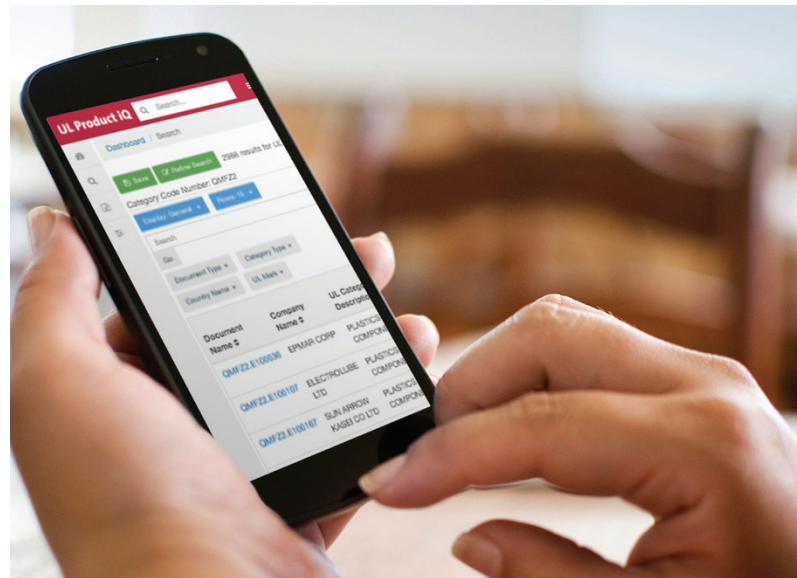
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## **List of UL Fire Door/Window/Hardware Related Categories**

### **FIRE DOOR AND FIRE WINDOW ASSEMBLIES**

For listings of complete proprietary fire door assemblies and fire window assemblies, refer to Fire Door Assemblies and Window Assemblies (GSNN)

### **FIRE DOORS**

For listings of Fire Doors (GSNV), refer to the following specific product categories:

- Access-type Fire Doors (GSOT)
- Bullet-resisting-type Fire Doors (GSOX)
- Chute-type Fire Doors (GSPR)
- Curtain-type Fire Doors (GSQX)
- Dumbwaiter-type Fire Doors (GSRV)
- Freight-elevator-type Fire Doors (GSST)
- Passenger- elevator-type Fire Doors (GSUX)
- Rolling Steel Fire Doors (GSVV)
- Service-counter-type Fire Doors (GSWT)
- Sliding-type Fire Doors (GSXV)
- Special-purpose Fire Doors (GSXZ)
- Swinging-type Fire Doors (GSYX)
- Swinging-type Fire Doors, Positive-pressure Tested (GSZN)

Fire door finishers are organizations who receive swinging-type or positive-pressure tested swinging-type fire doors from the primary manufacturer and may modify the doors to satisfy site-specific requirements for items such as vision panels and hardware. Finishers are identified as distributors in the steel door industry and machiners in the wood door industry. For listings of finishers, refer to Finishers of Fire Door (GSZC).

For listings of retrofit parts used with fire doors, refer to the following categories:

- Freight-elevator-type Fire Door Retrofit Parts (GSSZ)
- Swinging-type Fire Door Retrofit Parts (GSZG)

### **FIRE DOOR CLOSERS, HOLDERS AND OPERATORS**

For listings of Fire Door Closers, Holders and Operators (GTBT), refer to the following specific product categories:

- Combination Fire Door Closers and Holders (GTIS)
- Combination Fire Door Closer and Holders, Retrofit Devices (GTLB)
- Fire Door Holders (GTPR)
- Fire Door Operators (GUCZ)
- Fire Door Operators with Automatic Closers (GUJY)
- Retrofit Rolling Steel Fire Door Operators (GUNL)
- Sliding Fire Door Closers (GUQX)
- Swinging Fire Door Closers (GVEV)

### **FIRE DOOR AND WINDOW FRAMES**

For listings of fire door and fire window frames, refer to Fire Door and Window Frames (GVTV).

Frame finishers are organizations who receive fire doors and window frames from the primary manufacturer and assembly the parts to satisfy site-specific requirements for items such as size and location of vision panels. Finishers are identified as distributors in the steel door industry and machiners in the wood door industry. For listings of finishers, refer to Finishers of Fire Door Frames and Fire Windows (GVUP).

### **FIRE DOOR ACCESSORIES**

For listings of Fire Door Accessories (GVUW), refer to the following specific product categories:

- Miscellaneous Fire Door Accessories (GVUX)
- Miscellaneous Fire Door Accessories, Positive-pressure Tested (GVUY)
- Cladding Materials for Fire Doors and Frames (GVUZ)
- Fire Door Coordinators (GVVR)
- Fire Door Glass Light Frames (GVVX)
- Gasketing Materials for Fire Doors (GVWZ)
- Gasketing and Edge-sealing Materials for Fire Doors, Positive-pressure Tested (GVYI)

### **LOUVERS**

For listings of fire door louvers, refer to Fire Door Louvers (GVZS).

### **FIRE DOOR HARDWARE**

For listings of Hardware (GWGR) used in conjunction with fire doors, refer to the following specific product categories:

- Builders Hardware (GWTZ)
- Accessories for Single-point Locks and Latches and Fire-exit Hardware (GWVW)
- Auxiliary Locks (GWXT)

- Door Hinges (GWZQ)
- Electric Strikes (GXAY)
- Fire-exit Hardware (GXHX)
- Flush and Surface Bolts, Automatic Type (GXOW)
- Flush and Surface Bolts, Manual Type (GXSR)
- Flush and Surface Bolts, Self-latching Type (GXVV)
- Single-point Locks and Latches (GYJT)
- Electrically-controlled Single-point Locks and Latches (GYQS)
- Two- and Three-point Locks and Latches (GYXR)
- Elevator Fire Door Hardware, Passenger (GZKZ)
- Fire Door Hardware (GZYX)
- Fire Door Viewers (HAAU)

### **FUSIBLE LINKS**

For listings of fusible links used in conjunction with fire doors, refer to Fusible Links (JGIX).

### **GLAZING**

For listings of glazing used in conjunction with fire doors and fire windows, refer to the following categories:

- Fire-protection-rated Glazing Materials (KCMZ)
- Fire-resistance-rated Glazing Materials (CCET)

### **GLASS BLOCKS**

For listings of glass blocks and their installation materials, refer to the following categories:

- Glass Blocks (KCJU)
- Glass Block Installation Materials (KCLK)

### **LEAKAGE-RATED DOOR ASSEMBLIES**

For listings of door assemblies investigated for their leakage rating, refer to Leakage-rated Door Assemblies (OPBW).

### **FIRE-PROTECTIVE CURTAINS**

For listings of fire-protective curtains, refer to Fire-protective Curtains (GSSN).

### **FLOOR ACCESS DOORS**

For listings of doors installed in floor assemblies to provide access to the areas beneath the floors, refer to Floor Access Doors (CCJV).

## **DOOR HARDWARE FOR USE IN HAZARDOUS LOCATIONS**

For listings of door operators and holders for use in hazardous locations, refer to the following categories:

- Door Holders for Use in Hazardous Locations (FDGF)

## **MEANS OF EGRESS HARDWARE**

For listings of hardware used in conjunction with means of egress doors, refer Exit Signs and Exit Appliances (FUDQ) and to the following specific product categories:

- Controlled Exit Panic Devices (FULA)
- Door Closers (FUOR)
- Exit Locks (FUQV)
- Exit Doors (FUXV)
- Panic Hardware (FVSR)
- Panic Hardware, Retrofit (FVSU)
- Special Locking Arrangements (FWAX)

## **WINDSTORM-RATED BUILDING PRODUCTS**

For listings of doors used in conjunction with Windstorm-rated Building Products (ZHBA), refer to the following specific product categories:

- Windstorm-rated Swinging Door Components (ZHCH)
- Accessories for Windstorm-rated Swinging Doors (ZHCK)
- Swinging Doors, Exterior (ZHCW)
- Door Frames (ZHDL)
- Glass Light Frames for Windstorm-rated Doors (ZHDO)
- Hinges (ZHDX)
- Latching Hardware (ZHEM)
- Florida Products Inspected Under the Quality Assurance Inspection Program (ZHFB)
- Windstorm-rated Assemblies (ZHLA)
- Products for Use in Windstorm-rated Assemblies (ZHLL)

## **BURGLARY-RESISTANT ELECTRIC LOCKING MECHANISMS**

For listings of Burglary-resistant Electric Locking Mechanisms (CVWZ), refer to the following specific product categories:

- Burglary-resistant Electrically-operated Door-locking Mechanisms (CVXJ)
- Burglary-resistant Electric Dead Bolts (CVXS)
- Burglary-resistant Electric Door Strikes (CVXY)
- Burglary-resistant Electric Locking Mechanism Accessories (CVYR)



- Burglary-resistant Electromagnetic Locks (CVYT)

### **LOCKS FOR SECURITY EQUIPMENT**

For listings of burglary resistant locks used with doors, refer to Locks (OWVV) and to the following specific product categories:

- Combination Locks (OXJT)
- Combination Locks, Group 1 (OXXR)
- Combination Locks, Group 1R (OYKZ)
- Combination Locks, Group 2 (OYYX)
- Combination Locks, Group 2M (OYZV)
- High-security Electronic Locks (OZDC)
- High-security Electronic Locks, Type 1 (OZDU)
- High-security Electronic Locks, Type 1F (OZEM)
- High-security Electronic Locks, Type 2 (OXFE)
- Security-container Key Locks (OZFW)
- Locking Cylinders (OZMV)
- Cabinet-locking Cylinders (OZQI)
- Door Locks (OZTU)
- Door-lock Accessories (OZWZ)
- Locks for Safe Deposit Boxes (PAAT)
- Delayed-action Timelocks (PAOR)

### **VAULT DOORS AND RELATED PRODUCTS**

For listings of vault door and related products, refer to the following categories:

- Vault Doors, Burglary Resistant (YUSR)
- Relocking Devices for Light Vault Doors (TEHV)

### **DOOR, DRAPERY, GATE, LOUVER & WINDOW OPERATORS & SYSTEMS**

For listings of operator and closure systems, refer to Door, Drapery, Gate, Louver and Window Operators and Systems (FDDR).

