Maintaining Protection: Fire-Rated Glazing

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FCIA
Firestop Contractors International Association

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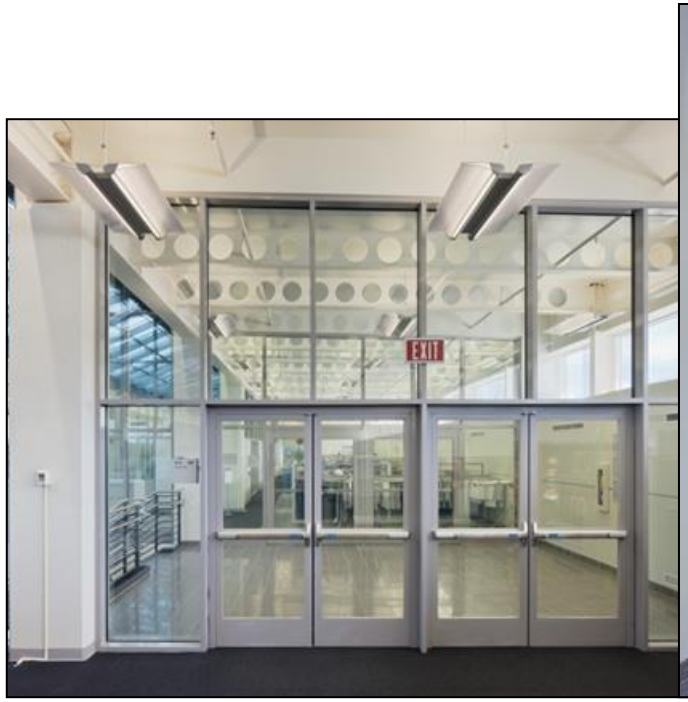
Key Purposes of Fire-rated Glazing

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



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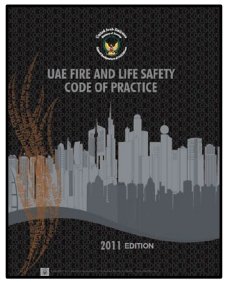
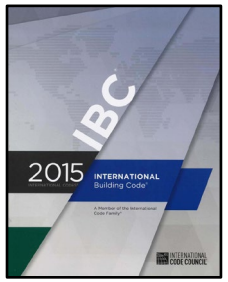
Uses of Fire-rated Glazing

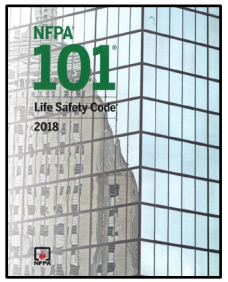
- As a fire-resistance-rated wall assembly
- Vision panels in fire rated door assemblies
- Transom and sidelight panels used adjacent to fire doors
- Fire window assemblies

Building & Fire Code Requirements

- UAE Fire and Life Safety Code
  - New and Existing Buildings – Chapter 1
  - Existing Building Maintenance – Chapter 1, Section 21
- International Codes
  - New and Existing Buildings – International Building Code – Chapter 7
  - International Fire Code – Chapter 7
- NFPA
  - New and Existing Buildings – NFPA 5000 & 101 – Chapter 8
  - Fire Code – NFPA 1 – Chapter 12







- ***Minimum requirements*** - ***Construction*** & ***Maintaining Protection***

What Type of Glazing is Required?

- 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 UAE Fire and Life Safety Code
- In IBC and NFPA based codes, the type of glazing required is found directly in the code

Key Attributes for Fire and Human Impact Safety

- **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.

- **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

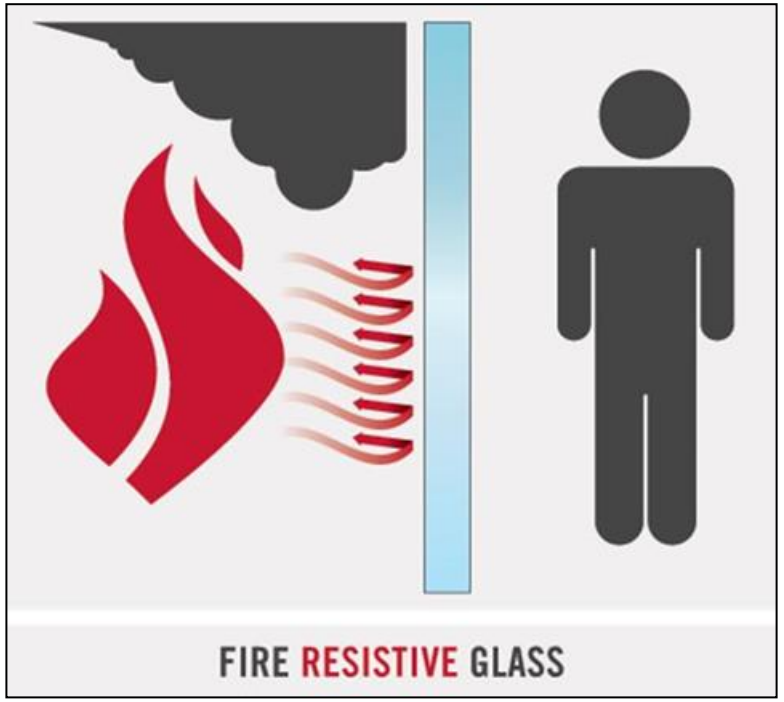
- Fire-rated glazing
  - Fire-resistance-rated glazing
    - Fire-resistance-rated glazing used in walls
    - Fire-resistance-rated glazing used in fire door applications including transoms and sidelights

