

# Maintaining Protection: Fire-Rated Glazing

- **Design**
- **Installation**
- **Inspection**
- **Maintenance & Management**

FCIA Virtual 'DIIM Symposium Canada  
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# Key Purposes of Fire-rated Glazing

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- Allows visibility into a space
- Prevents spread of fire (compartmentation)



# Uses of Fire-rated Glazing

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- As a fire-resistance-rated wall assembly
- Vision panels in fire rated door assemblies
- Transom and sidelight panels used adjacent to fire doors
- Fire window assemblies

# What Type of Glazing is Required?

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- The type of glazing required for each of these applications is based on the following:
  - Type of barrier
  - Rating of barrier
  - Application of the glazing panel
  - Size of glazing panel
- The type of glazing required is found in the NFPA 80 based on references from the National Building Code of Canada

# Key Attributes for Fire and Human Impact Safety

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- **Fire Test** – Measures the amount of time, in minutes or hours, that fire-rated glazing and framing can withstand fire exposure in a furnace
- **Hose Stream Test** – Heated glass and frames are subjected to water from a hose stream. The cooling, impact and erosion created by the hose stream evaluates the structural integrity of the glazing and frame

# Key Attributes for Fire and Human Impact Safety Cont.

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- **Impact Safety Test** – Measures the ability of glass to withstand impact. Ratings are given in levels based on the amount of force the glass can resist.

# Types of Fire-rated Glazing

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- Fire-rated glazing
  - Fire-resistance-rated glazing
    - Fire-resistance-rated glazing used in walls
    - Fire-resistance-rated glazing used in fire door applications including transoms and sidelights

# Types of Fire-rated Glazing

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- Fire-rated glazing
  - Fire-protection-rated glazing
    - Fire-protection-rated glazing used in walls
      - Fire-protection-rated meeting hose stream requirements
    - Fire-protection-rated glazing used in fire door applications including transoms and sidelights
      - Fire-protection-rated glazing w/o hose stream
      - Fire-protection-rated glazing meeting hose stream requirements
      - Fire-protection-rated glazing meeting hose steam and temperature requirement (Pre 2012 IBC US based applications only)
    - Wired glass

# 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



TGP Image

# Fire-resistance-rated Glazing Cont.

- Size shall not exceed manufacturers tested size
- When used in doors, must also meet requirements of hose stream after full fire exposure



TGP Image

# Standards

## Fire-resistance-rated Glazing

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- When used as a wall
  - CAN/ULC-S101
- When used as vision panel in doors
  - CAN/ULC-S101, and
  - CAN/ULC-S104

# Conditions of Acceptance

## CAN/ULC-S101

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- Flame Passage
- 140°C / 180°C Temperature Rise
- Hose Stream on Duplicate Test Sample Exposed to Fire for Reduced Time Frame