### **MISCELLANEOUS DOOR AND DOOR ACCESSORIES**

For listings of miscellaneous door and door accessories, refer to the following categories:

- Door Fasteners (FDEP)
- Door Panel Assemblies (FDIT)
- Electromagnetic Locking Mechanisms (FONY)
- Doors and Door-operator Systems for Use in Meat and Poultry Plants (TSRC)

# Marking and Application Guide Doors, Windows and Related Hardware

## FIRE, SMOKE, EGRESS, AND WINDSTORM RELATED APPLICATIONS

### PREFACE

**Fire and smoke protection** – Building codes rely on fire and smoke protection features to safeguard the public and emergency responders from fire and smoke hazards. One aspect of this protection is based on limiting the movement of fire and smoke through the building using a compartmentation approach (also called the fire area). This includes requiring fire-resistance rated fire walls, fire barriers, fire partitions, smoke barriers, shaft enclosures and fire rated horizontal assemblies to be provided to limit the spread of fire. It also includes requirements designed to limit the movement of smoke through the building using smoke barriers and partitions. This passive protection is an integral part of the overall safety scheme included in the model codes.

An important aspect of limiting the spread of fire and smoke is protecting openings in the fire and smoke rated assemblies that are provided to allow the building to be functional. Opening protective products and systems are provided to protect these openings. These include fire doors and frames, hardware, fire windows and frames, and leakage rated door and window assemblies.

UL certifies a wide range of products and systems that are covered by opening protective requirements in model building codes. These products and materials create systems, and the applications for which they are certified are covered in detail in this guide. Since some of the products and systems are also certified for use as part of the building's means of egress system or for resilience from damage from wind-borne debris, information on these applications is also covered in this guide. Doors, windows, and related hardware that have been certified by UL to provide protection against burglary, robbery or theft or for access control are not covered in this guide. More information on those products is located in [UL's Product iQ database](#) under security equipment.

**Means of egress** – Doors serving a means of egress system are required by model building and life safety codes to meet specific requirements that help provide a continuous and unobstructed path of travel from any occupied portion of a building or structure to a public way. UL certifies doors and hardware that are specifically evaluated for use as part of the means of egress system.

**Windstorm rated assemblies** – Concern about potential damage to building exteriors caused by high wind events, such as hurricanes and tornadoes, has resulted in regulations being adopted to provide resilience from wind-borne debris and the effects of high windspeeds and wind load. UL certifies windstorm rated doors, hardware and other building assemblies for use in these applications.

*This guide was developed for use by code authorities, architects, engineers, contractors, installers and other interested parties to help them determine how UL Certified opening protectives can be used in code compliant installations.*

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## 1. INTRODUCTION

### A. USE OF THIS GUIDE

This guide is designed to help users locate, specify or verify UL Certified doors, windows and related hardware to meet applicable model code requirements for applications including fire and smoke protection, egress, and windstorm resilience. This guide explains the differences in product certification markings for each application. Additional information on the intended use or limitations that may apply and the standard(s) used to evaluate products under the product category is provided.

A four or five-letter code following each product category in this guide is the UL category code number (CCN), which identifies product categories under which products are certified by UL for the identified application.

Each UL CCN provides a direct link to the published Product Guide Information for the product category which is separate from the information contained in this Marking and Application Guide. The Product Guide Information includes the scope of the products and assemblies covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, general installation and use information, and information on product markings and the UL Mark to be used on the product. Product Guide information is available in the [UL Product iQ database](#).

The product markings identified in this Guide do not include every possible marking that could be provided either on a product, product packaging or in its installation instructions, but provides an indication of the type of text and location of markings that address features that may be critical in determining if a product is certified for a particular application. With some applications, UL would recommend that the end user also reference installation standards maintained by industry associations or the NFPA as cited in each Guide (For example: NFPA 80 or SDI A250.11).

## B. CERTIFICATION, LISTING AND CLASSIFICATION

Model codes and regulations may require certain products to be “Listed”, or “Listed and Labeled”. Products that UL has certified for use in applications where “listing” or “listing and labeling” are required in the code include a UL Certified, a UL Listed, or a UL Classified Mark. Collectively, these are referred to by UL in this Guide as marks. Products bearing any of these UL marks comply with the definition of a listed product in the code, and should be considered to be listed. The latest information about UL marks may be found online at <https://marks.ul.com/about/>

The UL Mark on a product means UL has tested and/or evaluated representative samples of that product and determined that they meet the requirements in the applicable standard(s). The production of UL Certified products is periodically audited by UL Staff at the manufacturing facility to verify that the products continue to comply with the applicable requirements in the standard used to evaluate the products.

## C. IDENTIFICATION OF UL CERTIFIED PRODUCTS

UL Certified products are eligible to bear one of the following Certification Marks, namely the UL Certified Mark, UL Listing Mark, or UL Classification Mark. Refer to product category guide information for specific marking requirements. Products not bearing a UL Mark are not considered to be UL Certified.

### UL CERTIFIED MARK



### UL LISTING MARK



### UL CLASSIFICATION MARK



## D. FIELD EVALUATIONS

You may encounter situations in which you are unable to determine if a product has been listed by a third-party organization. Or in other situations, you might encounter a product bearing a listing label that may have subsequently been modified in the field, and now you question whether or not the product still complies with the applicable standard. UL offers a field evaluation service that provides a method to assist you in making your decision whether to accept the product and/or approve the installation. The field evaluation service is available for the evaluation of doors and frames. Anyone directly involved with a product – including manufacturers, owners, contractors, and regulatory authorities – can request a Field Evaluation. Detailed information for this program can be found on [UL's Field Evaluation](#).



## 2. OPENING PROTECTIVES

### A. FIRE-RESISTANCE RATED GLAZING

Fire-resistance rated glazing tested as part of a fire-resistance rated wall assembly in accordance with the Standard for Fire Tests of Building Construction and Materials, [UL 263](#) (ASTM E119), is covered under the Fire-resistance Rated Glazing Materials ([CCET](#)) category. These materials are investigated for use in ([BXUV](#)) fire-resistance designs. The glazing materials have been investigated for use in specific fire-resistive floor-ceiling, wall and/ or partition constructions with respect to (1) construction details, and (2) maximum size of individual glazing panels, as described in the individual design ([BXUV](#)). This type of glazing material provides the insulation properties needed to achieve compliance with the [UL 263](#) temperature rise requirements.

Assemblies incorporating fire-resistance rated glazing comply with all of the requirements that a fire-resistance rated wall must meet (e.g. prevent fire transmission, limit elevated unexposed surface temperatures and withstanding the impact of a hose stream). Therefore, codes do not limit the quantity or the size of the fire-resistance rated glazing that can be used in a wall. These materials typically are much thicker than the common ¼ in. or 3/8 in. thick. fire protection rated products. These materials have not been investigated by UL to determine compliance with safety glazing requirements.

UL Certified fire-resistance rated glazing materials include the word CLASSIFIED above the UL symbol and the manufacturer's identification. The UL Certification marking for fire-resistance rated glazing materials intended for use in fire-resistance rated walls includes an identifier in the form:

W – xxx

Where “W” indicates the glazing meets the wall assembly criteria and “xxx” indicates the fire-resistance rating period in minutes

### B. FIRE-PROTECTION RATED GLAZING

**Fire-protection Rated Glazing Materials** ([KCMZ](#)) are intended for use in fire windows, fire doors and fire door frames with transoms and/or sidelights that are provided with suitable glazing frame members. These products are investigated in accordance with [UL 9](#), Standard for Fire Tests of Window Assemblies. These products are Classified for fire ratings of 3/4 hour, 1 hour, 1-1/2 hours, and 3 hours, or a fire rating of 20 min fire-protection rated without hose stream as indicated in the individual Classifications.

Fire-protection rated glazing materials are intended for installation in fire windows, fire doors, and fire door frames with transoms and/or sidelights that are provided with suitable glazing frame members.

Unless otherwise indicated in the individual Certifications, these materials have not been investigated by UL to determine compliance with safety glazing requirements.