Types of Fire-rated Glazing

- 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)

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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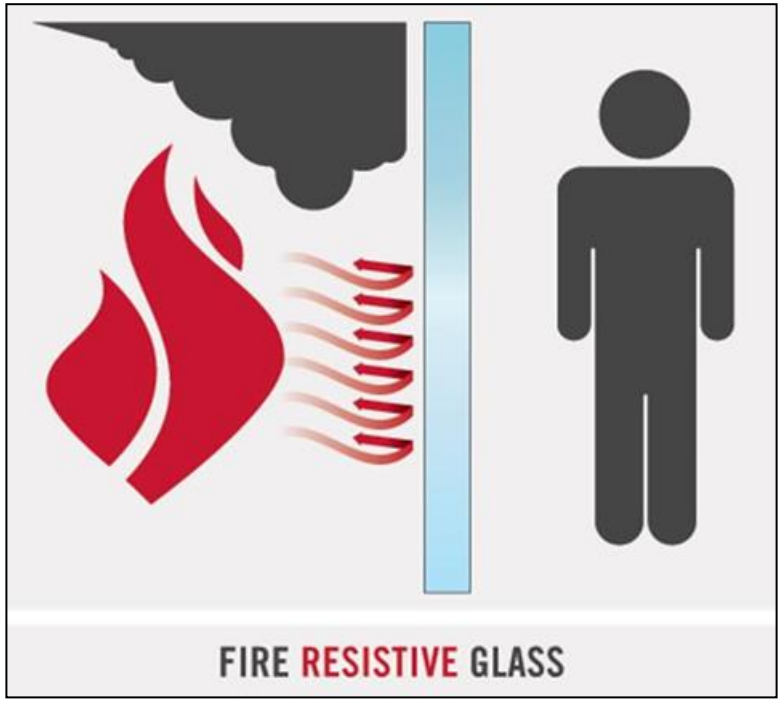
Fire-resistance-rated Glazing Cont.

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



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Standards
Fire-resistance-rated Glazing

- When used as a wall, glazing shall be tested to the fire-resistance standards:
  - ASTM E119 / UL 263, ISO 834, EN 1365, BS 476
- When used as vision panel in doors, glazing shall be tested to the fire-resistance and door fire-protection standards:
  - ASTM E119 / UL 263, ISO 834, EN 1365, BS 476, and
  - NFPA 252 / UL 10B / UL 10C, ISO 3009

Conditions of Acceptance
Fire-Resistance Standards

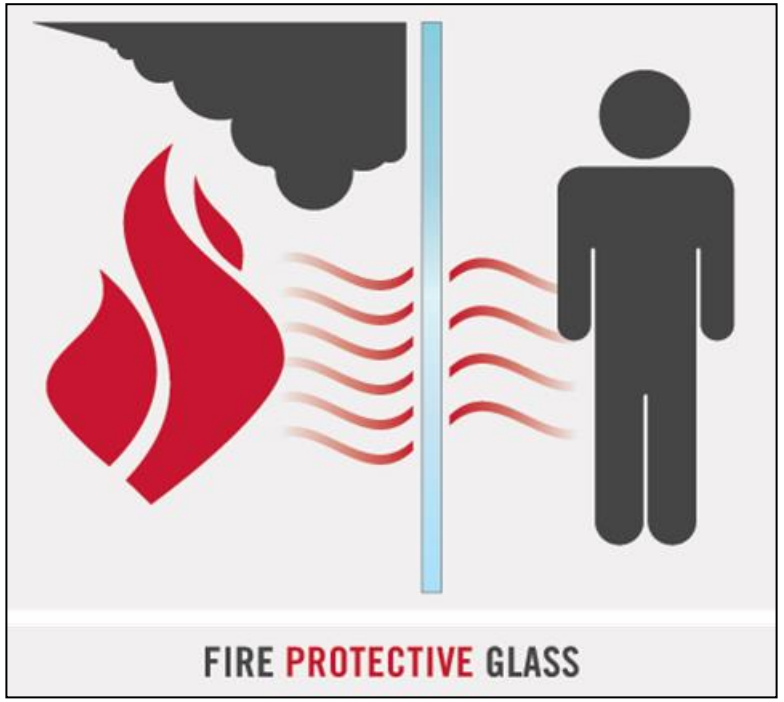
- Flame Passage
- 250ºF (140ºC) / 325ºF (180ºC) Temperature Rise
- Hose Stream on Duplicate Test Sample Exposed to Fire for Reduced Time Frame (North American Standards only)

