FCIA Webinar Series

Fire-Resistance Protection of Swinging Fire Doors

Rich Walke, CTI
Consultant to FCIA

FCIA
Firestop Contractors International Association

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June 16, 2021

FCIA – Firestop Contractors International Association

- **Fire Exits??**
- **Housekeeping….Phones, Hands off Keyboard!**
- **Thanks to FCIA Members**
  - Firestop Contractors
  - Manufacturers, Consultants
  - Firestop Distributors, Reps, Friends
- **FREE PDF MOP/ Word Doc Spec** - Specifiers @ AE, Independents, AHJ's with Jurisdictions, More

FCIA – Firestop Contractors International Association

- **FREE Life Safety Digest**

- **UL/ULC, FM 4991 Contractor Programs**
  IAS AC 291 Inspection Agency
  Accreditation Program, Individual Knowledge
- **ASTM E2174/E2393 Inspection Standards**
- **Tools** @ **FCIA.org** for Specifiers, AHJ's, Building Owners, Firestop Contractors & Inspection Agencies
- **Watch FCIA.org for Webinar Announcements!**

“TOTAL FIRE PROTECTION”

- **Effective Compartmentation**
  - Fire Barriers, Fire Walls/Floors, Smoke Barriers
  - Firestopping, Fire Dampers, Swinging and Rolling Fire Doors, Fire Rated Glazing
- **Detection & Alarm Systems**
- **Sprinkler Suppression Systems**
- **Education for Safety**
  - Building Owners & Managers, Building Occupants and Firefighters

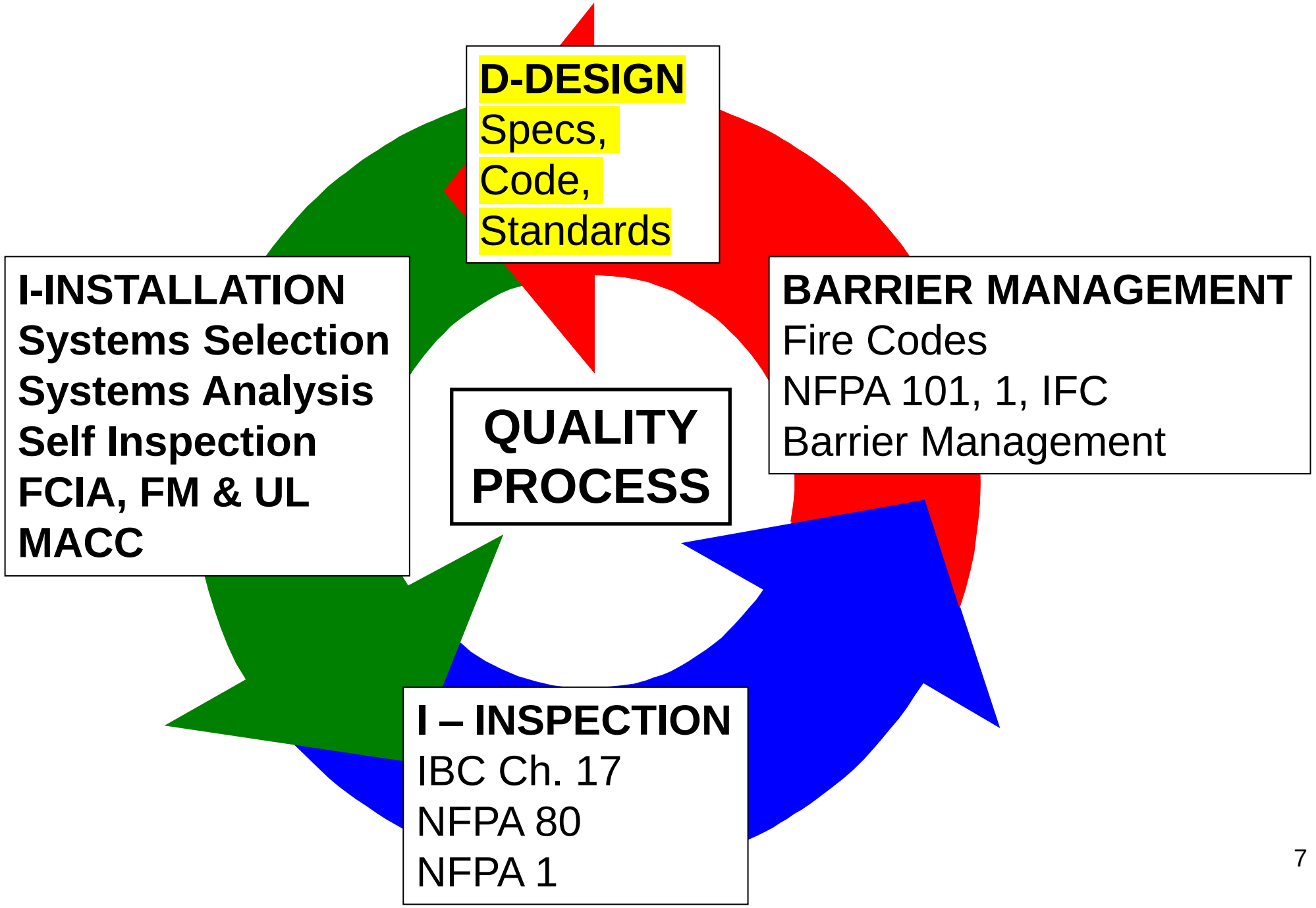
“DIIM” – Design, Install, Inspect, Maintain
“DIIM” @ FCIA since 1998….

- Fire Resistance & Smoke Resistant Firestopping
  - **Properly *Designed*** Building Codes
    - FCIA - 07-84-00 – Specification – ***CCS, RSW***
    - ***Tested and Listed Systems*** – ASTM E814, UL1479, ASTM E1966, UL 2079, ASTM E2307, E2837, E2874, E3037
    - **Movement (M), Smoke (L), Water (W)**
  - Professional ***Installation*** –
    - FCIA Member, UL/ULC Qualified Contractors, FM 4991 Approved Contractors
  - Properly ***Inspected*** –
    - ASTM E2174 / E2393, by IAS-AC291 Agency, UL/ULC, IFC, FM Exam
  - ***Protection Maintained*** – Annually – by FCIA Members

FCIA Actions - 2021

Firestop Contractors International Association

- Conferences - HYBRID
  - FCIA ECA @ Kansas City – May, 2021
  - FCIA FIC @ San Diego – Nov. 2-5
  - FCIA ECA & FIC 2022 – Watch FCIA.org!
- Webinars & Symposiums
- Code Development & Standards Discussions
- Committee Action
- International Discussions
- ***NEW Education in Firestopping!!***
  - ***FCIA's FCAEP Level 1 – Check it out!***


D-DESIGN
Specs,
Code,
Standards
I-INSTALLATION
Systems Selection
Systems Analysis
Self Inspection
FCIA, FM & UL
MACC
QUALITY
PROCESS
BARRIER MANAGEMENT
Fire Codes
NFPA 101, 1, IFC
Barrier Management
I – INSPECTION
IBC Ch. 17
NFPA 80
NFPA 1

FCIA – Firestop Contractors International Association

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FCIA
Firestop Contractors International Association