UL Certified glazing materials include the word “CERTIFIED” or “CLASSIFIED” above the UL symbol and the manufacturer’s identification. The marking for glazing materials intended for use in fire doors includes the following information:

1. The UL symbol with the words “CERTIFIED” or “CLASSIFIED”
2. Manufacturer name or identification
3. [ANSI/UL 10B](#) and/or [ANSI/UL 10C](#)
4. D – H or NH – T or NT – xxx

Where:

- “D” indicates the glazing is suitable for use in fire door assemblies
- “H” indicates compliance with the hose stream requirements of the standard
- “NH” indicates the glazing has not been subjected to the hose stream requirements of the standard
- “T” indicates the glazing material has a temperature rating, which is defined as a maximum unexposed surface temperature of 450°F when measured at 30 minutes during the standard fire test
- “NT” indicates the glazing material does not have a temperature rating, which is defined as a maximum unexposed surface temperature in excess of 450°F when measured at 30 minutes during the standard fire test
- “xxx” indicates the fire-protection-rating period in minutes

The marking for glazing materials intended for use in fire windows includes the following information:

1. The UL symbol with the words “CERTIFIED” and “SAFETY” (when using the Alternate UL Mark, the UL symbol with the word “CLASSIFIED” above the UL symbol)
2. Manufacturer name or identification
3. [ANSI/UL 9](#)
4. OH – xxx
  - Where “OH” indicates compliance with the fire and hose stream requirements of the standard and “xxx” indicates the fire-protection-rating period in minutes

### C. FIRE DOORS

UL certifies fire doors under a variety of different product categories that reflect the type or use of the door and the criteria used to evaluate them. See Appendix A for a complete list of fire door product categories, and the UL Standards used to certify doors under these categories.

Some fire doors are supplied as complete assemblies, including the frame, hardware and other accessories. In other cases, fire doors are supplied independently from the other components, and are assembled at the job site with the fire door frame, glazing, hardware, and/or other accessories to form a fire door assembly, which provides the degree of fire protection required for the opening.

Fire-protection ratings – Fire doors include a rating of 4, 3, 1-1/2, 1, and ¾ hours, or 30 or 20 minutes, which indicates the duration of exposure to fire. For products intended for use in regions outside of North America, fire doors may be rated with a 2-hour rating in accordance with local building practices.

Temperature rise ratings – Some fire doors contain a temperature-rise rating on the Certification Mark. This rating is intended for use in determining compliance with the temperature-rise requirements contained in the International Building Code, NFPA 101, and NFPA 5000. A temperature-rise rating of 250°F, 450°F or 650°F reflects the limiting potential temperature rise on the unexposed surface of the door during the first 30 minutes of fire exposure. Certification Marks that do not indicate a temperature rise are for doors which either develop a temperature rise in excess of 650°F on the unexposed surface of the door or have not been evaluated for a temperature rise rating.

Glass lights in fire doors in excess of 100 sq. in. shall be fire-resistance rated and shall also be evaluated as a component of the door assembly in accordance with [UL 10B](#) or [UL 10C](#) where the door is rated for a duration greater than 45 minutes. Doors with glass light panels meeting the size limitations and the rating requirements of the installation code carry the same rating as similar doors without glass light panels.

Glazing materials – Glazing materials covered under the fire door categories are Classified for a fire-protection rating only. The glazing materials are to be installed in the fire doors in accordance with NFPA 80 and the installation instructions provided by the manufacturer of the door, glass light frame or glazing material. See Fire Door Glass Light Frames ([GVVX](#)) and Fire-protection Rated Glazing Materials ([KCMZ](#)).

A door prepared at the factory for a glass light may include the glazing members (frame) but normally does not include the glazing itself. When the door is shipped from the factory with an integral glass light frame pre-installed, the frame is considered part of the door construction and will not bear a separate Mark. Glazing materials are usually provided by other than the door manufacturer and are installed at the time of the door installation.

Oversized doors – Freight elevator type, rolling steel type, and sliding or swinging steel-covered composite type, hollow-metal type, metal-clad (Kalamein) type, sheet-metal type and tin-clad type are fire tested up to the sizes recorded in the listings published under their respective product categories. Doors exceeding this size limitation are supplied with a Classification Mark for Oversized Fire Door which indicates compliance (except for size), with all requirements for design, materials and construction of the product placed under the oversized program and are based upon the maximum size door that was fire tested.

Similarly, a Certification Mark for Passenger Elevator Fire Door Frame Assemblies incorporating a transom panel can be provided when such frame/transom panel assemblies, designed for use with specific Classified Passenger Elevator Fire Doors and Listed Passenger Elevator Fire Door Hardware, exceed the maximum heights which have been subjected to Standard Fire Tests. As with the oversize doors described above, prospective users should first ascertain from the code authority whether the oversize frame assembly is acceptable for any given location.

Positive pressure fire doors – Some code applications require swinging fire door assemblies to comply with the Standard for Positive Pressure Fire Tests of Door Assemblies, [UL 10C](#). To assist in selecting components of fire door assemblies tested under positive pressure, eight categories, identified as A through J, were established. See Swinging-type Fire Doors, Positive-pressure Tested ([GSZN](#)) for certifications and category types. Categories A and B specifically indicate fire door rated for positive pressure and how the doors are to be installed.

Fire door markings – UL certified fire doors include the UL symbol, the word CERTIFIED or CLASSIFIED and the following information:

- Fire door category name (see Appendix A)
- Hourly rating (e.g. 4 HR, 3 HR, 1-1/2 HR, 1 HR, 3/4 HR, 30 MIN or 20 MIN)
- Temperature rise, if established – (e.g. 30 MIN – 250°F MAX, 30 MIN – 450°F MAX, 30 MIN – 650°F MAX or No Reference Provided)

Installation instructions – Fire doors are intended to be installed in accordance with the installation instructions provided by the manufacturer.

#### **D. FIRE DOOR AND WINDOW FRAMES**

UL fire door and window frames are certified under the Fire Door and Window Frames ([GVTV](#)) category. This category covers fire door frames, fire window frames, and 20-minute-type door frames or window frames fire tested without hose stream (where permitted). These frames are intended for installation in conjunction with fire doors, hardware, glazing and/or other accessories that together form a fire door assembly or a fire window assembly, which provides the degree of fire protection to the opening. The frames can be constructed from various materials including wood and steel.

Certification Mark considerations – UL certified fire door frames and window frames bear either a UL Listing Mark or a UL Certified Mark that appears on the frame where visible after installation. Fire doors, in comparison, include a UL Classification Mark or a UL Certified Mark, as described above.

Fire door frame and fire window frame Marks include the UL symbol, the word LISTED or CERTIFIED and a description of the certified product. This could include descriptions such as “Fire Door Frame”, “Transom or Sidelight Panel”, “Fire Window Frame (3/4 Hr., 1 Hr. Or 1-½ Hr.) Fire Rating”, “Sheet-Metal Mullion for Nonbearing Fire Window Frames” and similar wording. The Mark typically describes if the frame includes sidelights and/or transom panels, may include hourly ratings, and may describe if the frame was evaluated without hose stream.

When the Listing Mark of UL is stamped into the frame, one of the following abbreviated product identities may be used:

“FDF” in lieu of “Fire Door Frame”

“FDF-L” in lieu of “Fire Door Frame for Lights”

“FDF-P” in lieu of “Fire Door Frame with Panels”

“FDF-20” in lieu of “Fire Door Frame Fire Rating 20 Minutes”

“FDF-20 NH” in lieu of “20 Minute Type Door Frame Fire Tested Without Hose Stream”

Installation instructions – Fire door and fire window frames are intended to be installed in accordance with NFPA 80 and SDI A250.11. Installation instructions are not required to be shipped with frames that are to be installed in accordance with NFPA 80 and SDI A250.11. Installation details other than those specified in NFPA 80 and SDI A250.11 are shipped with the frames. Elevator door frames, wood frames and other special use frames as identified in the individual certifications are intended for installation only in walls of the types shown in the installation instructions accompanying the door or window frame.

Hourly fire-protection ratings – Door frames are intended for use in applications where codes require a minimum hourly rating for the overall door or window assembly. However frames may or may not be marked with hourly ratings. When combining doors, frames and hardware with different ratings the overall rating of the assembly will be the lesser of the ratings of any of the individual components.

Door frames bearing a UL Certification Mark without an hourly rating and provided with masonry wall anchors can be used in conjunction with fire doors rated up to 3 hours and installed in masonry walls having fire resistance ratings not less than the rating of the door.

Door frames bearing a UL Certification Mark without an hourly rating and provided with steel stud or wood stud anchors can be used in conjunction with fire doors rated up to 1-1/2 hours and installed in steel stud and wood stud walls steel stud cavity walls, steel stud shaft walls and wood stud cavity walls protected with gypsum board, having fire resistance ratings not less than the rating of the door nor more than 2 hours.



Elevator and special use frames – Elevator door frames, frames of the slip-on type, wood frames and other special use frames as identified in the individual certifications are for installation only in the walls of the types shown in the installation instructions accompanying the door frame.

Elevator door frames are intended for use with sliding freight or passenger elevator fire door designs for use in dry wall or masonry shaft construction, as identified in the individual certifications for door frames.