# Conditions of Acceptance

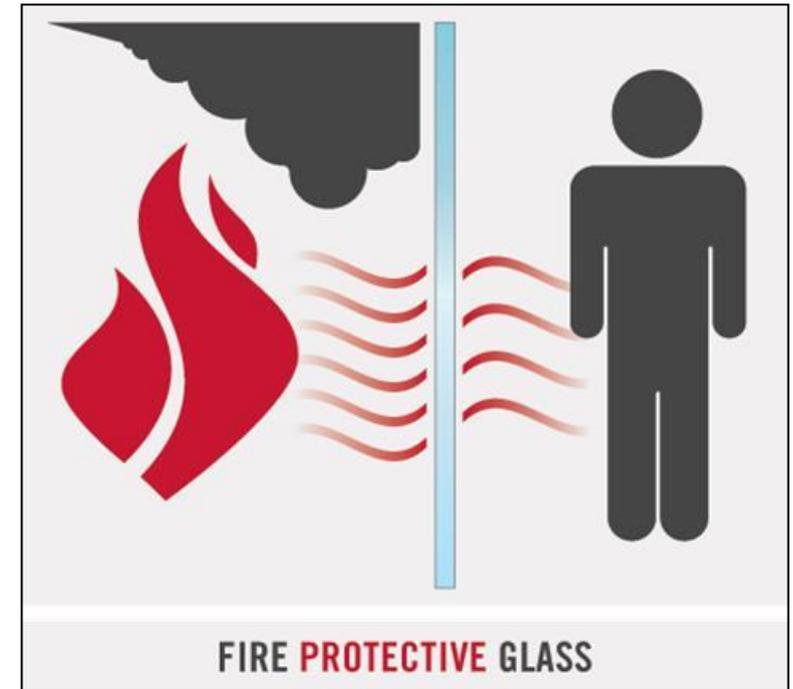
## CAN/ULC-S104

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

# Fire-protection-rated Glazing

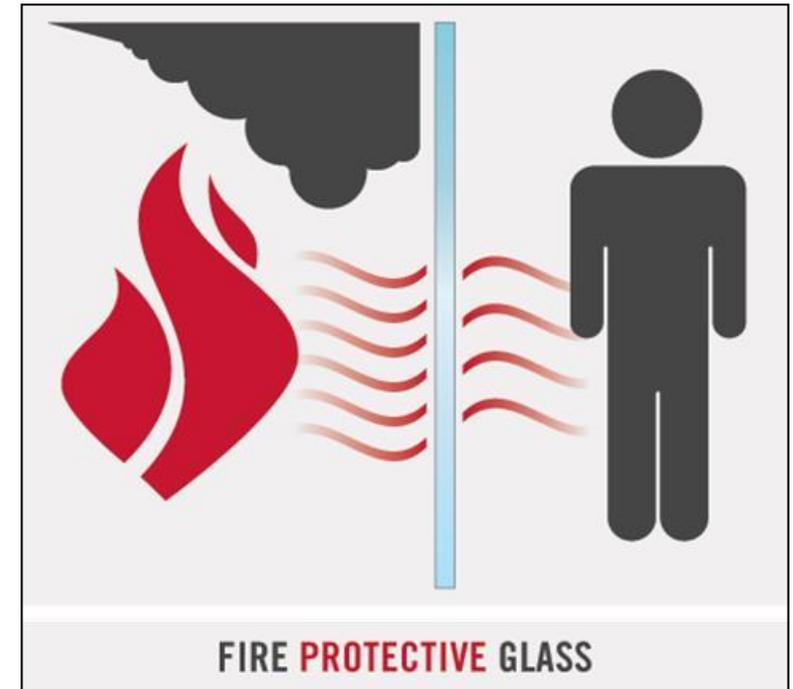
- Fire-rated, thin glazing
- Traditional fire-rated material (wired glass, proprietary glass, etc.)
  - Wired glass does not meet the US safety glazing requirements
- Allows significant radiant heat from unexposed side
- May or may not be required to meet hose stream requirements depending on application



TGP Image

# Fire-protection-rated Glazing Cont.

- Used in or as Closures
  - Fire Windows: 20 to 45 minutes
  - Fire Doors: 20 minutes to 3 hrs
  - Size shall comply with NFPA 80, and may not exceed manufacturers tested sizes



TGP Image

# Standards

## Fire-protection-rated Glazing

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- Glazing used in fire door assemblies
  - CAN/ULC-S104

# Standards

## Fire-protection-rated Glazing Cont.

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- Glazing used in fire window assemblies
  - CAN/ULC-S106