FCIA Webinar Series

Fire-Resistance Protection of Swinging Fire Doors

Rich Walke, CTI

Introduction

- Original Webinar – December 16, 2020
  - ASTM E119 / UL 263 – Baseline for other fire resistive standards
  - *Overview* of complimentary standards and ratings developed on each unique method for protecting breaches in or through hourly rated assemblies
- 2021 Series of Webinars
  - Multiple webinars which will address the *details* of the standards and ratings developed on each unique method for protecting breaches in or through hourly rated assemblies
- **Todays Webinar – Fire-Resistance Protection of Swinging Fire Doors**

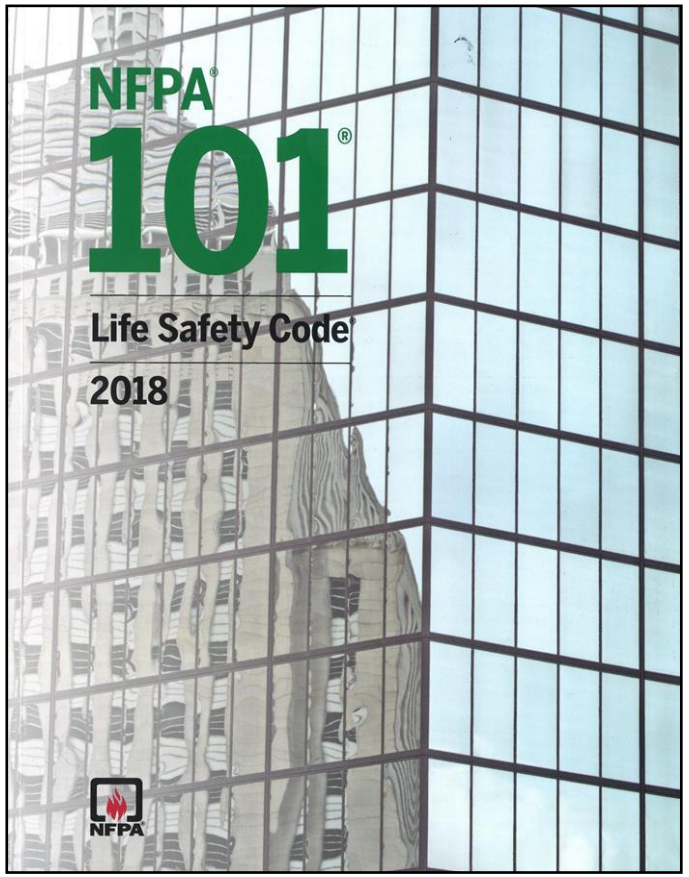
Formal Definition of Opening Protective

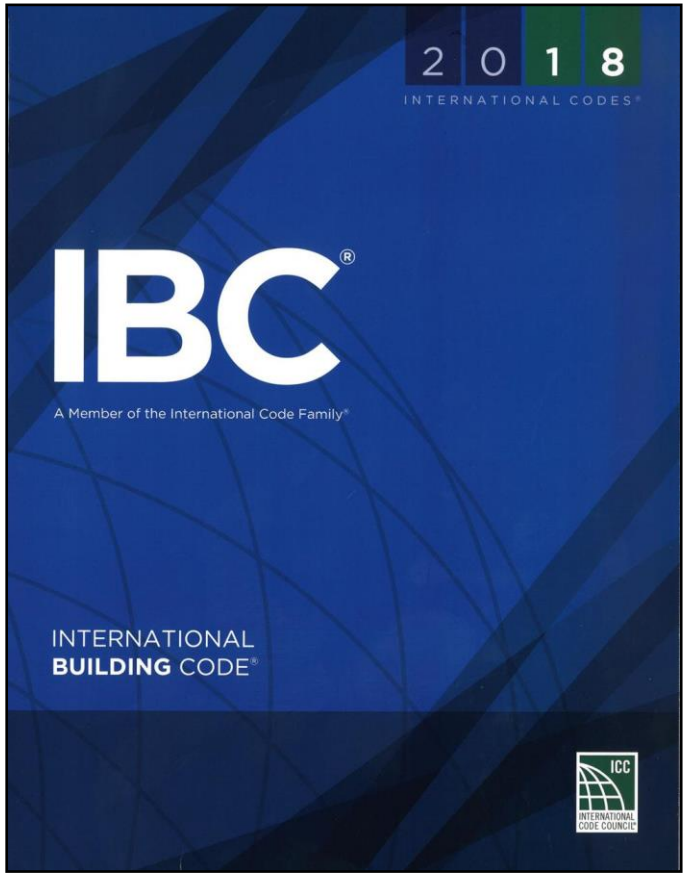
- Opening Protective – A *fire door* assembly, fire shutter assembly, *fire window assembly* or glass-block assembly in a fire-resistance-rated wall or partition. (IBC)

Opening Protectives

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

Codes


NFPA
101
Life Safety Code
2018
NFPA

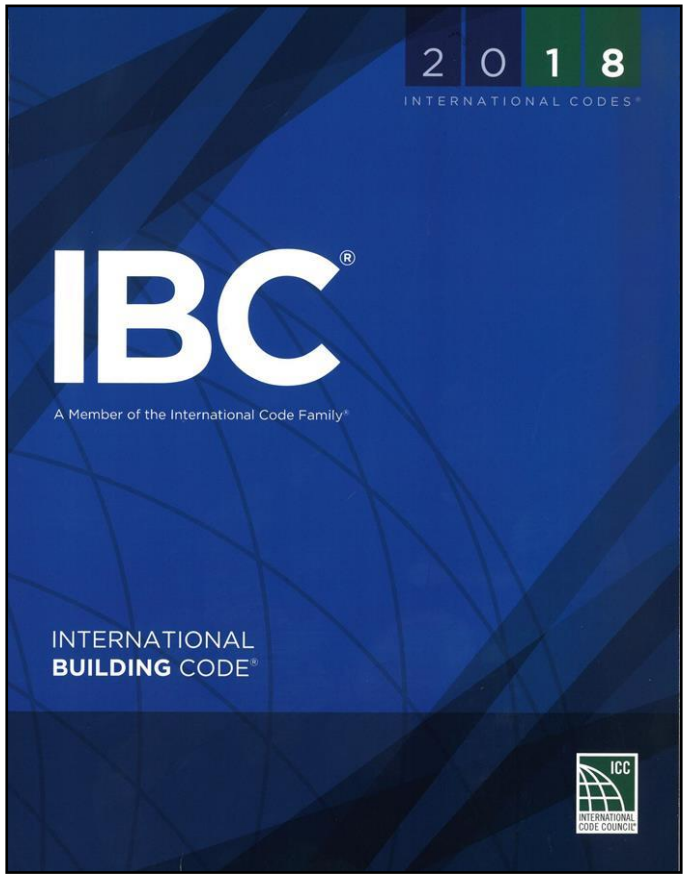

2018
INTERNATIONAL CODES
IBC
A Member of the International Code Family
INTERNATIONAL
BUILDING CODE
ICC
INTERNATIONAL CODE COUNCIL

Component Approach Used for Fire Door Assemblies

- Both documents prescribe a component approach for fire door and fire window openings
- IBC and NFPA 101 both reference NFPA 80 and 105 for details on the installation of fire and leakage rated door assemblies, respectively
- Approval of the finished opening protective relies on Listing and ratings of individual components with final approval up to the Code Official

Fire Door Assemblies

Code
Requirements



Code Requirements

- Section 716 has been substantially reorganized in the 2018 IBC
- FS101-15
- Separated requirements for fire door assemblies from requirements for fire window assemblies
- Corrected roughly six technical issues

Code Requirements Cont.