Special frames are constructed of materials other than steel and are intended for use with doors rated less than 3 hours. The hourly ratings for special frames are shown in the individual certifications.

Some special frames are intended for use with Certified fire doors and Certified transom panels of a specific design. These frames and the labeled components are identified in the individual certifications.

Mullions, transom panels and other features – Standard door frames are of the single-unit or three-section type and consist essentially of steel head and jamb members, including hardware reinforcements, wall anchors, door stops, and provisions for anchoring to the floor.

Door frames may be provided with mullions, transom panels, or transom lights. In addition to the steel head and jamb members, these frames should be equipped with a steel mullion, transom bar, steel-covered composite transom panel, and glazing beads. Transom panel frames of standard construction are for use with doors rated up to and including 1-1/2 hours. Transom light frames glazed with labeled glazing material are intended for use with doors rated a max of 3/4 hour.

Some manufacturers can provide labeled transom panel frames for use with doors rated up to and including 3 hours as indicated in the individual certifications. Some manufacturers can provide labeled transom frames with hollow-metal transom panels with or without a transom bar. Transoms of solid construction are for use with doors rated up to and including 1-1/2 hours (unless otherwise noted for 3 hours in the individual certifications). Some manufacturers can provide labeled door frames with side panels or sidelights. Frames with side panels are for use with doors rated up to and including 1-1/2 hours. Frames with sidelights glazed with labeled glazing material are intended for use with doors rated a max of 3/4 hour. Separately Certified and labeled wood or wood composite transom and side panels may also be installed into a labeled steel transom and or sidelight frame when the panels are properly labeled for the rating and application intended.

Double egress frames are intended for use with double egress door designs as identified in the individual certifications.

Oversized frames – Freight elevator, passenger elevator and swing-type fire door frames incorporating transom panels exceeding the heights eligible for certification and which have not been subjected to standard fire tests that are otherwise found to be in compliance (except for size) with all requirements for design, materials and construction can be provided with an Oversized Frame Listing Mark. These oversized frame assemblies are intended for use with specific Classified freight elevator fire doors, passenger elevator fire doors, or swinging fire doors. Code authorities should be consulted as to whether the assembly is acceptable for a specific location. The Certificate can be a separate certificate or a label certificate affixed to the assembly.

20-minute rated frames – 20-minute type door frames may be provided with sidelights and/or transom lights as indicated in the individual certifications.

Standard 20-minute type door frames are of the single-unit pressed steel type and consist essentially of steel head and jamb members, including hardware reinforcements, wall anchors, door stops and provisions for anchoring to the floor.

A 20-minute type door frame with a transom and/or sidelight prepared at the factory for the glazing material does not normally include the glazing material itself. These frames should be glazed with Classified Fire-protection Rated Glazing Materials ([KCMZ](#)).

20-minute type door frames fire tested without hose stream are intended for use with 20-minute rated door assemblies fire tested without hose stream. These frames are only intended for use in the applications specifically identified in the model codes, such as in door assemblies used in some corridor and smoke barrier applications.

Positive pressure frames – All three-sided hollow-metal frames, manufactured from No. 18 gauge or heavier steel or stainless steel and properly anchored, will comply with the positive pressure test requirements. UL does not require that these frames be marked for compliance with positive pressure. Every steel frame manufacturer under the Fire Door and Window Frames ([GVTV](#)) category is eligible to produce hollow-metal frames for compliance to positive pressure. Some manufacturers have opted to mark their frames for conformity to positive pressure as noted below.

Window frames – Fire window frames consist of sash and mullions of various designs. Fire window frames are Listed for a 3/4 hour or 1-hour fire rating. In addition, some window frames are Listed for 20-minutes without hose stream as indicated in the individual certifications. Fire window frames are intended to be installed in masonry-type walls unless otherwise identified in the individual certification.

Fire window frames intended to be installed in drywall construction, and supported directly by a noncombustible floor bear the supplemental marking “Fire Window Frame for Installation on Noncombustible Floor with Base Anchor Provided on Frame.”

Fire window frames intended to be installed above the floor in drywall construction should be installed as specified by the installation instructions provided with the window frame.

20-minute type window frames fire tested without hose stream are typically pressed steel window frames of the hollow-metal type. Standard 20-minute type window frames consist of formed steel sheet, reinforced as required, with a stationary-type single sash or with stationary type multiple sashes.

The window frame prepared at the factory for the glazing material does not always include the glazing material. Classified glazing material is usually provided by someone other than the window frame manufacturer and installed after installation of the window frame in the building.

Oversized frames – Fire window frames exceeding the height and width eligible for certification and which have not been subjected to standard fire tests that are otherwise found to be in compliance (except for size) with all requirements for design, materials and construction can be provided with an Oversized Frame Assemblies Certified or Listing Mark . Code authorities should be consulted as to whether the assembly is acceptable for a specific application.

## **E. LEAKAGE RATED DOOR ASSEMBLIES**

Model codes may require doors installed in smoke partitions to meet the requirements for a smoke and draft control door assembly when tested in accordance with the Standard for Air Leakage Tests of Door Assemblies, [UL 1784](#). The air leakage rate of the door assembly is often specified, and typically cannot exceed 3.0 cubic feet per minute per square foot of door opening at 0.10 inch of water column for both the ambient temperature test and the elevated temperature exposure test.

UL certifies products for use in these applications under the Leakage-rated Door Assemblies ([OPBW](#)) category. These assemblies consist of combinations of individual component products, which may include the door, frame, hardware, gasketing and other door accessories. This category consists of a diverse

range of door types including swinging, sliding, coiling and curtain type products manufactured from aluminum, steel, wood and woven fabrics.

“S” rated door assemblies – Model codes often require fire doors installed in corridors and smoke barriers to meet the requirements for a smoke and draft control door assembly when tested in accordance with [UL 1784](#). The air leakage rate of the door assembly is often specified, and typically cannot exceed 3.0 cubic feet per minute per square foot of door opening at 0.10 inch of water for both the ambient temperature test and the elevated temperature (400°F) exposure test. Swinging fire doors, fire tested under positive pressure in accordance with [UL 10C](#) and bearing the Smoke and Draft Control Door “S” marking have been investigated in accordance with [UL 1784](#) and were determined to have an air leakage rate of the door assembly not exceeding 3.0 cfm per square foot of door opening at 0.10 inch of water column? for both the ambient and elevated temperature conditions. These doors are intended to be installed in a Certified or Listed fire door frame and provided with a UL Certified or Classified Category H gasketing material for fire doors. Frame manufacturers may mark the frame with the letter “S” but this is not required by UL or by model codes.

Leakage-rated door assemblies are intended for installation in accordance with NFPA 105 and the installation instructions provided with each leakage-rated component. Leakage-rated door assemblies may be assembled at the job site, or may be factory assembled. Information concerning the specific air-leakage rating, mounting locations, installation clearances, and the like is provided in the detailed installation instructions accompanying each leakage-labeled product. The manufacturer’s certification information in the [UL Product iQ](#) database also describes the components used in the assembly.

Leakage ratings for door assemblies are determined at ambient air temperature (75°F) and/or elevated air temperature (400°F) and at three air pressure differentials including 0.10, 0.20, and 0.30 in. water column.

Artificial bottom seals – [UL 1784](#) allows for an artificial seal to be applied to the bottom 6 inches of the test sample in order to obtain information on the extent of air leakage through the perimeter of a test sample without the sample leakage being influenced by the clearance at the bottom of the door. The artificial seal may be any material, such as an impermeable plastic sheet or tape. The manufacturer chooses whether an artificial bottom seal is applied or not during the test.

NFPA 105 does not allow smoke door assemblies intended to be installed where pressurization is provided to control smoke movement to have an artificial bottom seal installed during the test. Alternately, the International Building Code requires enclosed elevator lobby doors to comply with smoke and draft control door assembly requirements when tested in accordance with UL 1784 without an artificial bottom seal.

Leakage rated door assemblies are not marked to indicate if they were tested with or without an artificial bottom seal. This information, if needed, should be available in the manufacturer’s installation instructions and may be indicated on the manufacturer’s [OPBW](#) Card available through the [UL ProductIQ](#) Tool.

## **F. FIRE DOOR AND WINDOW HARDWARE AND ACCESSORIES**

Fire door and window hardware and accessories are certified under a variety of product categories. Hardware includes locks, latches, hinges, electric strikes, flush and surface bolts, viewers and fire exit hardware. Accessories include fire door coordinators, cladding materials, glass light frames, and gasketing and edge sealing materials. Fire door closers, holders and operators are also certified by UL.

Hardware and accessories may be installed at the manufacturer’s facility or at the job site. In all cases installation is to be done in accordance with NFPA 80, NFPA 105 and the manufacturer’s installation instructions.

Fire exit hardware – This hardware is intended for use on swinging fire doors to facilitate the safe egress of persons in the case of emergency, as well as provide fire protection for door assemblies. See the Means of Egress Related Door Certifications section for additional information. Only products bearing the UL Certified or Listed Fire Exit Hardware Label are rated for use on fire door assemblies and should not be confused with UL Certified Panic Hardware Label which is only intended for use on non-rated exit doors.