Conditions of Acceptance
Fire-Protection Standards for Doors

- Flame Passage
- Hose Stream after Full Duration Fire Exposure (North American Standards only)
  - 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



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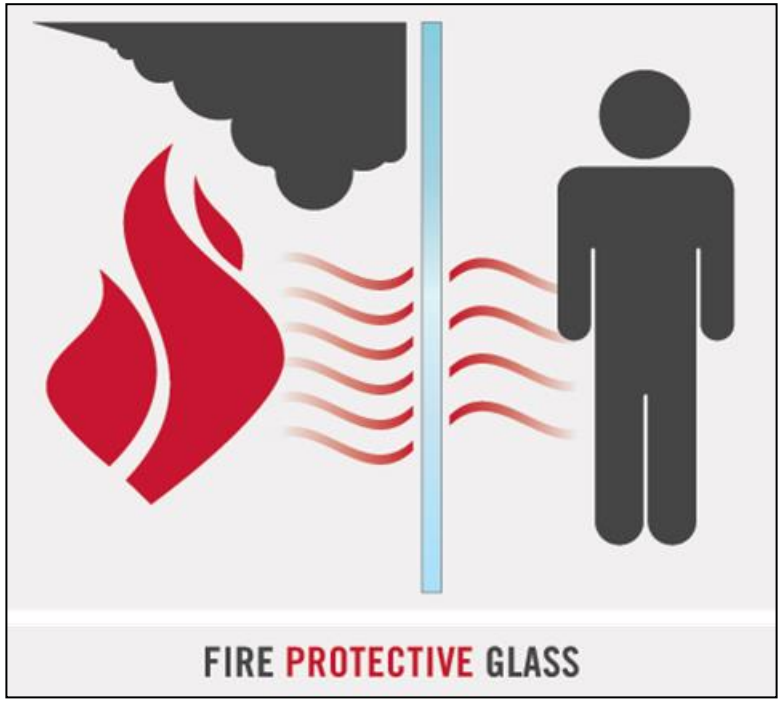
Fire-protection-rated Glazing Cont.

- Used as an Opening Protective
  - Fire Windows: 20 to 45 minutes
  - Fire Doors: 20 minutes to 3 hrs
  - Size shall comply with UAE Fire and Life Safety Code, IBC, NFPA 101 and NFPA 80, as applicable, and may not exceed manufacturers tested sizes



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Standards
Fire-protection-rated Glazing Used in Doors

- Glazing used in fire door assemblies
  - UL 10C / NFPA 252 (side hinged or swinging fire door assemblies)
  - UL 10B / NFPA 252 (all other types of fire door assemblies)
  - EN 1634-1
  - When used in some 20 min fire door applications, the code waives the requirement for the hose stream test