- Basic organization:
  - Section 716.1 – General
  - Section 716.2 – Fire Door Assemblies
  - Section 716.3 – Fire Window Assemblies

Code Requirements Cont.

- Section 716 of the 2018 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

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

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[b]	FIRE-RATED GLAZING MARKING DOOR VISION PANEL[c, e]	MINIMUM SIDELIGHT/ TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDELIGHT/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 b	D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3[a]	See Note b	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
Enclosures for shafts, interior exit stairways and interior exit ramps.	2	1 1/2	100 sq. in.[c]	≤ 100 sq. in. = D-H-90 > 100 sq. in.= D-H-T-W-90	Not Permitted	2	Not Permitted	W-120
Horizontal exits in fire walls[d]	4	3	100 sq. in.	≤ 100 sq. in. = D-H-180 > 100 sq. in.= D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3[a]	100 sq. in.	≤ 100 sq. in. = D-H-180 > 100 sq. in.= D-H-W-180	Not Permitted	3	Not Permitted	W-180
Fire barriers having a required fire-resistance rating of 1 hour: Enclosures for shafts, exit access stairways, exit access ramps, interior exit stairways and interior exit ramps; and exit passageway walls	1	1	100 sq. in.	≤ 100 sq. in. = D-H-60 >100 sq. in.= D-H-T-W-60	Not Permitted	1	Not Permitted	W-60

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 enclosures, ramps and exit passageways shall have maximum transmitted temperature end point of not more than 450ºF for 30 minutes

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 enclosures, 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 450ºF for 30 minutes is permitted up to area tested.

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

Fire Door Assemblies

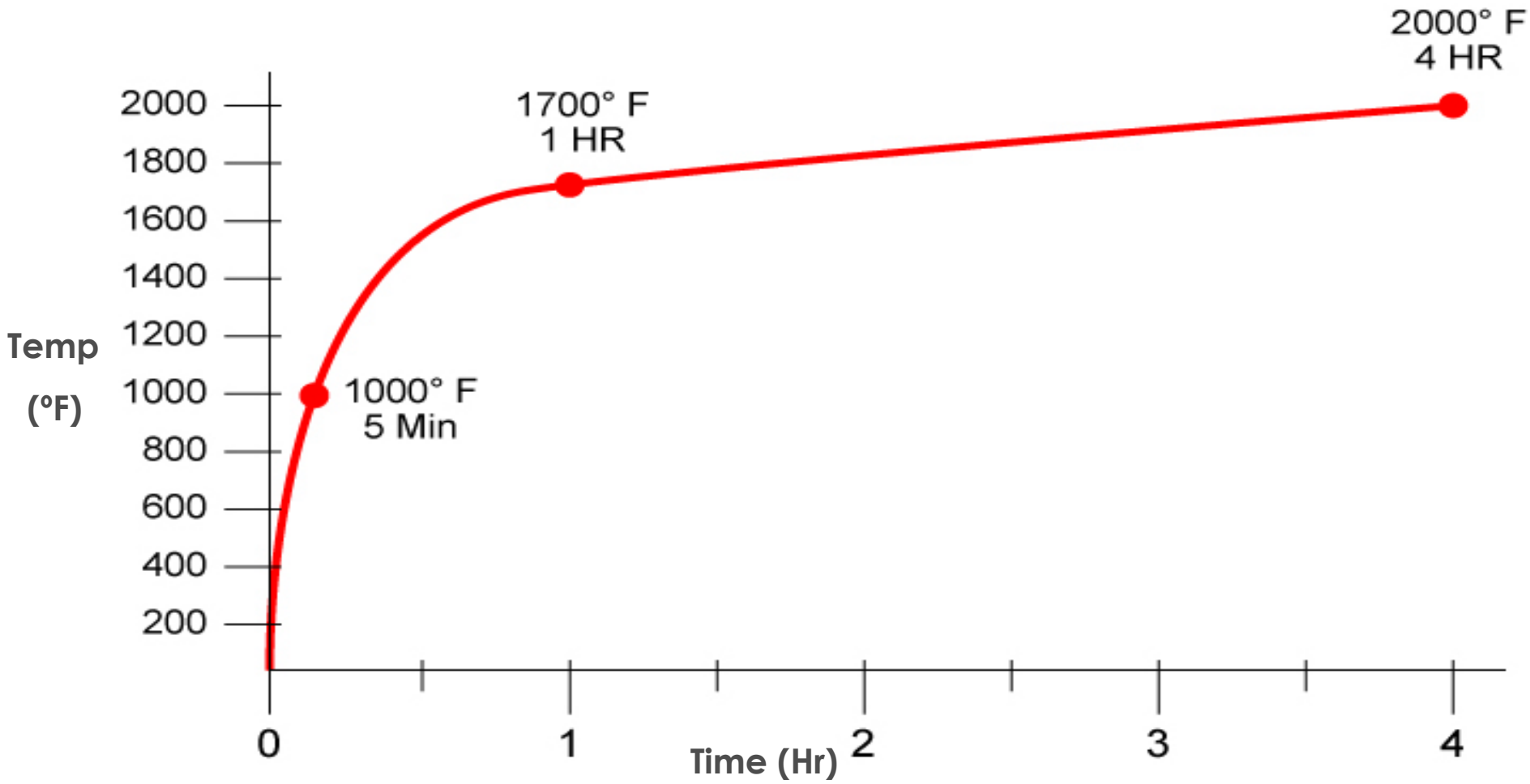
Fire Testing of
Door Assemblies

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)