Gasketing and edge seal materials – There is often confusion about whether UL certified gasketing and edge seal materials are required for fire doors used in smoke barriers and smoke partitions. There are two product categories covering these materials. The Gasketing Materials for Fire Doors ([GVWZ](#)) category includes gasket materials investigated in accordance with the Standard for Fire Tests of Door Assemblies, [UL 10B](#). The gasketing material is intended to be installed in accordance with the installation instructions packaged with the material. These materials have been investigated only with respect to determination that the materials do not adversely affect the fire rating of fire doors in which they are installed. Gasketing material identified for use at the meeting edges of pairs of doors is not intended to replace the astragal (if required by the door manufacturer) or to alter the clearance between doors, as specified in NFPA 80 or in the door manufacturer’s installation instructions. A product intended to alter the clearance or correct an excessive clearance after a door has been installed can be certified as a Miscellaneous Fire Door Accessory or as a Miscellaneous Fire Door Accessory, Positive Pressure Tested ([GVUY](#)) and is not considered a gasketing product. These products must be installed following the manufacturer’s provided instructions.

The Positive-pressure Tested Gasketing and Edge-sealing Materials for Fire Doors ([GVYI](#)) category includes materials investigated in accordance with [UL 10C](#). Gaskets and edge seals are categorized as previously discussed in the Positive Pressure Fire Doors section.

### 3. MEANS OF EGRESS RELATED DOOR CERTIFICATIONS

Model Code requirements – A key life safety concept in building and life safety codes is providing a means of egress system that allows occupants to safely evacuate a building during an emergency. The means of egress is intended to provide a continuous and unobstructed path of travel from any occupied portion of a building or structure to a public way.

Model codes include requirements for doors which serve the means of egress system, which are referred to as exit (egress) doors. Code requirements for exit doors include specific criteria that are not applicable for doors that are not in the means of egress travel path. These include the following:

1. Model codes specify the minimum width of door openings, which varies depending on the occupancy or area which they serve, and the maximum length of projections into the clear width.
2. Exit (egress) doors, with some exceptions, are required to be of the pivoted or side-hinged swinging type. They are also required to swing in the direction of egress travel where they serve a room or area containing 50 or more persons or certain occupancy types.
3. Model codes include specific requirements for exit door hardware which includes the hardware mounting height, locks and latches, special locking arrangements, and delayed egress locks, and other locking arrangements.
4. To minimize this risk of creating potential crowd crush problems at exit doors through which large numbers of people must pass, panic hardware is required in certain situations. For example exit doors serving a hazardous occupancy or exit doors serving spaces with an occupant load of 50 in certain occupancy types are not allowed to be provided with a latch or lock, unless it is listed panic hardware or fire exit hardware. Panic hardware is required to be listed in accordance with the Standard for Panic Hardware, [UL 305](#), and fire exit hardware must be listed in accordance with [UL 10C](#) and [UL 305](#). Additional information on panic hardware and [UL 305](#) is included below.

UL certifications – UL certifies the following products for use with doors serving a building’s means of egress system. Product category codes are indicated below.

Controlled Exit Panic Devices ([FULA](#)). This category covers devices intended for mounting on outward swinging exit doors to facilitate the egress of occupants. When the system is activated, it is intended to monitor against unauthorized egress and allow exiting within 15 seconds, (or a maximum of 30 seconds when approved by the code authority). These devices are intended to allow immediate exit in case of power failure or upon activation of an automatic fire alarm system (fail-safe).

Certified products includes the UL symbol the word LISTED or CERTIFIED and Controlled Exit Panic Device.

Exit Doors ([FUXV](#)) – This category covers sliding, swinging and bifold doors incorporating a panel that can be manually opened to permit exit travel. The assembly consists of a frame, doors and necessary hardware. Exit doors are intended for use in applications where model codes allow power operated sliding or swinging doors, such as those installed in supermarkets.

In normal use these doors open upon the approach of a person or are provided with power-assisted manual operation. In the event of power failure, the door leaves open manually (fail-safe) to allow egress travel or close when necessary to safeguard the means of egress.

These doors are tested to verify that the release mechanism is constructed so that a horizontal force of 50 pounds or less will open the emergency panel. Exit doors are investigated in accordance with the [UL Subject 1336](#) Outline of Investigation for Exit Doors. Certified exit doors include the UL symbol, the word LISTED or CERTIFIED, and Sliding Exit Door, Swinging Exit Door, Bifold Exit Door or Exit Door.

Exit Locks ([FUQV](#)) – This category covers locking hardware assemblies intended for mounting on outward swinging doors for the purpose of locking such exit doors against unauthorized egress. These products have not been investigated for a fire resistance classification. Devices so Classified are covered under Hardware ([GWGR](#)). Exit locks are investigated in accordance with the [UL 305](#) standard for Panic Hardware. UL certified exit locks include the UL symbol, LISTED or CERTIFIED, and Exit Lock.

Fire Exit Hardware ([GXHX](#)) – This category covers devices intended for mounting on or integral with outward-swinging fire doors to facilitate the safe egress of persons in case of emergency. Fire exit hardware is investigated in accordance with [UL 305](#) and [UL 10C](#).

[UL 305](#) requirements cover releasing devices actuated by an actuating bar (also referred to as a crossbar or push pad) or actuating paddle for outward-opening doors, designed to facilitate the egress of persons from buildings in the event of panic or other emergency. Among other criteria [UL 305](#) requires the actuating bar to extend across not less than one half of the width of the door leaf. The actuating paddle is an arm, push plate or paddle which functions as the activating mechanism of an exit lock on the egress side of the door. The active surface of the actuating paddle must be visually and physically distinct from the rest of the device.

The model codes prohibit fire exit hardware from having a mechanical latch retraction or dogging mechanism as part of the construction. Latch retraction options are only permitted if they are electrically operated and can be connected to an initiating device or fire alarm control panel. Latch retraction options are factory supplied as part of the exit device or may be certified as an accessory for use with single-point locks or latches and fire exit hardware ([GWVW](#)) category.

UL certified fire exit hardware includes the UL symbol, LISTED or CERTIFIED, and Fire Exit Hardware. Fire exit hardware that is additionally investigated to the BHMA A156.3 Exit Devices standard is so indicated in the individual Listings.

Panic Hardware ([FVSR](#)) – This category covers devices intended for mounting on or integral with outward-swinging doors to facilitate the safe egress of persons in case of emergency. Panic hardware is investigated in accordance with [UL 305](#).

[UL 305](#) requirements cover releasing devices operated by an actuating bar (also referred to as a crossbar or push pad) or actuating paddle for outward-opening doors, designed to facilitate the egress of persons from buildings in the event emergency. Among other criteria [UL 305](#) requires the actuating bar to extend across not less than one half of the width of the door leaf. The actuating paddle is an arm, push plate or paddle which functions as the activating mechanism of an exit lock on the egress side of the door. The active surface of the actuating paddle must be visually and physically distinct from the rest of the device.

UL certified panic hardware includes the UL symbol, LISTED or CERTIFIED, and Panic Hardware. Panic hardware that is additionally investigated to the BHMA A156.3 Exit Devices standard is so indicated in the individual Listings.

Special Locking Arrangements ([FWAX](#)) – This category covers assemblies intended to be mounted on door frames of outward-swinging exit doors for the purpose of locking such doors against unauthorized egress. These devices are designed to release automatically in case of a power failure or upon activation of an automatic fire-alarm system.

These devices are intended for use in applications where codes regulate special locking arrangements, delayed egress unlocking, access-controlled egress, and electromagnetically locked exit (egress) doors. Refer to individual manufacturer's certifications to determine the applications for which their products are Listed.

The basic standard used to investigate special locking arrangements is the [UL 294](#) Standard for Access Control System Units. UL certified special locking arrangements include the UL symbol, LISTED or CERTIFIED, SECURITY, and Special Locking Arrangement.

#### 4. WINDSTORM RATED ASSEMBLIES

Concern about potential damage to building exteriors caused by high wind events such as hurricanes and tornadoes has spurred many states, including Florida and Texas, as well as the model codes to adopt regulations to increase resilience from windborne debris and the effects of high winds and static loads. Buildings constructed in specific regions of these states are required to comply with these criteria.

These additional regulations typically require Windstorm-rated Building Products ([ZHBA](#)) to comply with specific test protocols or standards and to be manufactured under a quality assurance program. UL certified windstorm rated building assemblies ([ZHLA](#)) clearly identifies the test criteria used during an investigation, and components and products ([ZHLL](#)) used within these assemblies are subject to an ongoing factory (quality control) audit inspection as part of UL's Follow-Up Service program.

Windstorm Rated Swinging Door Components ([ZHCH](#)) – This category covers exterior swinging door components for use in exterior swinging-door assemblies, that have been investigated to specific test standards and protocols for specific ratings. Components within the assembly may include swinging doors ([ZHCW](#)), door frames ([ZHDL](#)), latching hardware ([ZHEM](#)), hinges ([ZHDX](#)) and other items, along with a description of the allowable wall constructions and, where applicable, the maximum impact energy resistance and maximum design pressure. Drawings are included as part of a rated assembly, along with descriptions of individual components and construction details. Each design also specifies the test standard(s) used and performance ratings achieved so code compliance can be determined. Windstorm rated products in the following categories include Certified products that have been investigated for use in the windstorm rated assemblies described above. These products, by themselves, have not been investigated for specific windstorm performance ratings, except as noted in the individual Classifications.