# Conditions of Acceptance

## CAN/ULC-S104

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

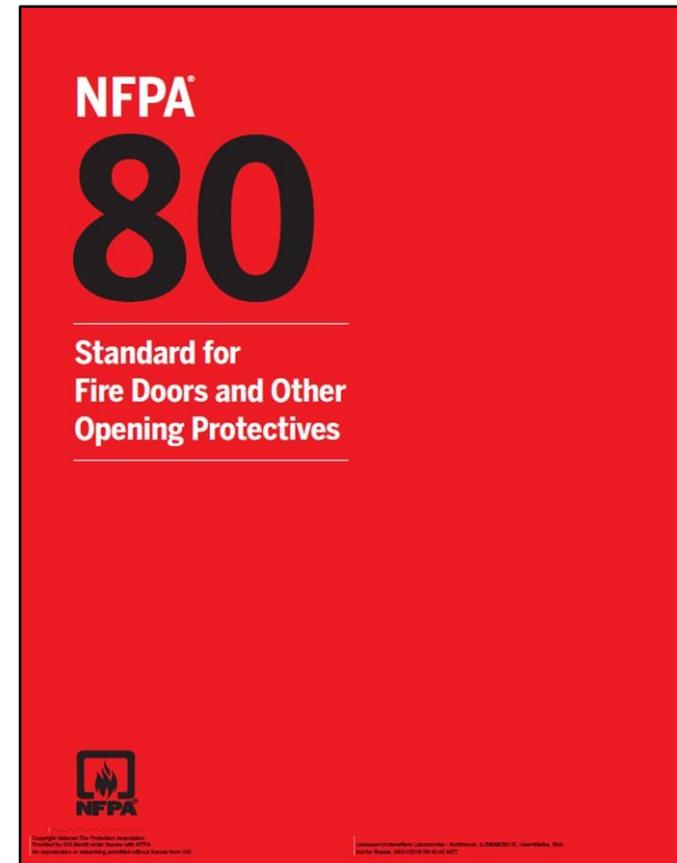
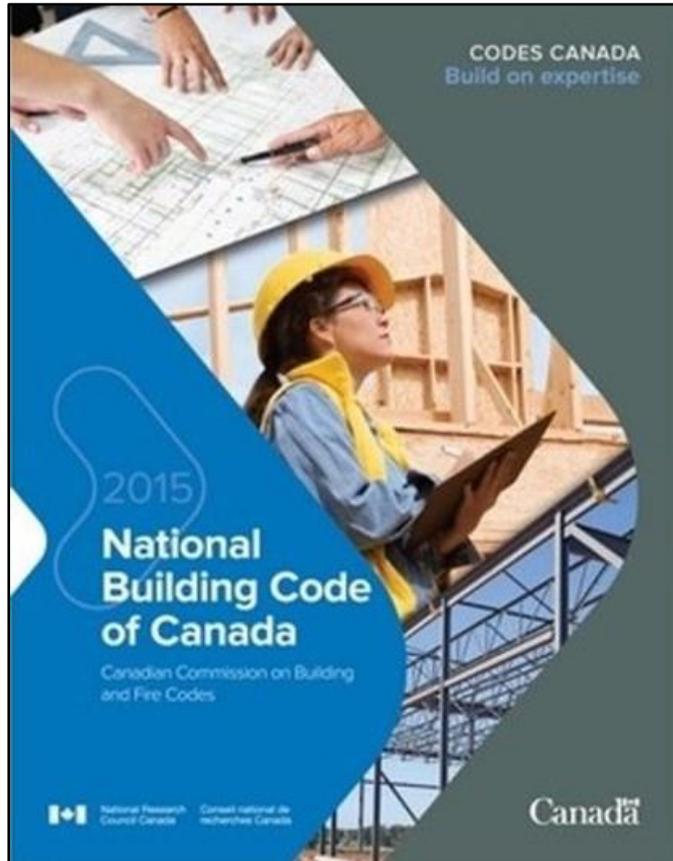
# Conditions of Acceptance

## CAN/ULC-S106

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

# Code Requirements for Fire-Rated Glazing



# Component Approach Used for Fire Door and Fire Window Assemblies

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- Both documents prescribe a component approach for fire door and fire window openings
- The NBCCC, through reference to NFPA 80, requires fire door and fire window components to be Listed and Labeled

# Component Approach Used for Fire Door and Fire Window Assemblies

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- Approval of the finished closure relies on Listing and ratings of individual components with final decision up to the Code Official

# Glazing in Fire Doors

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- Division B, Part 3, Section 3.1.8 of the 2015 NBCC
- Table 3.1.8.4
  - Establishes requirements for rating on closures based on required vertical assembly rating
- Section 3.1.8.5
  - Requires every door, fire damper, window assembly or glass block used as a closure in fire separations be installed in accordance with NFPA 80-2013