Fire Door Assembly
Ready for Testing

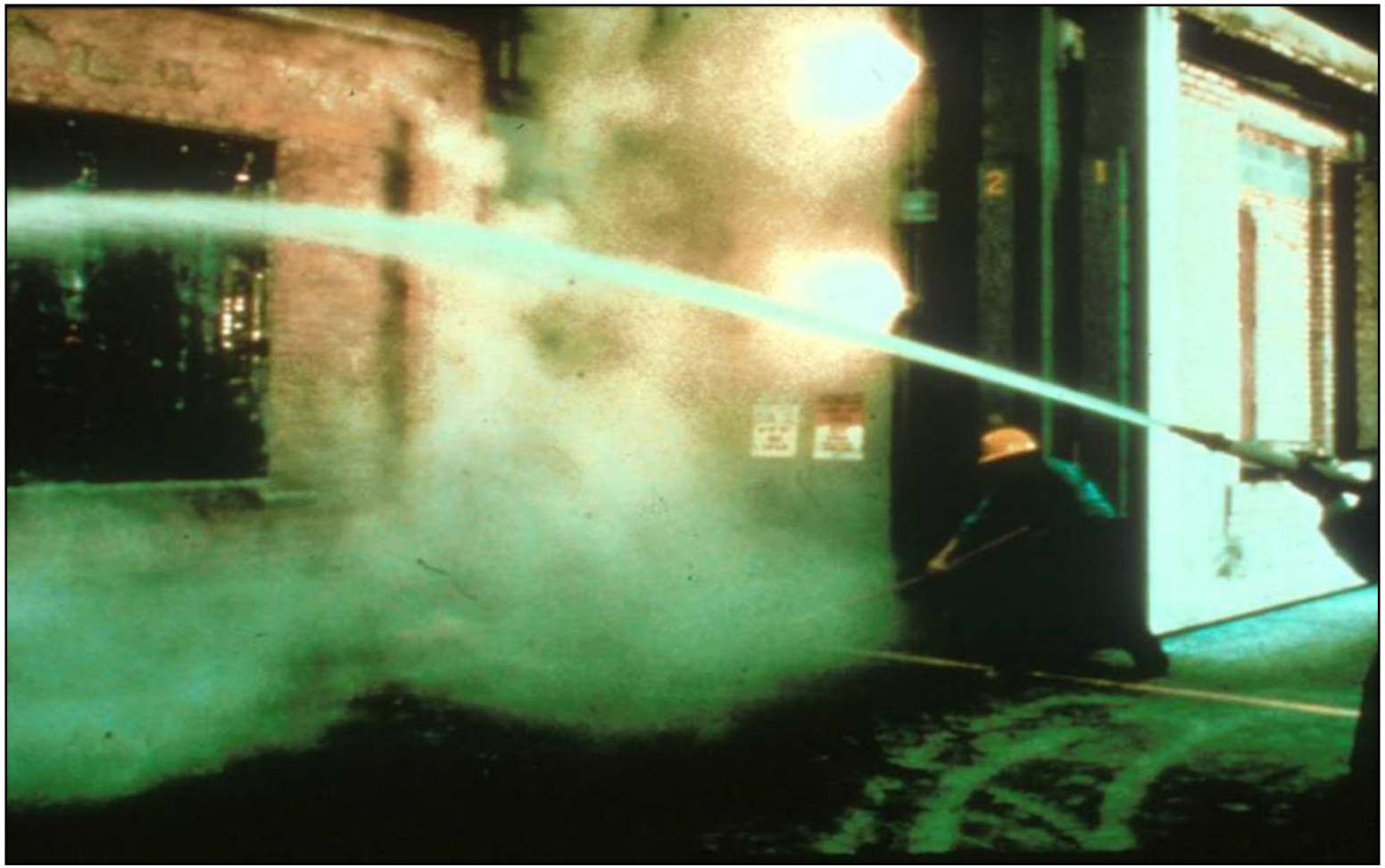
Time - Temperature Curve



Fire Door / Window Assembly Under Test

Fire Door Assemblies Under Test

Hose Stream Test



Conditions of Acceptance
Fire Door Assemblies

- Flame Passage
- Hose Stream After Full Duration Fire Exposure

UL

Warrington

Fire Door Assemblies

Fire
Doors

Types of Fire Doors

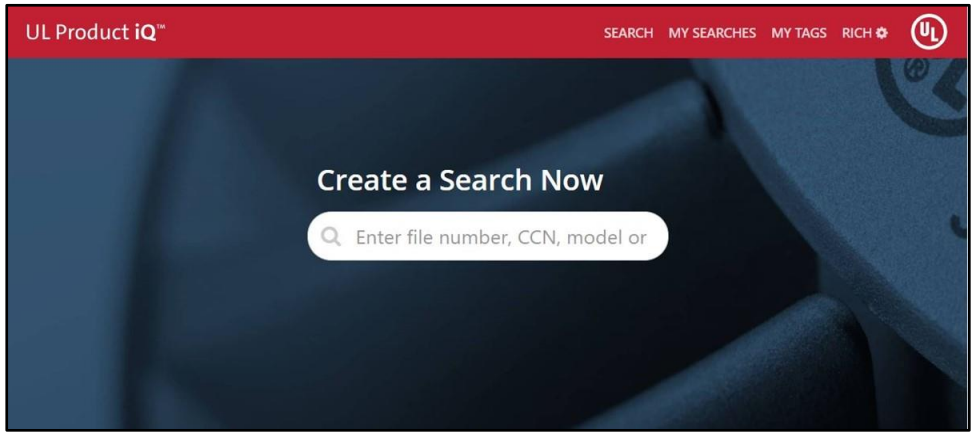
- Swinging Type Fire Doors – Typically of wood, wood composite, hollow metal and steel composite constructions
- Specialty Doors – Typically passenger elevator doors, freight elevator doors, chute doors, rolling steel or curtain type fire doors

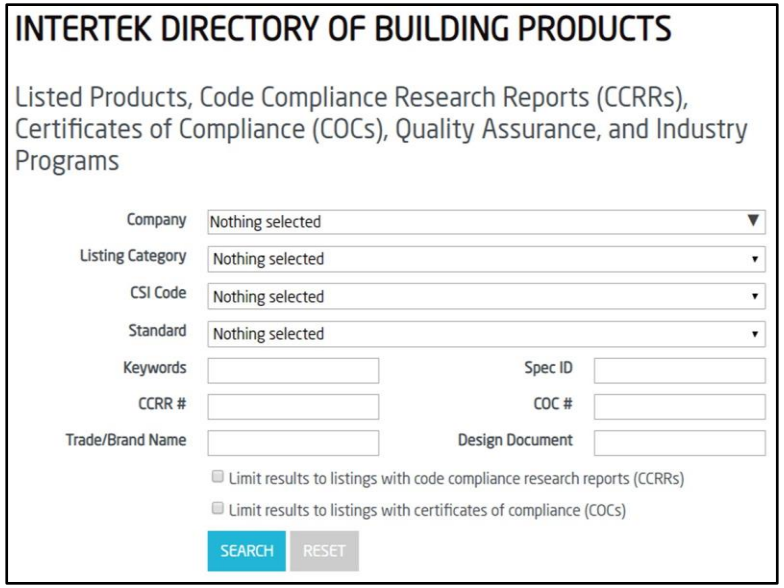
Hollow Metal Doors with Fire Exit Hardware

Wood Composite Fire Doors

Where Can I Find The Most Current Listings?

UL Product iQ





Fire Door Assemblies

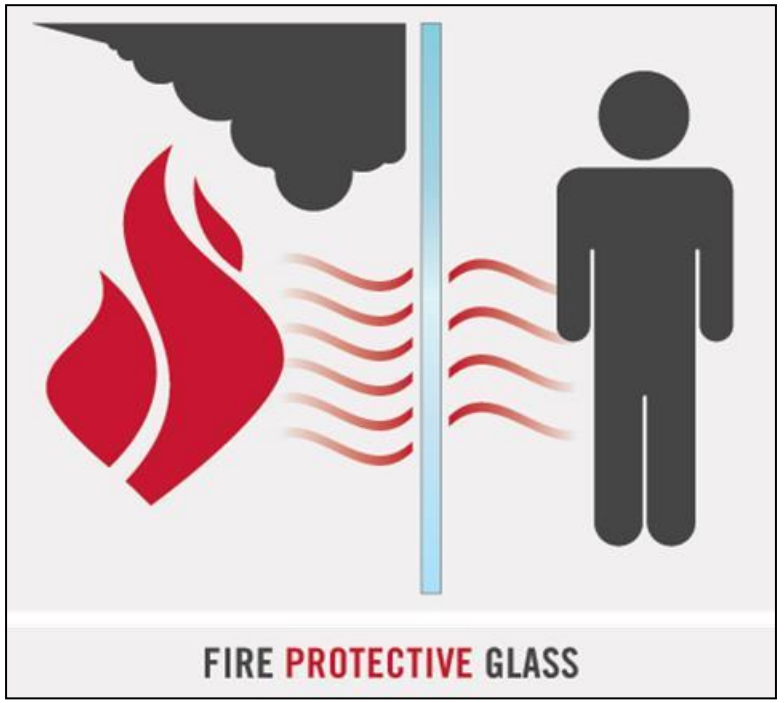
Glazing in Fire Door and Fire Window Assemblies