Standards
Fire-protection-rated Glazing Used in Windows

- Glazing used in fire window assemblies
  - NFPA 257 / UL 9, ISO 3009

Conditions of Acceptance
Fire-Protection Standards for Doors

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

Conditions of Acceptance
Fire-Protection Standards for Windows

- Flame Passage
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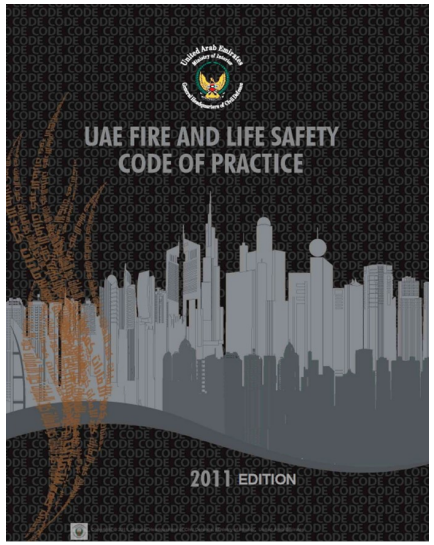
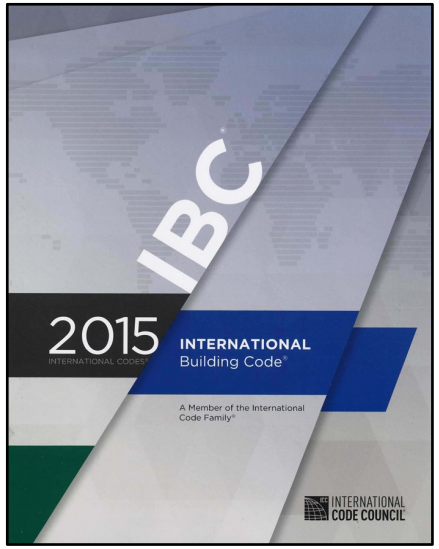
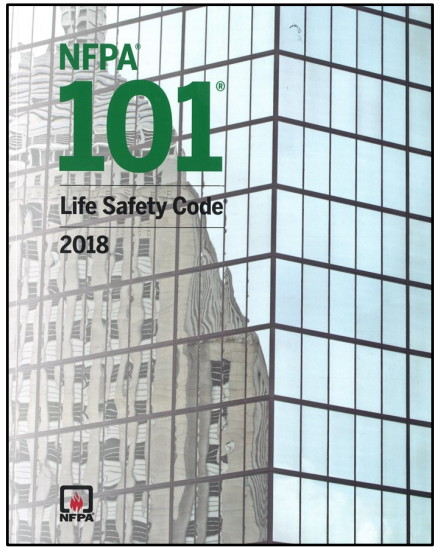
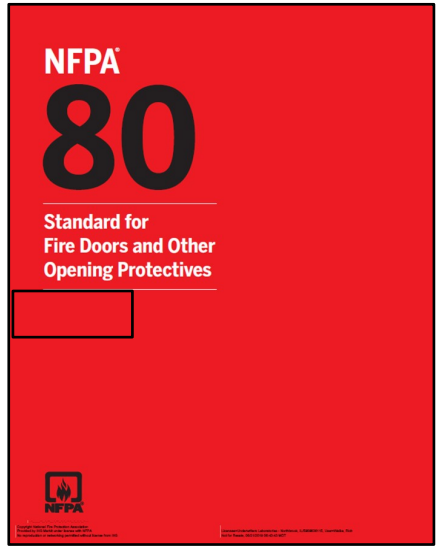
Code Requirements for Fire-Rated Glazing









Component Approach Used for Fire Door and Fire Window Assemblies

- All four documents prescribe a component approach for fire door and fire window openings
- The UAE Fire and Life Safety Code, through reference to NFPA 80, along with the IBC, NFPA 101 and NFPA 80 require fire door and fire window components to be Listed and Labeled

Component Approach Used for Fire Door and Fire Window Assemblies

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

Glazing in Fire Doors

- 2011 UAE Fire and Life Safety Code
- Table 1.10
  - Establishes requirements for rating on fire door assemblies, including glazing, based on required vertical assembly type and rating
- Section 20.7.2
  - Requires fire door assemblies, including glazing, to be installed in accordance with NFPA 80

Glazing in Fire Doors Cont.

- 2015 International Building Code
  - Section 716
    - Establishes testing, performance, installation and labeling requirements for fire door assemblies, including glazing
  - Section 716.5
    - Requires fire door assemblies, including glazing, to be installed in accordance with the IBC and NFPA 80
  - Table 716.5
    - Establishes requirements for rating on fire door assemblies, including glazing, based on required vertical assembly type and rating

Glazing in Fire Doors Cont.

- 2018 NFPA 101 Life Safety Code
  - Section 8.3.3
    - Establishes testing, performance, installation and labeling requirements for fire door assemblies, including glazing
  - Section 8.3.3.3.1
    - Requires fire door assemblies including glazing, to be installed, inspected, tested and maintained in accordance with NFPA 80
  - Table 8.3.3.2.2
    - Establishes requirements for rating on fire door assemblies, including glazing, based on required vertical assembly type and rating

Glazing in Fire Doors Cont.

- NFPA 80 Standard for Fire Doors and Other Opening Protectives
  - All encompassing document which establishes testing, performance, installation and labeling requirements for fire door assemblies, including glazing
  - Glazing shall be installed in accordance with the manufacturer's installation instructions
  - It is THE document reference by other codes

Glazing in Fire Windows

- 2011 UAE Fire and Life Safety Code
- Table 1.10
  - Establishes requirements for rating on fire window assemblies, including glazing, based on required vertical assembly type and rating
- Section 20.7.2
  - Requires fire window assemblies, including glazing, to be installed in accordance with NFPA 80

Glazing in Fire Windows Cont.

- 2015 International Building Code
  - Section 716
    - Establishes testing, performance, installation and labeling requirements for fire window assemblies, including glazing
  - Section 716.6
    - Requires fire-protection-rated glazing in fire window assemblies to comply with NFPA 80
  - Table 716.6
    - Establishes requirements for rating on fire window assemblies, including glazing, based on required vertical assembly type and rating

Glazing in Fire Windows Cont.