Windstorm Rated Exterior Swinging Doors ([ZHCW](#)) – This category covers exterior swinging doors intended for use as components in swinging door type windstorm-rated assemblies (not window assemblies, skylights, louvers or shutters). The performance of these doors is based upon test methods in ANSI/SDI-BHMA A250.13, Testing and Rating of Severe Windstorm Resistant Components for Swinging Door Assemblies.

Information needed to determine the acceptability of a particular installation is noted in individual Classifications. Doors prepared at the factory for glazing materials include the glazing members (framing) but are not required to include glazing itself. Glazing materials may be provided by other than the door manufacturer, and are installed at the same time as the door.

These products are intended to be installed in accordance with the installation instructions/manuals provided by the door manufacturer. The installation instructions include the type(s) and size(s) of glazing materials permitted, and the accessories or hardware permitted that are not Classified separately.

Windstorm Rated Door Frames ([ZHDL](#)) – This category covers door frames intended for use in swinging door windstorm-rated assemblies. The performance of door frames for exterior swinging doors as a component of an assembly is based upon test methods in SDI-BHMA A250.13. The manufacturer and model number of the frame, wall type, opening size, maximum design pressure and maximum impact energy resistance are identified in each Classification.

These door frames are intended to be installed in accordance with SDI A250.11, Recommended Erection Instructions for Steel Frames, unless indicated otherwise in the individual manufacturers' Classifications.

Products for use in Windstorm Rated Assemblies ([ZHLL](#)) – This category covers products intended for use in windstorm-rated assemblies ([ZHLLA](#)).

These products are tested as part of a specific assembly or assemblies and include doors, frames, hardware, louvers, light kits and glazing. Products certified under the [ZHLL](#) category have been certified against various recognized model codes or regional test methods such as ASTM E330, ASTM E1886, ASTM E1996, TAS 201, TAS 202, TAS 203, or ICC-500 for storm shelters.

Other categories for Windstorm Rated Products — Product categories have been established to cover other products that have been investigated for use in windstorm rated assemblies, including:

- Glass Light Frames for Windstorm Rated Doors ([ZHDO](#))
- Accessories for Windstorm Rated Swinging Doors ([ZHCK](#)).

Installation considerations – To determine if a particular windstorm rated assembly is suitable for use in a specific application, first identify all test standards or protocols and performance ratings specified by the codes or regulations being enforced. Then, review the appropriate windstorm rated assembly certification to determine if it complies with all mandated test criteria. Finally, verify that the assembly is constructed and installed in accordance with the details included in the individual certification, manufacturer's instructions, and any applicable installation standards. Care should be taken to ensure that products used in the assembly include appropriate UL Certification Markings, as described in the design.

## 5. DOOR AND WINDOW SELECTION AND INSTALLATION

To properly select door and window assemblies, one needs to know and understand the building design criteria, applicable code requirements, and select the appropriate UL Certified products or systems. The following steps provide a systematic approach that can be followed to provide a safe, code compliant installation. This recommended approach can also be used by code authorities during the building plan review and final approval process.

This recommended approach applies primarily to doors, but some of the concepts are also applicable to windows, specifically those intended to restrict the movement of fire and smoke in a building.

- 1. Determine the size and location of doors** – A number of factors dictate the number, size and location of doors to be provided in a building. These may be driven by code requirements, the needs of the occupants or by other means.

*Locations* – Building and life safety codes require doors to be provided in specific locations to protect the door openings. This includes protecting door openings (1) in required fire and smoke rated walls, barriers and partitions, (2) between dwelling units and attached garages, and (3) in various portions of the means of egress system. Besides the locations specified by code requirements, doors are also provided in locations to meet the needs of the building occupants. This includes doors that provide privacy, limit access, isolate equipment, provide security, etc.

*Door sizes* – Door sizes are sometimes dictated by code requirements. This is particularly true if the door is located in the means of egress system, or is covered by accessibility requirements. The code and building construction documents should be consulted to determine the size and locations of various doors within the building.

- 2. Confirm if doors and windows are required to limit the passage of fire or smoke** – The fire safety system embodied in building code requirements is based on the use of walls, barriers and partitions designed to contain fires and the resulting smoke in certain areas within the building. This concept is often referred to as compartmentation (e.g. containing fires within various fire areas). Codes require doors and windows that protect openings in these walls, barriers and partitions to comply with specific UL standards for safety and performance, and for doors and windows to have certain ratings in order to limit the spread of fire and/or smoke.

To determine the standards and ratings these doors and windows must meet to comply with model codes, one first needs to determine if the walls in which they installed are covered by code requirements.

### *Fire Walls, Fire Barriers and Fire Partitions*

These are all vertical assemblies designed to restrict the spread of fire in which continuity is maintained. All of these assemblies are required to have a fire-resistance rating. However, the hourly rating, construction, extent of continuity and support for these structures varies.

Door and window openings in these assemblies are required to be protected in accordance with the opening protective requirements in the code, and they may be limited to a maximum individual size, maximum area and aggregate width.

Fire door assemblies typically have an hourly fire- protection rating that is nominally less than the corresponding hourly fire-resistance rating of the vertical (wall) assembly in which they are installed. These fire door assemblies should be certified in accordance with [UL 10A](#), [10B](#), and [10C](#) as applicable, and installed in accordance with NFPA 80.

Fire window assemblies typically have an hourly fire-protection rating somewhat less than the corresponding hourly fire-resistance rating of the vertical (wall) assembly in which they are installed. These fire window assemblies should be certified in accordance with [UL 9](#), and installed in accordance



with NFPA 80. Fire window assemblies can be tested and certified for use in positive pressure applications as noted in the individual certifications.

### *Smoke Barriers and Smoke Partitions*

Smoke barriers are continuous membranes, either vertical or horizontal, such as a wall, floor or ceiling assembly, that are designed to restrict the movement of smoke through a building. In addition to limiting the spread of smoke, smoke barriers are required to have a fire-resistance rating as specified in the building code. Smoke partitions are continuous vertical membranes, such as a wall, that are also designed to restrict the movement of smoke through a building.

Door and window assemblies in smoke barriers are required to be protected against fire and smoke leakage in accordance with requirements included in the opening protective portion of the code. Door assemblies in smoke partitions are required to be protected by specific construction and air leakage requirements. To determine the appropriate standards and ratings for doors in these assemblies, refer to the specific code requirements covering the wall assemblies. This will include a leakage rating at a specified pressure and temperature for doors and windows used in smoke barriers and partitions, in conjunction with hourly fire-resistance ratings for doors and windows in smoke barriers.

- 3. Identify the wall construction** – Once the size, location, standards and ratings required for the door and window assemblies are established, the next step is to identify the construction of the walls into which they will be mounted. This is important to know because the construction affects the anchoring of the door frames, transoms and side lights.

For example, fire door and window frames used in walls with wood or steel studs and gypsum wall board construction are anchored differently than frames installed in concrete or block walls. The proper frame should be selected for each of these applications. The frame is to be provided by the manufacturer with anchors selected to match the wall construction being used. The manufacturer's installation instructions or SDI A250.11 and NFPA 80 should be referred to for these details.

- 4. Determine the type of door required** – There are a wide variety of fire door types that are listed with specific constructions features and for use in specific applications. These include rolling steel, special-purpose, chute type, sliding type, swinging type, and freight or passenger elevator type fire doors.
- 5. Means of egress considerations** – Doors serving a means of egress system for a building are required to comply with specific requirements that will help facilitate the egress of occupants from the building in an emergency. It is important to identify the doors in the building that are subject to specific egress related requirements, as covered in the Means of Egress chapter of the code.

Egress requirements include minimum door widths, projections into the doorways, and door swing requirements. It also includes specific requirements related to the use of revolving, sliding and power operated doors.

Egress requirements also require these doors to be readily operable from the egress side without the use of a key or special knowledge or effort, and to include panic hardware that is listed in accordance with [UL 305](#). There are also requirements in place for special locking arrangements that allow for egress while also providing a suitable level of security for the premises. Ensure that the product labeling for the exit hardware device matches the application as panic hardware is only for use on non-rated assemblies while fire exit hardware is to be selected for openings where a fire rating is required.

- 6. Glazing** – Glazing used in fire doors, transoms, sidelights and fire windows is regulated in the opening protective portion of the code, and may be limited in aggregate and individual sizes and dimensions. Glazing is required to be listed in accordance with [UL 9](#) and/or [UL 263](#) requirements, and may consist of fire-protection or fire-resistance rated glazing. Glazed areas subject to human impact loads, such as

in a door or side transom, are also required to meet safety glazing requirements. Wired glass is not permitted in those areas.