Types of Glazing

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

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 requirement



TGP Image

Standards
Fire-Protection-Rated Glazing

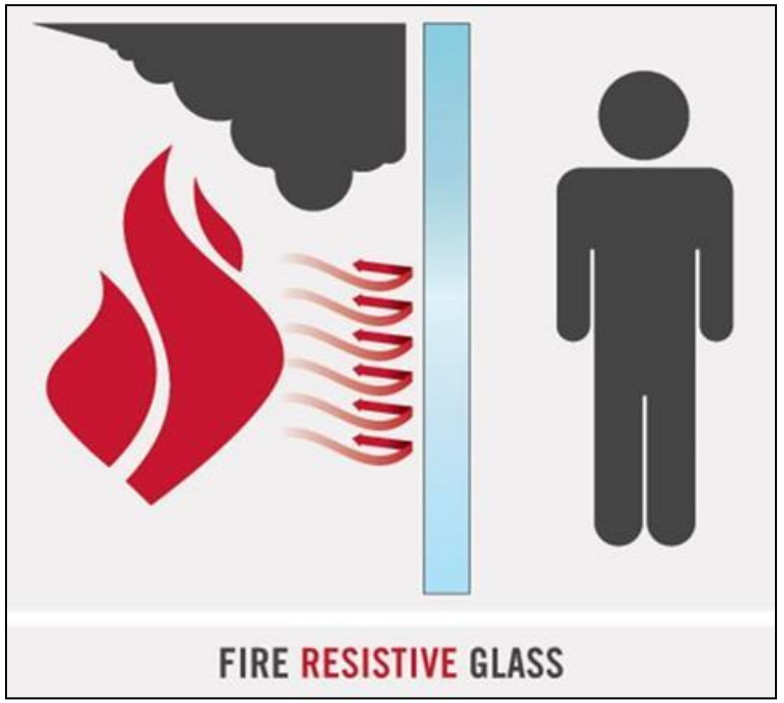
- When Used in Fire Door Assemblies
  - UL 10B
  - UL 10C
  - NFPA 252
- Fire Window Assemblies
  - UL 9
  - NFPA 257

Conditions of Acceptance
Fire-Protection-Rated Glazing

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

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

Standards
Fire-Resistance-Rated Glazing

- UL 263
- ASTM E119

Conditions of Acceptance
Fire-Resistance-Rated Glazing

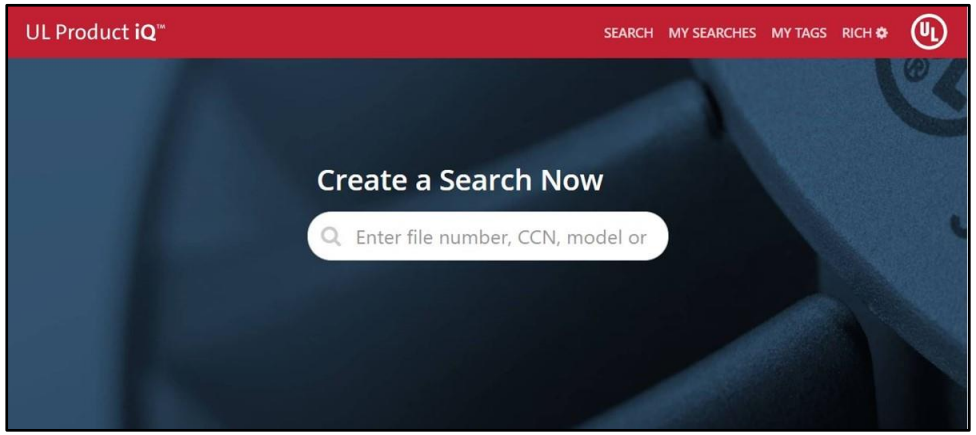
- Flame Passage
- 250ºF / 325ºF Temperature Rise
- Hose Stream on Duplicate Test Sample Exposed to Fire for Reduced Time Frame

What Type of Glazing is Required?

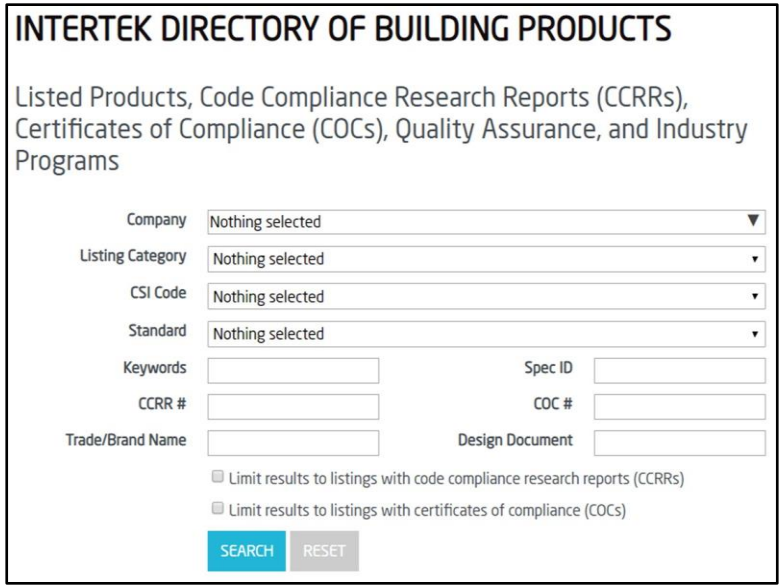
- The type of glazing required for each of these applications is based on the following:
  - Type of barrier
  - Rating of barrier
  - Application of the glazing panel
  - Size of glazing panel
- The type of glazing required is found in the International Building Code and the Life Safety Code

Where Can I Find The Most Current Listings?

UL Product iQ



UL Category Code: KCMZ and CCET



Fire Door Assemblies

Leakage Rated
Door Assemblies

Leakage Rated Door Assemblies

- Required for rated corridor walls and smoke barriers
- Tested to UL 1784
- Tested as complete package of components necessary to obtain rating
- Maximum 3 cfm per sq ft door area at 0.1 in. WC at ambient and 400ºF

Components of a Leakage Rated Door Assembly

- Swinging Fire Door, Positive Pressure
  - Label on swinging fire doors complying with leakage rating bear the statement “Smoke and Draft Control Door” or the letter “S”
- Fire Door Frame
  - Any Listed welded or knock down style frame
  - No special leakage marking required

Components of a Leakage Rated Door Assembly Cont.