- 2018 NFPA 101 Life Safety Code
  - Section 8.3.3
    - Establishes testing, performance, installation and labeling requirements for fire window assemblies, including glazing
  - Section 8.3.3.5.1
    - Requires fire window assemblies including glazing, to be installed, inspected, tested and maintained in accordance with NFPA 80
  - Table 8.3.3.2.2
    - Establishes requirements for rating on fire window assemblies, including glazing, based on required vertical assembly type and rating

Table 8.3.3.2.2 Minimum Fire Ratings for Opening Protectives in Fire Resistance–Rated Assemblies and Fire-Rated Glazing Markings

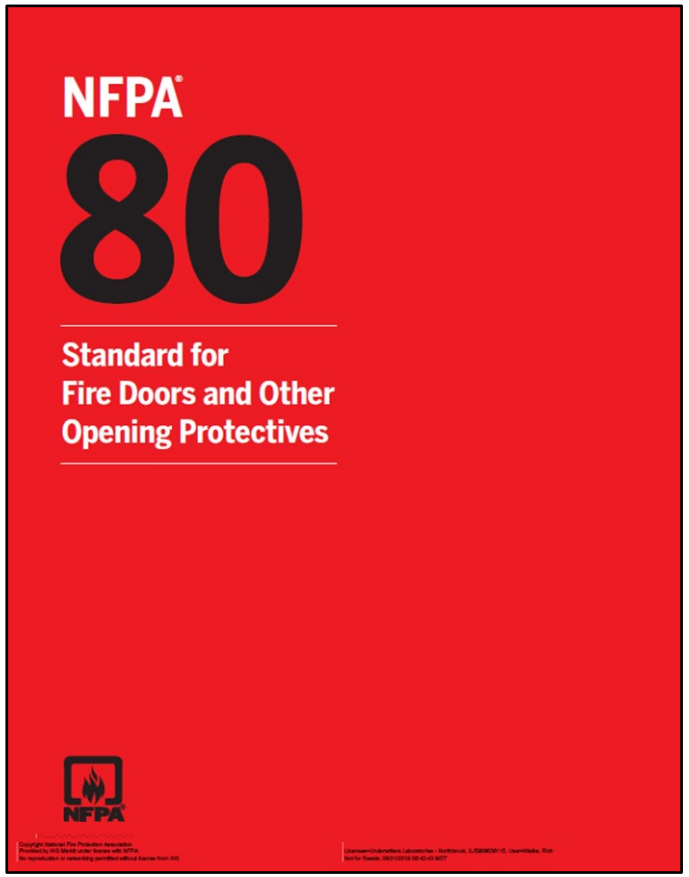
Component	Walls and Partitions (hr)	Fire Door Assemblies (hr)	Door Vision Panel Maximum Size (in.^{2})	Fire-Rated Glazing Marking Door Vision Panel	Minimum Side Light/ Transom Assembly Rating (hr)		Fire-Rated Glazing Marking Side Light/ Transom Panel		Minimum Fire-Rated Windows Rating[a,b] (hr)		Fire-Rated Window Marking	
					Fire protection	Fire resistance	Fire protection	Fire resistance	Fire protection	Fire resistance	Fire protection	Fire resistance
Elevator hoistways	2	1½	155 in.^{2}[c]	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	2	NP	W-120
	1	1	155 in.^{2}[c]	D-H-60 or D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
	½	⅓	85 in.^{2}[d]	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.^{2}[a]	≤100 in.^{2}, D-H-T-60 or D-H-W-60 >100 in.^{2}, 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	1½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	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

Glazing in Fire Windows Cont.

- NFPA 80 Standard for Fire Doors and Other Opening Protectives
  - All encompassing document which establishes testing, performance, installation and labeling requirements for fire window assemblies, including glazing
  - It is THE document reference by other codes

Installation Standard – NFPA 80

- The UAE Fire and Life Safety Code, the IBC and NFPA 101 references NFPA 80, Standard for Fire Doors and Other Opening Protectives for the installation of fire door and fire window assemblies



General – Fire Door and Fire Windows

- **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

- **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.

- **NFPA 80, Section 4.4.2 –** Glazing in fire doors must meet safety glazing criteria

Glazing in Fire Doors Cont.

- **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.

- **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 100 sq in. (0.065 sq m)
  - Glazing in temperature rise rated fire doors having a rating of 1-1/2 hrs is limited to 100 sq in. (0.065 sq m)

Glazing in Fire Doors and Fire Windows

- **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

- **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.

- **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

- **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.

- **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 1296 sq in. (0.84 sq m) with no dimension exceeding 54 in. (1.37 m) unless otherwise tested

Marking Requirements for Fire-rated Glazing

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

You Can NOT!!!