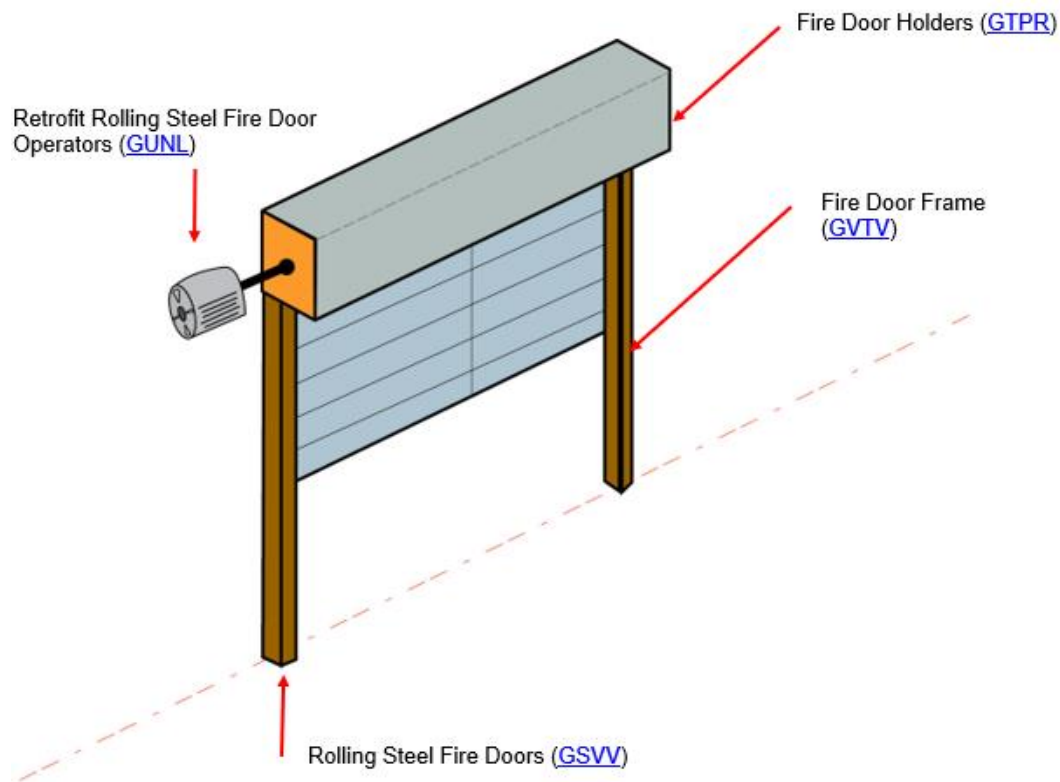
7. **Select appropriate hardware** – In order to operate properly, door hardware needs to be outfitted on the door assemblies. This hardware may include hinges, latches, locks, closers, and fire exit hardware. Most of these products (except leaf style commercial hinges) are required to be Certified in accordance with UL standards.
8. **Putting it all together** – In order to provide the desired door installation that complies with applicable code requirements it is important to identify the wall construction, determine the type of door required, evaluate means of egress considerations, understand the requirements applicable to glazing, and select the appropriate hardware. Similarly, for a fire window installation it is important to identify the wall construction, the type of glazing required and the appropriate frame for the glazing and wall construction.

Care should be taken to verify that the doors, frames, glazing and hardware are installed in accordance with the manufacturer’s installation instructions, and in accordance with NFPA 80 requirements.

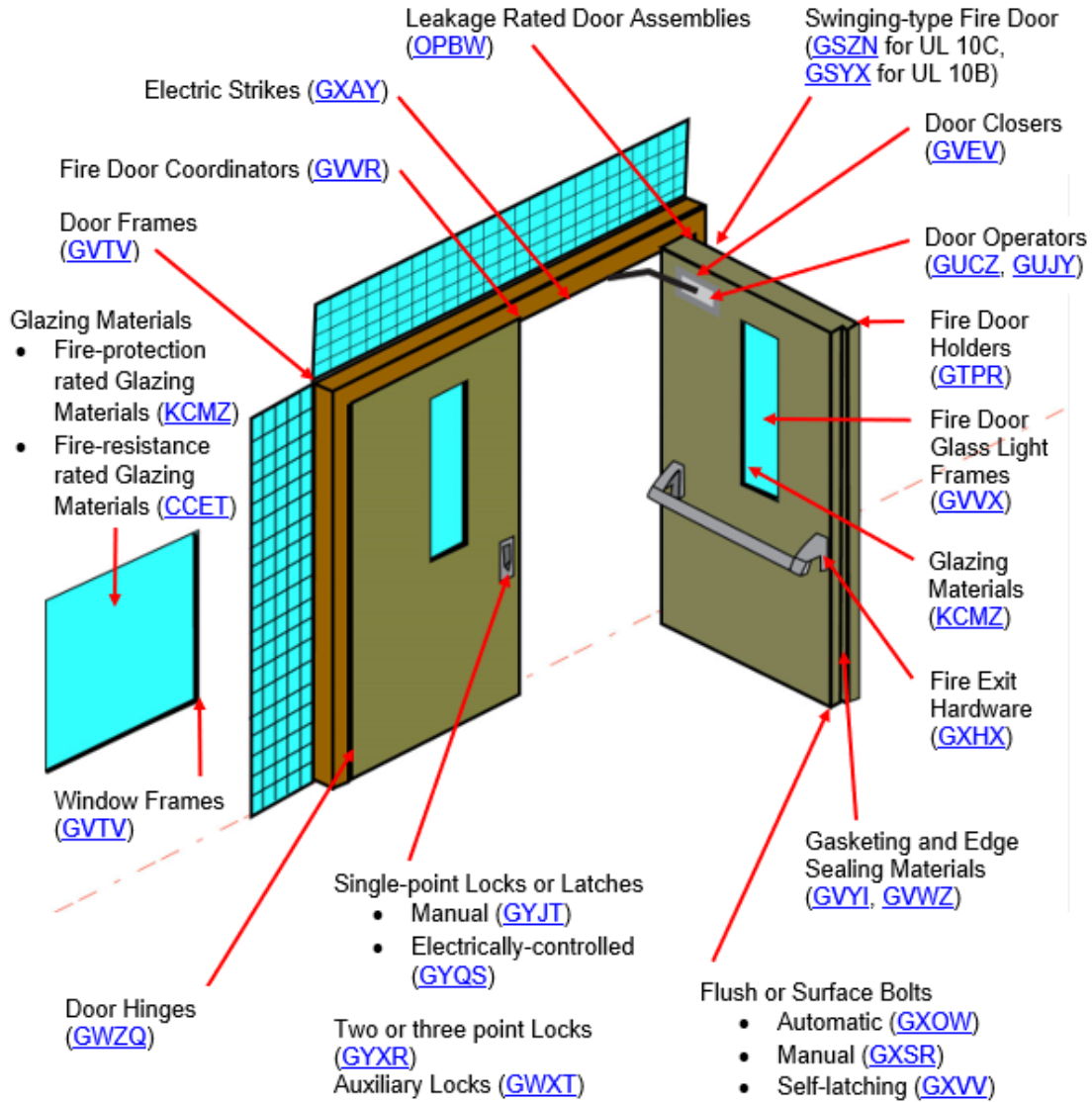
## 6. DIAGRAMS OF COMPLETE ASSEMBLIES

The following diagrams identify the components that make up complete assemblies, along with links to the guide information for the various product categories. Refer to Appendix A for a complete list of related product categories.

### ROLLING STEEL FIRE DOOR ILLUSTRATION



## DOUBLE FIRE DOOR ILLUSTRATION



## APPENDIX A – DOOR, WINDOW AND RELATED HARDWARE CATEGORIES

UL certifies the door, window and related hardware under the following product categories. Click on Category Code links to view UL Guide Information for the product category. The Guide Information also has links to manufacturers whose products are certified under the category. See the [UL Product iQ](#) database at [www.ul.com/PiQ](http://www.ul.com/PiQ) for details.

Category Code	Category Name	Standard Used
<a href="#"><u>GSNV</u></a>	<b>Fire Doors</b>	
<a href="#"><u>GSNN</u></a>	Fire Door Assemblies and Window Assemblies	UL 10B, UL 10C, or UL 9
<a href="#"><u>GSOT</u></a>	Access-type Fire Doors	UL 10B or UL 263
<a href="#"><u>GSOX</u></a>	Bullet-resisting-type Fire Doors	UL 10B and UL 752
<a href="#"><u>GSPR</u></a>	Chute-type Fire Doors	UL 10B
<a href="#"><u>GSQX</u></a>	Curtain-type Fire Doors	UL 10B and UL 555
<a href="#"><u>GSRV</u></a>	Dumbwaiter-type Fire Doors	UL 10B
<a href="#"><u>GSZC</u></a>	Finishers of Fire Doors	UL 10B or UL 10C, UL 1784
<a href="#"><u>CCJV</u></a>	Floor Access Doors	UL 263
<a href="#"><u>GSST</u></a>	Freight-elevator-type Fire Doors	UL 10B
<a href="#"><u>GSSZ</u></a>	Freight-elevator-type Fire Door Retrofit Parts	UL 10B
<a href="#"><u>GSUX</u></a>	Passenger-elevator-type Fire Doors	UL 10B
<a href="#"><u>GSVV</u></a>	Rolling Steel Fire Doors	UL 10B
<a href="#"><u>GSWT</u></a>	Service-counter-type Fire Doors	UL 10B
<a href="#"><u>GSXV</u></a>	Sliding-type Fire Doors	UL 10A and UL 10B