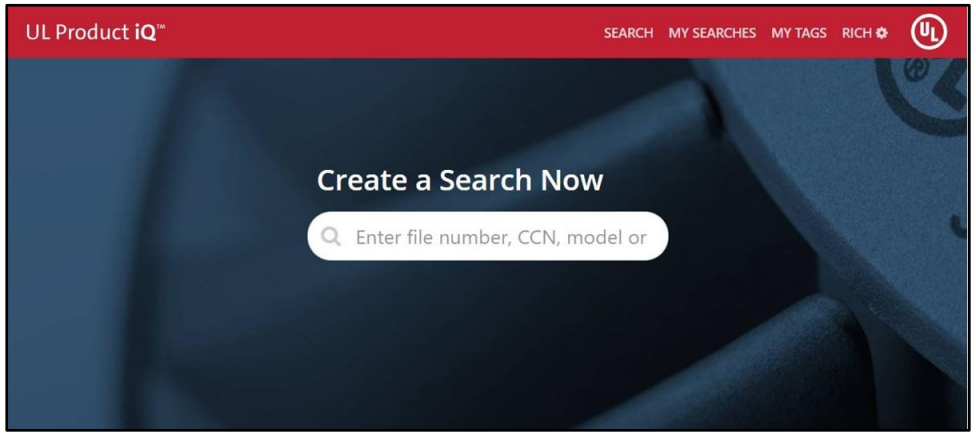
- Category H Gaskets
  - Labeled Category H gasket for use with positive pressure fire doors

OR

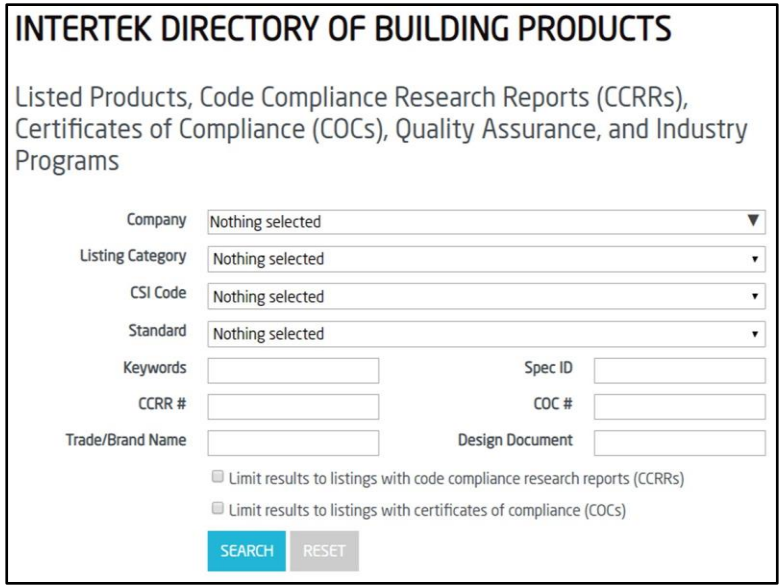
- Use a listed “Leakage-Rated Door Assemblies” (OPBW)

Where Can I Find The Most Current Listings?

UL Product iQ

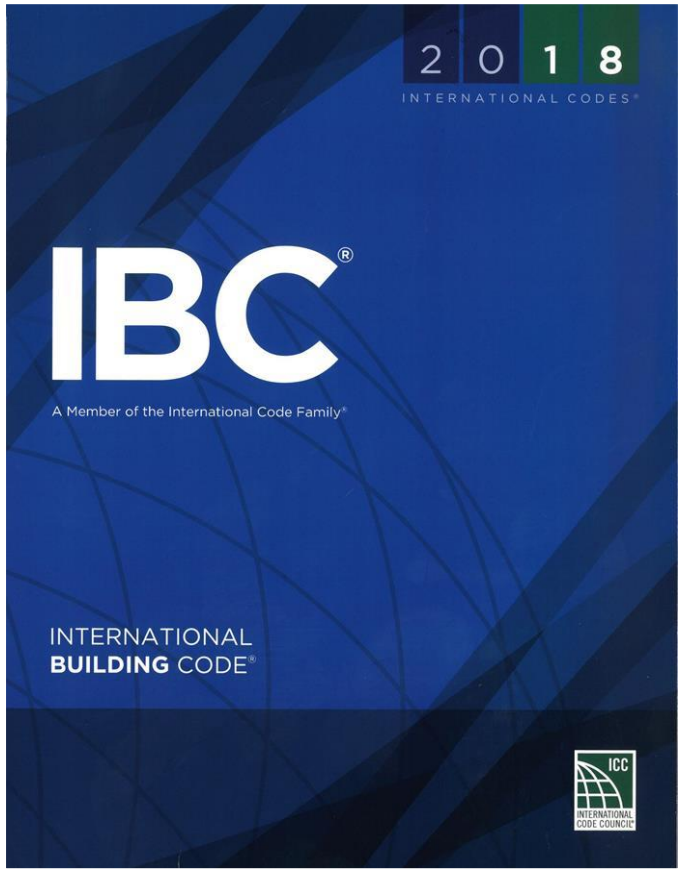


UL Category Code: GVYI and OPBW



Opening Protectives

IBC Marking
Requirements for Glazing



2018 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[a]
NFPA 257 or UL 9	OH	Meets fire window assembly criteria including the hose stream test.
NFPA 252 or UL 10B or UL 10C	D H T	Meets fire door assembly criteria. Meets fire door assembly hose stream test. 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.
a. See Section 2409.1

2018 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 has been subjected to hose stream test
  - T indicates the glazing meets 450ºF temperature rise for 30 minutes
  - XXX indicates fire-protection rating in minutes

2018 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 has been subjected to hose stream test
  - T indicates the glazing meets 450ºF temperature rise
  - W indicates the glazing meets the wall assembly criteria
  - XXX indicates fire-protection rating in minutes

2018 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

2018 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 716.1(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[b]	FIRE-RATED GLAZING MARKING DOOR VISION PANEL[c, e]	MINIMUM SIDELIGHT/ TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDELIGHT/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 b	D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3[a]	See Note b	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
Enclosures for shafts, interior exit stairways and interior exit ramps.	2	1 1/2	100 sq. in.[c]	≤ 100 sq. in. = D-H-90 > 100 sq. in.= D-H-T-W-90	Not Permitted	2	Not Permitted	W-120
Horizontal exits in fire walls[d]	4	3	100 sq. in.	≤ 100 sq. in. = D-H-180 > 100 sq. in.= D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3[a]	100 sq. in.	≤ 100 sq. in. = D-H-180 > 100 sq. in.= D-H-W-180	Not Permitted	3	Not Permitted	W-180
Fire barriers having a required fire-resistance rating of 1 hour: Enclosures for shafts, exit access stairways, exit access ramps, interior exit stairways and interior exit ramps; and exit passageway walls	1	1	100 sq. in.	≤ 100 sq. in. = D-H-60 >100 sq. in.= D-H-T-W-60	Not Permitted	1	Not Permitted	W-60

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

- 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”

NFPA 80 Requirements – Care and Maintenance

- **5.1.1.2** The requirements of this chapter shall apply to new and existing installations.
- **5.1.3 Replacement** When replaced, fire doors, shutters windows and component parts shall be replaced with components which meet the rating required for new installations.

NFPA 80 Requirements – Care and Maintenance Cont.

- **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.