2016 NFPA 80 Marking Requirements for Glazing

- 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

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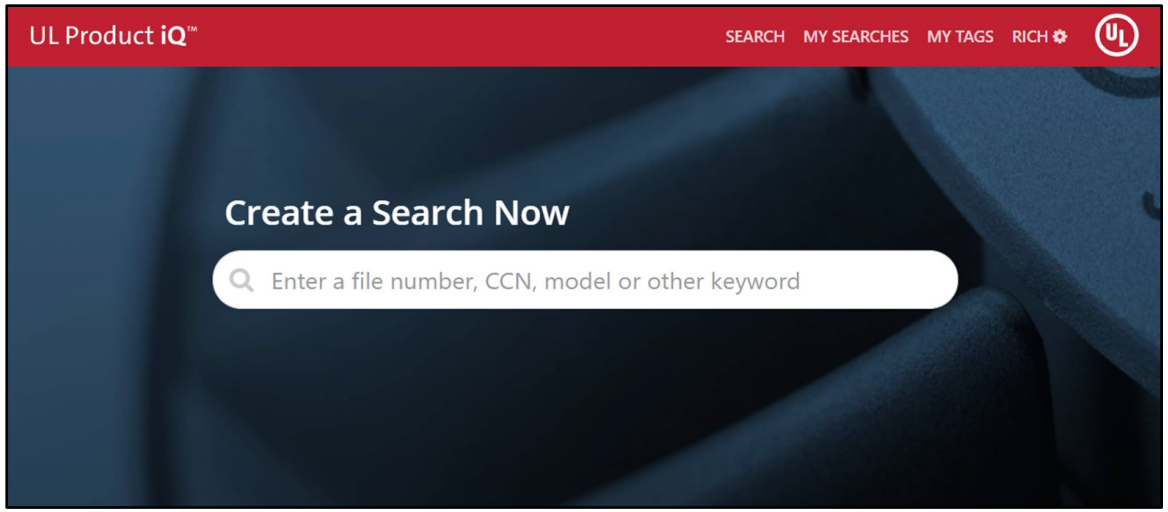
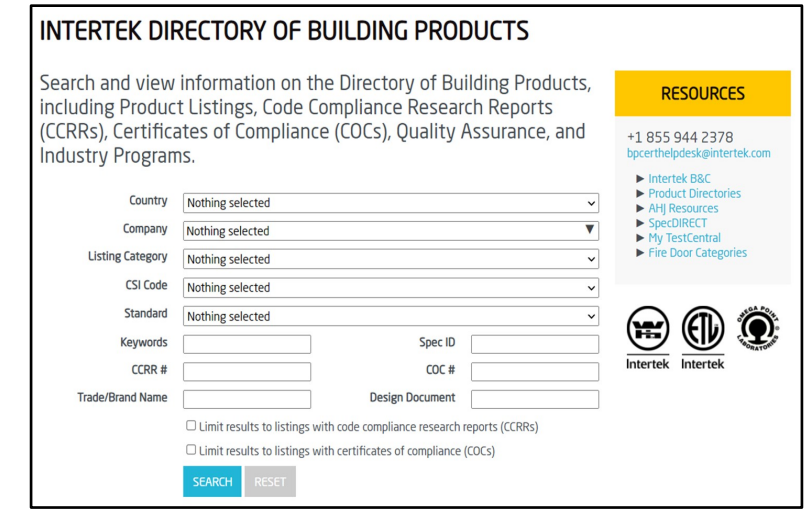
Where are Listings Found?