<b>Category Code</b>	<b>Category Name</b>	<b>Standard Used</b>
<a href="#"><u>GSXZ</u></a>	Special-purpose Fire Doors	UL 10B, UL 10C and UL 1784
<a href="#"><u>GSYX</u></a>	Swinging-type Fire Doors	UL 10A, UL 10B and U UL 1784
<a href="#"><u>GSZG</u></a>	Swinging-type Fire Door Retrofit Parts	UL 10B
<a href="#"><u>GSZN</u></a>	Swinging-type Fire Doors, Positive-pressure Tested	UL 10C, UL 1784
<a href="#"><u>GSZV</u></a>	Tin-clad-type Fire Doors	UL 10A and UL 10B
<a href="#"><u>GSSN</u></a>	Fire-protective Curtains	UL 10D, UL 1784
<a href="#"><u>GVZS</u></a>	Fire Door Louvers	UL 10B or UL 10C
<a href="#"><u>OPBW</u></a>	Leakage-rated Door Assemblies	UL 1784
	<b>Fire Windows</b>	
<a href="#"><u>CCET</u></a>	Fire-resistance rated Glazing Materials	UL 263
<a href="#"><u>KCMZ</u></a>	Fire-protection rated Glazing Materials	UL9, UL 10B, and/or UL 10C
	<b>Fire Door and Window Frames</b>	
<a href="#"><u>GVTV</u></a>	Fire Door and Window Frames	UL 10B, UL 10C, UL 9, or UL Subject 63
<a href="#"><u>GVUP</u></a>	Finishers of Fire Door Frames and Fire Window Frames	UL 10B, UL 10C, UL 9 or UL Subject 63
<a href="#"><u>CIKV</u></a>	Framing Members	UL 263
	<b>Fire Door and Window Hardware</b>	
<a href="#"><u>GWVV</u></a>	Accessories for Single-point Locks and Latches and Fire-exit Hardware	UL 10C

<b>Category Code</b>	<b>Category Name</b>	<b>Standard Used</b>
<a href="#"><u>GWXT</u></a>	Auxiliary Locks	UL 10C or UL 10B
<a href="#"><u>GWZQ</u></a>	Door Hinges	UL 10C
<a href="#"><u>GXAY</u></a>	Electric Strikes	UL 10C
<a href="#"><u>GXHX</u></a>	Fire-exit Hardware	UL 305, UL 10B, UL 10C
<a href="#"><u>GXOW</u></a>	Flush and Surface Bolts, Automatic Type	UL 10B or UL 10C
<a href="#"><u>GXSR</u></a>	Flush and Surface Bolts, Manual Type	UL 10B or UL 10C
<a href="#"><u>GXVV</u></a>	Flush and Surface Bolts, Self-latching Type	UL 10B or UL 10C
<a href="#"><u>GYJT</u></a>	Single-point Locks and Latches	UL 10B or UL 10C
<a href="#"><u>GYQS</u></a>	Electrically-controlled Single-point Locks and Latches	UL 10B or UL 10C
<a href="#"><u>GYXR</u></a>	Two- and Three-point Locks and Latches	UL 10B
<a href="#"><u>GZKZ</u></a>	Elevator Fire Door Hardware, Passenger	UL 10B
<a href="#"><u>GZYG</u></a>	Fire Door Hardware	UL 14B, UL 14C
<a href="#"><u>HAAU</u></a>	Fire Door Viewers	UL 10B or UL 10C
<a href="#"><u>GVUW</u></a>	<b>Fire Door Accessories</b>	
<a href="#"><u>GVVR</u></a>	Fire Door Coordinators	UL 10B or UL 10C, and UL Subject 14
<a href="#"><u>GVUX</u></a>	Miscellaneous Fire Door Accessories	UL 10B
<a href="#"><u>GVUY</u></a>	Miscellaneous Fire Door Accessories, Positive-pressure Tested	UL 10C

<b>Category Code</b>	<b>Category Name</b>	<b>Standard Used</b>
<a href="#"><u>GVUZ</u></a>	Cladding Materials for Fire Doors and Frames	UL 10B or UL 10C
<a href="#"><u>GVVX</u></a>	Fire Door Glass Light Frames	UL 10B or UL 10C
<a href="#"><u>GVWZ</u></a>	Gasketing Materials for Fire Doors	UL 10B
<a href="#"><u>GVYI</u></a>	Gasketing and Edge-sealing Materials for Fire Doors, Positive-pressure Tested	UL 10C
<a href="#"><u>GTBT</u></a>	<b>Fire Door Closers, Holders and Operators</b>	
<a href="#"><u>GVEV</u></a>	Swinging Fire Door Closers	UL 228
<a href="#"><u>GUQX</u></a>	Sliding Fire Door Closers	UL 228
<a href="#"><u>GTPR</u></a>	Fire Door Holders	UL 228
<a href="#"><u>GTIS</u></a>	Combination Fire Door Closers and Holders	UL 228
<a href="#"><u>GUCZ</u></a>	Fire Door Operators	UL 228 and UL 325
<a href="#"><u>GUJY</u></a>	Fire Door Operators with Automatic Closers	UL 228 and UL 325
<a href="#"><u>GUNL</u></a>	Retrofit Rolling Steel Fire Door Operators	UL 10B and UL 325
<a href="#"><u>FCQU</u></a>	Door Operators for use in Hazardous Locations	UL 325
<a href="#"><u>FDGF</u></a>	Door Holders for use in Hazardous Locations	UL 228
<a href="#"><u>FUDQ</u></a>	Means of Egress Related Certifications	
<a href="#"><u>FULA</u></a>	Controlled Exit Panic Devices	

<b>Category Code</b>	<b>Category Name</b>	<b>Standard Used</b>
<a href="#"><u>FUOR</u></a>	Door Closers	ANSI/BHMA A156.4
<a href="#"><u>FUXV</u></a>	Exit Doors	
<a href="#"><u>FUQV</u></a>	Exit Locks	
<a href="#"><u>FVSR</u></a>	Panic Hardware	UL 305 and ANSI/BHMA A156.3
<a href="#"><u>FWAX</u></a>	Special Locking Arrangements	
	<b>Windstorm Rated Assemblies</b>	
<a href="#"><u>ZHCH</u></a>	Windstorm-rated Swinging Door Components	UL 228
<a href="#"><u>ZHCK</u></a>	Accessories for Windstorm-rated Swinging Doors	ANSI A250.13
<a href="#"><u>ZHCW</u></a>	Swinging Doors, Exterior	ANSI A250.13
<a href="#"><u>ZHDL</u></a>	Door Frames	ANSI A250.13
<a href="#"><u>ZHDO</u></a>	Glass Light Frames for Windstorm-rated Doors	ANSI A250.13
<a href="#"><u>ZHDX</u></a>	Hinges	ANSI A250.13
<a href="#"><u>ZHEM</u></a>	Latching Hardware	ANSI A250.13
<a href="#"><u>ZHLA</u></a>	Windstorm-rated Assemblies	AMCA 540, ASTM E283, ASTM E331, ASTM E330, ASTM E1886, ASTM E1996, TAS 201/202/203, AAMA/WDMA/CSA 101/I.S.2/A440, and/or ICC 500
<a href="#"><u>ZHLL</u></a>	Products for Use in Windstorm-rated Assemblies	AMCA 540, ASTM E283, ASTM E331, ASTM E330, ASTM E1886, ASTM E1996, TAS 201/202/203, AAMA/WDMA/CSA 101/I.S.2/A440, and/or ICC 500

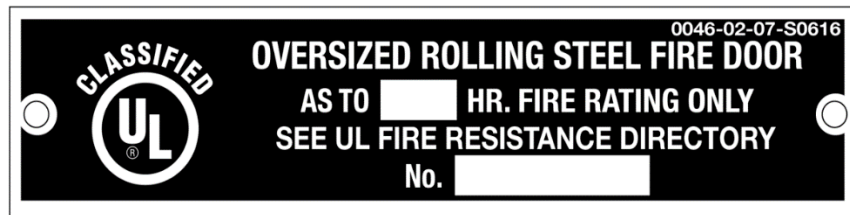


APPENDIX B- EXAMPLES OF UL LABELS

SWINGING FIRE DOOR LABEL



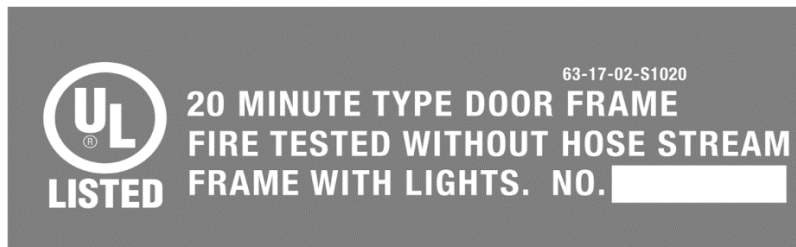
OVERSIZED ROLLING STEEL DOOR LABEL



FREIGHT ELEVATOR DOOR LABEL



20 MINUTE DOOR FRAME LABEL



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