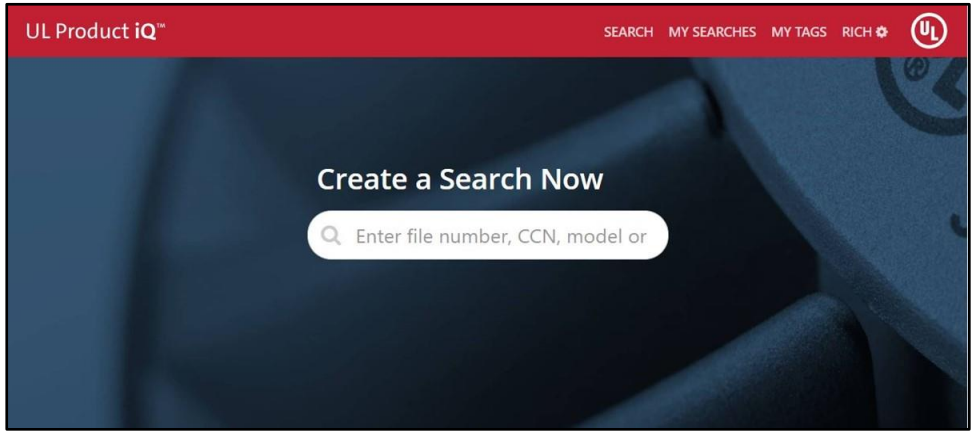
NFPA 80 Requirements – Care and Maintenance Cont.

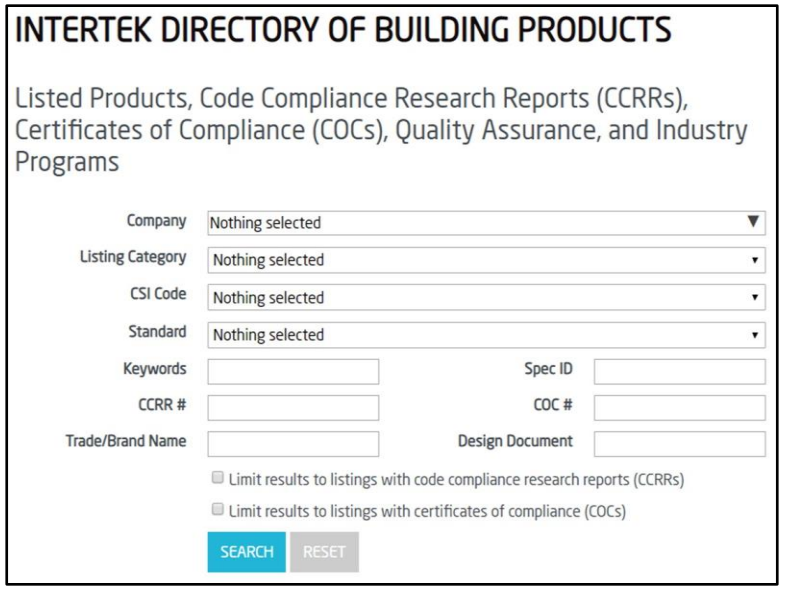
- **5.5 Maintenance**
  - **5.5.1*** Repairs shall be made, and defects that could interfere with operation shall be corrected without delay.
  - **5.5.2** Damaged glazing material shall be replaced with labeled glazing.
  - **5.5.3** Replacement glazing materials shall be installed in accordance with their individual listing.

Opening Protectives

Accessing Certifications

UL Product iQ





Intertek Directory of Building Products

UL Product Categories for Fire Doors and Windows

- 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)

UL Product Categories for Fire Doors and Windows Cont.

- Most fire door categories begin with the letter “G”, glazing categories begin with the letter “K”
- Each product category includes Guide Information and the individual manufacturer’s listings
- Each manufacturer’s listings describe Model No. and details of listing

Navigating the UL Online Directory

UL Product iQ

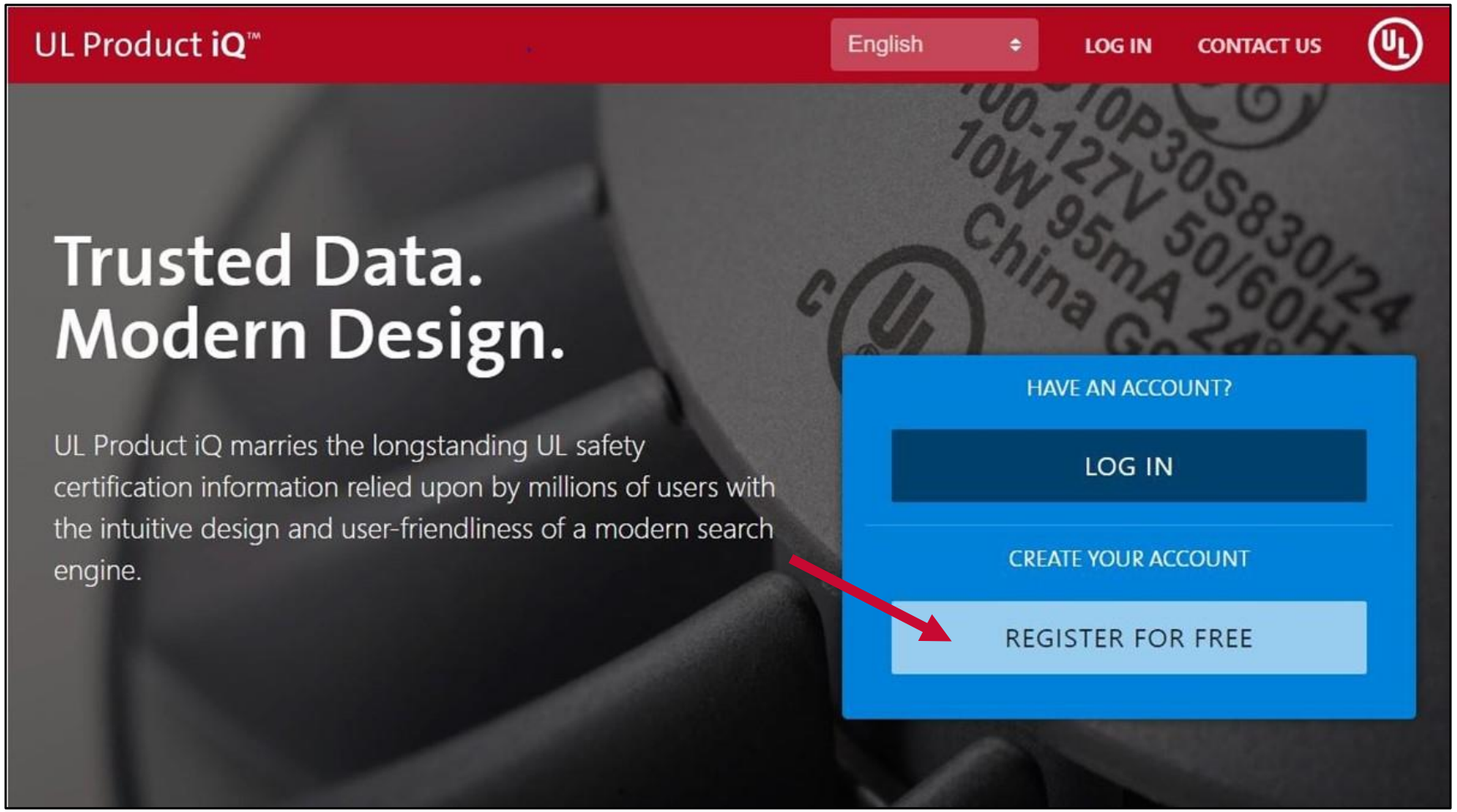
Product iQ – UL's New Online Directory

- 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

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
  - www.UL.com/ProductiQ
  - www.UL.com/PiQ

UL Product iQ Cont.