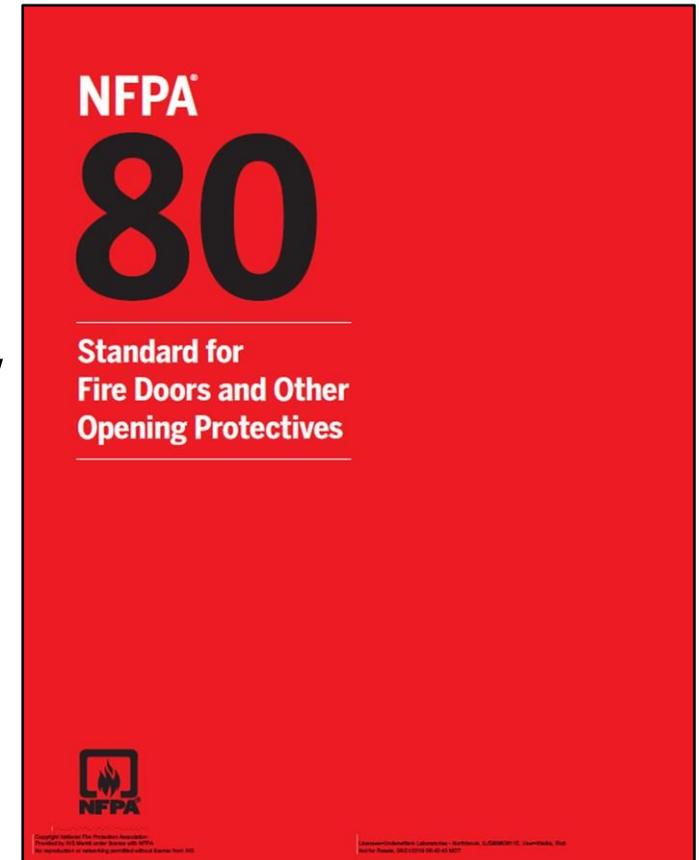
# Wired Glass in Fire Doors, and Other Locations

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- Division B, Part 3, Section 3.1.8 of the 2015 NBCC
- Sections 3.1.8.16, 3.1.8.17 and 3.1.8.18
  - Permits use of wired glass, without testing, in doors and in other locations in fire separations have a max fire-resistance rating of 1 hr, up to size limits specified in Table 3.1.8.17
- Section 3.1.8.19
  - Waives size limit for wired glass in specific exit conditions if the fire separation contains no wired glass within 3 m of a closure into an exit enclosure

# Installation Standard – NFPA 80

- The NBCC references NFPA 80, Standard for Fire Doors and Other Opening Protectives for the installation of fire door and fire window assemblies



# Scope

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- This standard regulates the installation and maintenance of assemblies and devices used to protect openings:
  - in walls,
  - in floors,
  - and in ceilings

**“against the spread of fire and smoke within, into, or out of buildings”**

# General – Fire Door and Fire Windows

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- **NFPA 80 Section 4.2 Listed and Labeled Products**
  - **4.2.1** Listed items shall be labeled
  - **4.2.2** Labels shall be applied in locations that are readily visible ...
  - **4.2.4** Specification of items of a generic nature, such as hinges, that are not labeled shall comply with the specifications contained in this standard

# Glazing in Fire Doors

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- **NFPA 80, Section 4.4.1\*** Only labeled fire-resistance-rated or fire-protection-rated glazing material shall be used in fire door assemblies when permitted by the door listing

# Glazing in Fire Doors Cont.

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- **NFPA 80, Section 4.4.2** – Glazing in fire doors must meet safety glazing criteria
  - Significant updates to wired glass requirements coming with the next edition of the NBCC

# Glazing in Fire Doors Cont.

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- **NFPA 80, Section 4.4.3\*** Glazing materials in vision panels shall be installed in labeled glass light kits or in accordance with the fire door listing and shall be installed in accordance with the manufacturer's installation instructions

# Glazing in Fire Doors Cont.

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- **NFPA 80, Table 4.4.5** – Maximum size of fire-protection-rated glazing is limited to the area tested, with two exceptions:
  - Glazing in fire doors having a rating of 3 hrs is limited to 0.065 sq m
  - Glazing in temperature rise rated fire doors having a rating of 1-1/2 hrs is limited to 0.065 sq m