UL

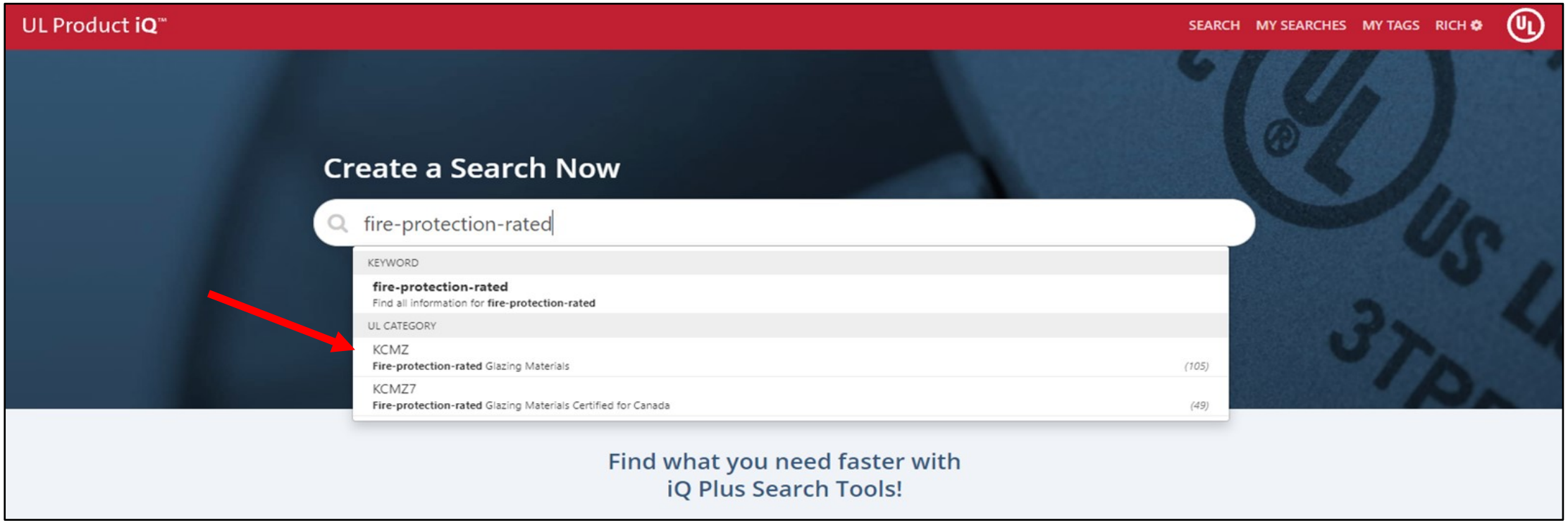


Intertek



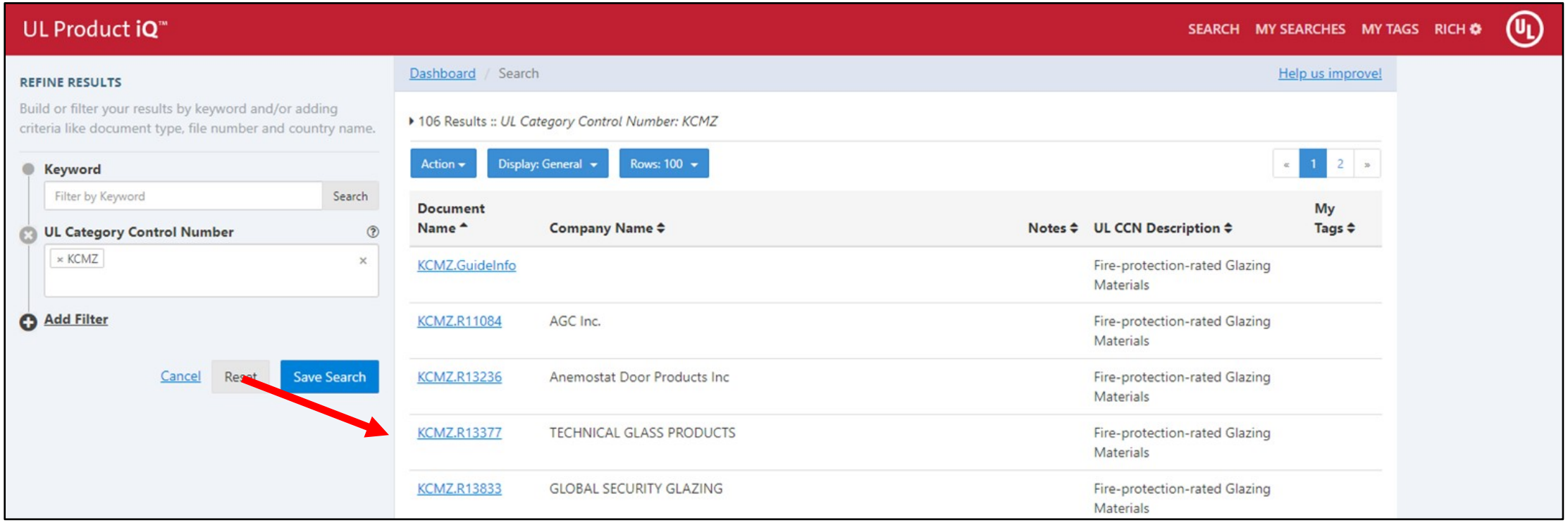
UL Product Categories

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

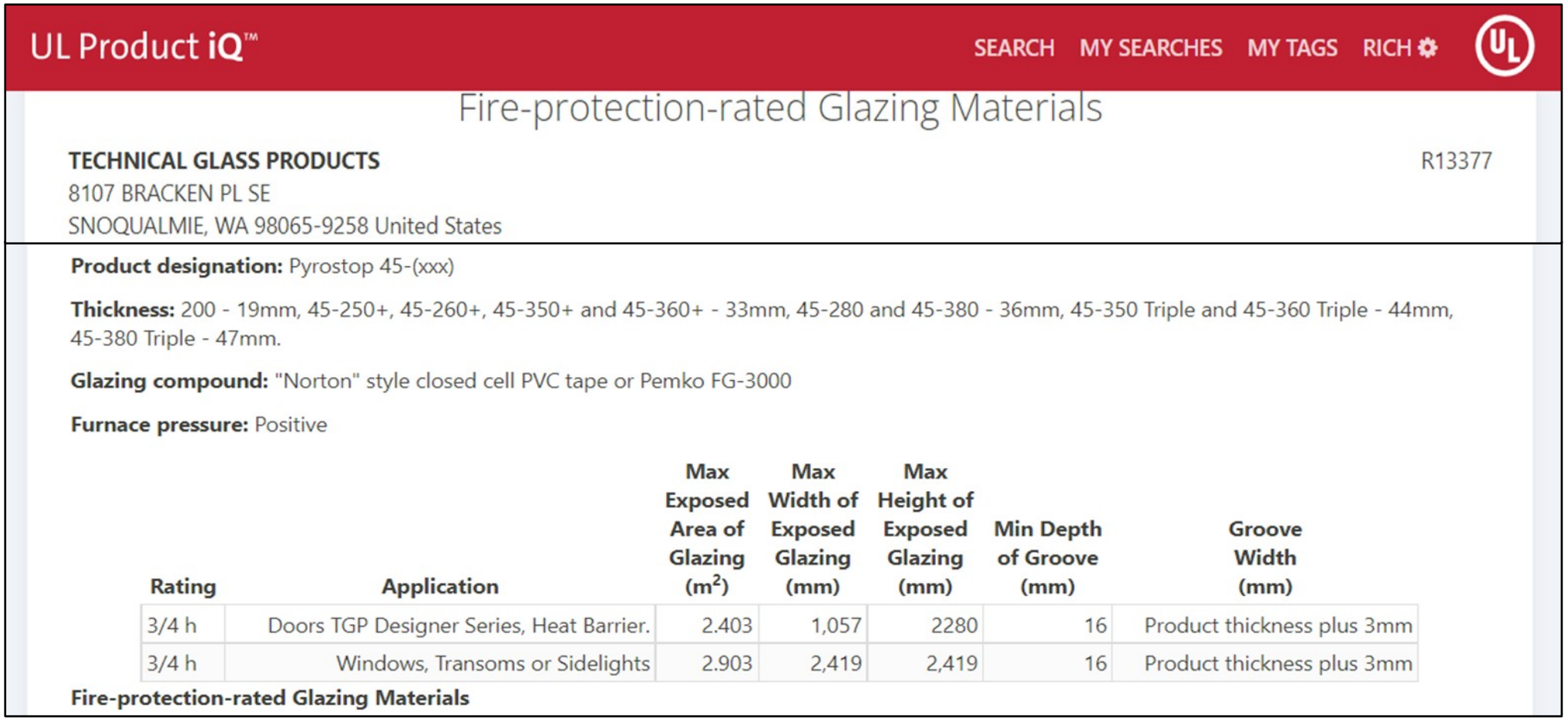


UL Listings

- Fire-protection-rated Glazing Materials (KCMZ)



UL Listings



UL Product iQ™ SEARCH MY SEARCHES MY TAGS RICH

Fire-protection-rated Glazing Materials

TECHNICAL GLASS PRODUCTS R13377