# Glazing in Fire Doors and Fire Windows

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- **NFPA 80, Section 4.5** – Fire-resistance-rated glazing is permitted in fire doors and fire windows having a fire-protection rating of 1-1/2 hr or less and shall be limited to the maximum area tested

# Glazing in Transoms and Side Lights

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- **NFPA 80, Section 6.3.3.3** – Frames with transom lights or side lights, or both shall be permitted where a fire-protection rating of 3/4 hr or less is required
- **NFPA 80, Section 6.3.3.4** – Frames with transom lights or side lights, or both, installed with fire-resistance-rated glazing shall be permitted where a fire-protection rating exceeding 3/4 hr is required

# Glazing in Transoms and Side Lights Cont.

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- **NFPA 80, Section 6.3.3.5** – Only labeled fire-protection-rated or fire-resistance-rated glazing shall be used to glaze light openings

# Glazing in Fire Windows

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- **NFPA 80, Section 17.2.1** – Fire-protection-rated or fire-resistance-rated glazing used in fire window assemblies shall be labeled

# Glazing in Fire Windows Cont.

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- **NFPA 80, Section 17.2.2.1** – The maximum size of glazing material shall be limited to the maximum size openings indicated in the listings
- **NFPA 80, Section 17.2.2.2** – Individual glazing material exposed area shall not exceed 0.84 sq m with no dimension exceeding 1.37 m unless otherwise tested

# Marking Requirements for Fire-rated Glazing

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Without some identification, how does one distinguish the various types of glazing?

**You Can NOT!!!**

# 2016 NFPA 80 Marking Requirements for Glazing

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- The 2016 and later editions of NFPA 80 require marking of glazing to confirm code compliance with fire protection requirements both at time of installation and during annual inspections



# 2016 NFPA 80 Marking Requirements for Glazing

Table 4.2.2 Marking Fire-Rated Glazing Assemblies

Fire Test Standard	Marking	Definition of Marking
ASTM E119, or ANSI/ UL 263 <sup>a</sup>	W	Meets wall assembly criteria
		Meets fire window assembly criteria, including the hose stream test
NFPA 257	OH	Meets fire door assembly criteria
NFPA 252	D	Meets fire door assembly hose stream test
	H	Meets 450°F (232°C) temperature rise criteria for 30 minutes
	T	The time, in minutes, of fire resistance or fire protection rating of the glazing assembly
	XXX	

<sup>a</sup>ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, and ANSI/UL 263, *Standard for Fire Tests of Building Construction and Materials*.

[101:Table 8.3.3.12]

Example: A piece of fire-resistance-rated glazing meeting the wall requirements and the door requirements for 90 minutes would be marked:

D – H – T – W – 90

Note: 450°F = 250°C

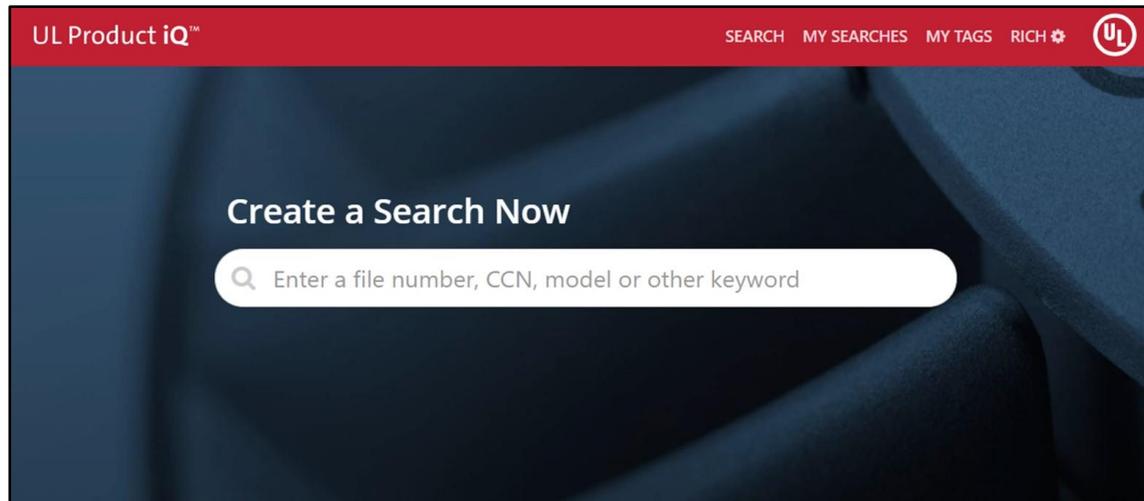
# 2016 NFPA 80

Table A.4.2.2 Minimum Fire Ratings for Opening Protectives in Fire Resistance–Rated Assemblies and Fire-Rated Glazing Markings

Component	Walls and Partitions (hr)	Fire Door Assemblies (hr)	Door Vision Panel Maximum Size (in. <sup>2</sup> )	Fire-Rated Glazing Marking Door Vision Panel	Minimum Side Light/Transom Assembly Rating (hr)		Fire-Rated Glazing Marking Side Light/Transom Panel		Minimum Fire-Rated Windows Rating <sup>a,b</sup> (hr)		Fire-Rated Window Marking	
					Fire protection	Fire resistance	Fire protection	Fire resistance	Fire protection	Fire resistance	Fire protection	Fire resistance
Elevator hoistways	2	1-½	155 in. <sup>2c</sup>	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-12 0	NP	2	NP	W-120
	1	1	155 in. <sup>2c</sup>	D-H-60 or D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
	½	⅓	85 in. <sup>2d</sup>	D-20 or D-W-20	⅓	⅓	D-H-20	D-W-20	⅓	⅓	OH-20	W-30
Elevator lobby (per 7.2.13.4)	1	1	100 in. <sup>2a</sup>	≤100 in. <sup>2</sup> , D-H-T-60 or D-H-W-60 >100 in. <sup>2</sup> , D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
Vertical shafts (including stairways, exits and refuse chutes)	2	1-½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-12 0	NP	2	NP	W-120
	1	1	Maximum size tested	D-H-60 or D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
Replacement panels in existing vertical shafts	½	⅓	Maximum size tested	D-20 or D-W-20	⅓	⅓	D-H-20	D-W-20	⅓	⅓	OH-20	W-30
Fire barriers	3	3	100 in. <sup>2a</sup>	≤100 in. <sup>2</sup> , D-H-180 or D-H-W-180 >100 in. <sup>2</sup> , D-H-W-180	NP	3	NP	D-H-W-18 0	NP	3	NP	W-180
	2	1-½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-12 0	NP	2	NP	W-120
	1	¾	Maximum size tested <sup>e</sup>	D-H-45 or D-H-W-45	¾ <sup>e</sup>	¾ <sup>e</sup>	D-H-45	D-H-W-45	¾	¾	OH-45	W-60

# Where are Listings Found?

## ULC

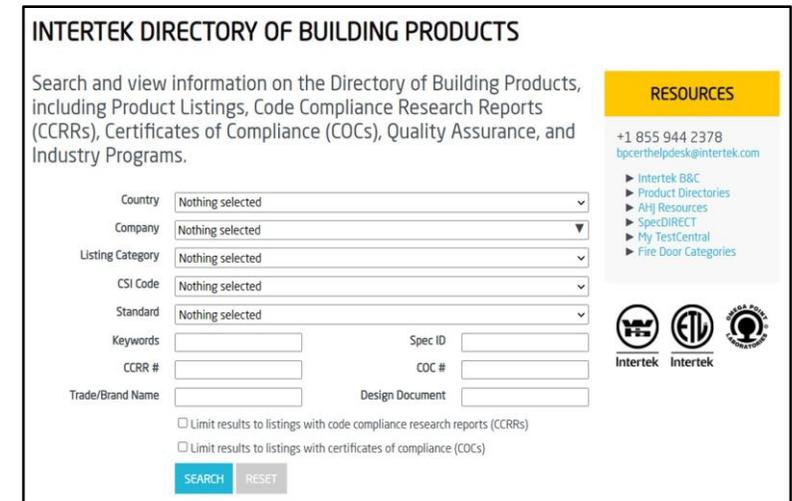


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- ▶ Fire Door Categories

Country:

Company:

Listing Category:

CSI Code:

Standard:

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)

# UL Product Categories

- Fire-protection-rated Glazing Materials (**KCMZ**)

The screenshot shows the UL Product iQ search interface. At the top, there is a red navigation bar with the text 'UL Product iQ™' on the left and 'SEARCH MY SEARCHES MY TAGS RICH' with a gear icon on the right. The main content area has a dark blue background with a large, faint UL logo and the text 'US LA 3TP'. A white search bar contains the text 'fire-protection-rated'. Below the search bar, a dropdown menu is open, showing search results. A red arrow points to the 'KCMZ' category in the dropdown.

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

### Create a Search Now

fire-protection-rated

KEYWORD	
<b>fire-protection-rated</b>	Find all information for <b>fire-protection-rated</b>

UL CATEGORY	
KCMZ	Fire-protection-rated Glazing Materials (105)
KCMZ7	Fire-protection-rated Glazing Materials Certified for Canada (49)

Find what you need faster with iQ Plus Search Tools!

# UL Listings

- Fire-protection-rated Glazing Materials (**KCMZ**)

The screenshot displays the UL Product iQ interface. On the left, a search sidebar includes a 'Keyword' field, a 'UL Category Control Number' field with 'KCMZ7' entered, and 'Add Filter', 'Cancel', 'Reset', and 'Save Search' buttons. The main content area shows a table of search results with columns for Document Name, Company Name, Notes, UL CCN Description, and My Tags. A red arrow points to the entry with Document Name 'KCMZ7.R16644' and Company Name 'TECHNICAL GLASS PRODUCTS'.

Document Name	Company Name	Notes	UL CCN Description	My Tags
<a href="#">KCMZ7.GuidelInfo</a>			Fire-protection-rated Glazing Materials Certified for Canada	
<a href="#">KCMZ7.R13236</a>	Anemostat Door Products Inc		Fire-protection-rated Glazing Materials Certified for Canada	
<a href="#">KCMZ7.R13377</a>	TECHNICAL GLASS PRODUCTS		Fire-protection-rated Glazing Materials Certified for Canada	
<a href="#">KCMZ7.R13833</a>	GLOBAL SECURITY GLAZING		Fire-protection-rated Glazing Materials Certified for Canada	
<a href="#">KCMZ7.R14212</a>	SAFTIFIRST		Fire-protection-rated Glazing Materials Certified for Canada	
<a href="#">KCMZ7.R14515</a>	VETROTECH SAINT-GOBAIN NORTH AMERICA INC		Fire-protection-rated Glazing Materials Certified for Canada	
<a href="#">KCMZ7.R16644</a>	TECHNICAL GLASS PRODUCTS		Fire-protection-rated Glazing Materials Certified for Canada	

# UL Listings



## Fire-protection-rated Glazing Materials Certified for Canada

[See General Information for Fire-protection-rated Glazing Materials Certified for Canada](#)

### TECHNICAL GLASS PRODUCTS

R16644

8107 BRACKEN PL SE  
SNOQUALMIE, WA 98065-9258 USA

**Product designation:** Pyrostop 45-(xxx)

**Thickness:** 200 - 19mm, 45-250+, 45-260+, 45-350+ and 45-360+ - 33mm, 45-280 and 45-380 - 36mm, 45-350 Triple and 45-360 Triple - 44mm, 45-380 Triple - 47mm.

**Glazing compound:** "Norton" style closed cell PVC tape or Pemko FG-3000

**Furnace pressure:** Positive

Rating	Application	Max Exposed Area of Glazing (m <sup>2</sup> )	Max Width of Exposed Glazing (mm)	Max Height of Exposed Glazing (mm)	Min Depth of Groove (mm)	Groove Width (mm)
3/4 h	Doors TGP Designer Series, Heat Barrier.	2.403	1,057	2280	16	Product thickness plus 3mm
3/4 h	Windows, Transoms or Sidelights	2.903	2,419	2,419	16	Product thickness plus 3mm

### Fire-protection-rated Glazing Materials

# Questions??



# Thanks for Attending!!!

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