8107 BRACKEN PL SE
SNOQUALMIE, WA 98065-9258 United States

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.

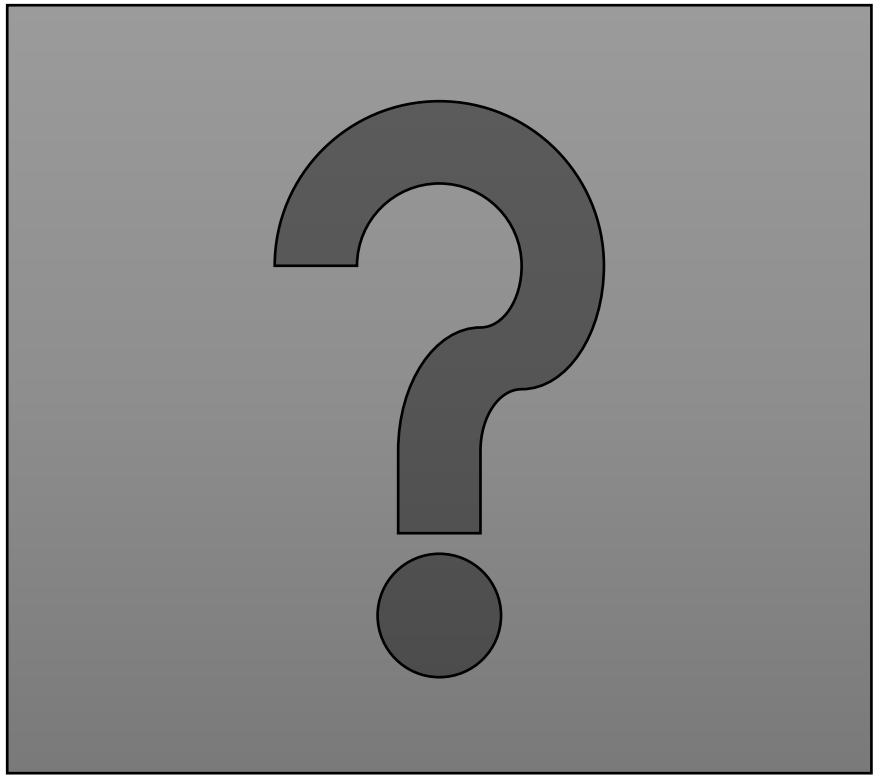
Glazing compound: "Norton" style closed cell PVC tape or Pemko FG-3000

Furnace pressure: Positive

Rating	Application	Max Exposed Area of Glazing (m^2)	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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