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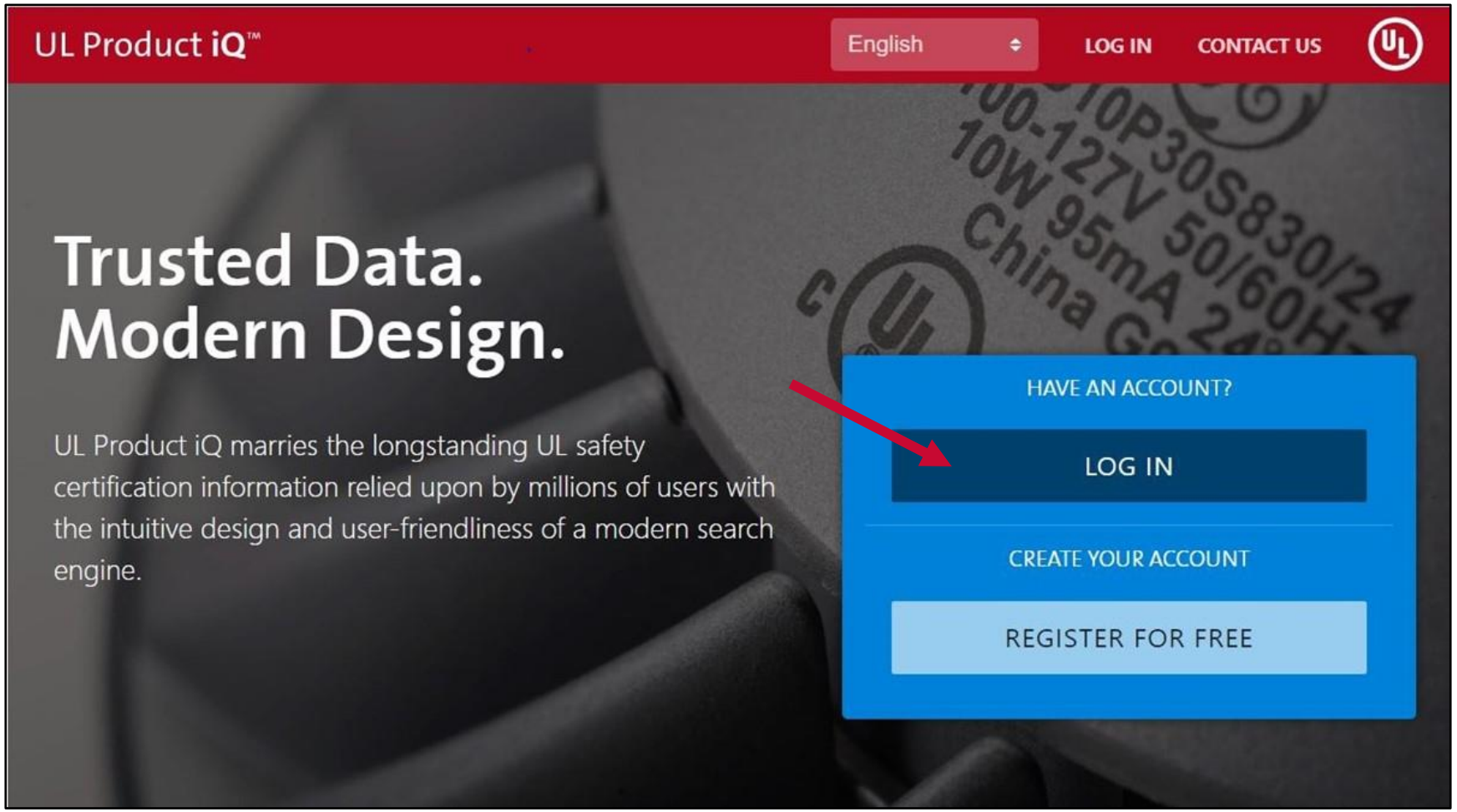

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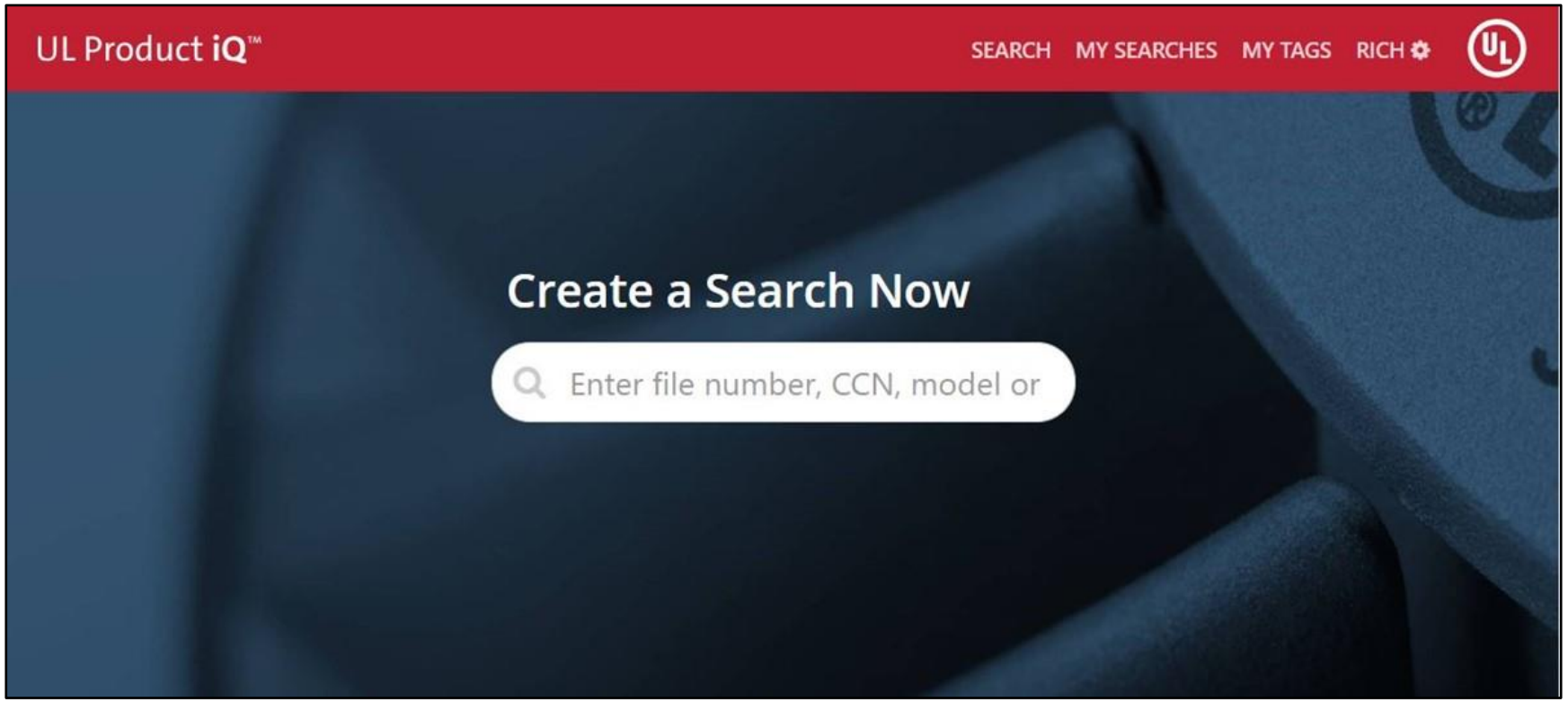
Smart Search



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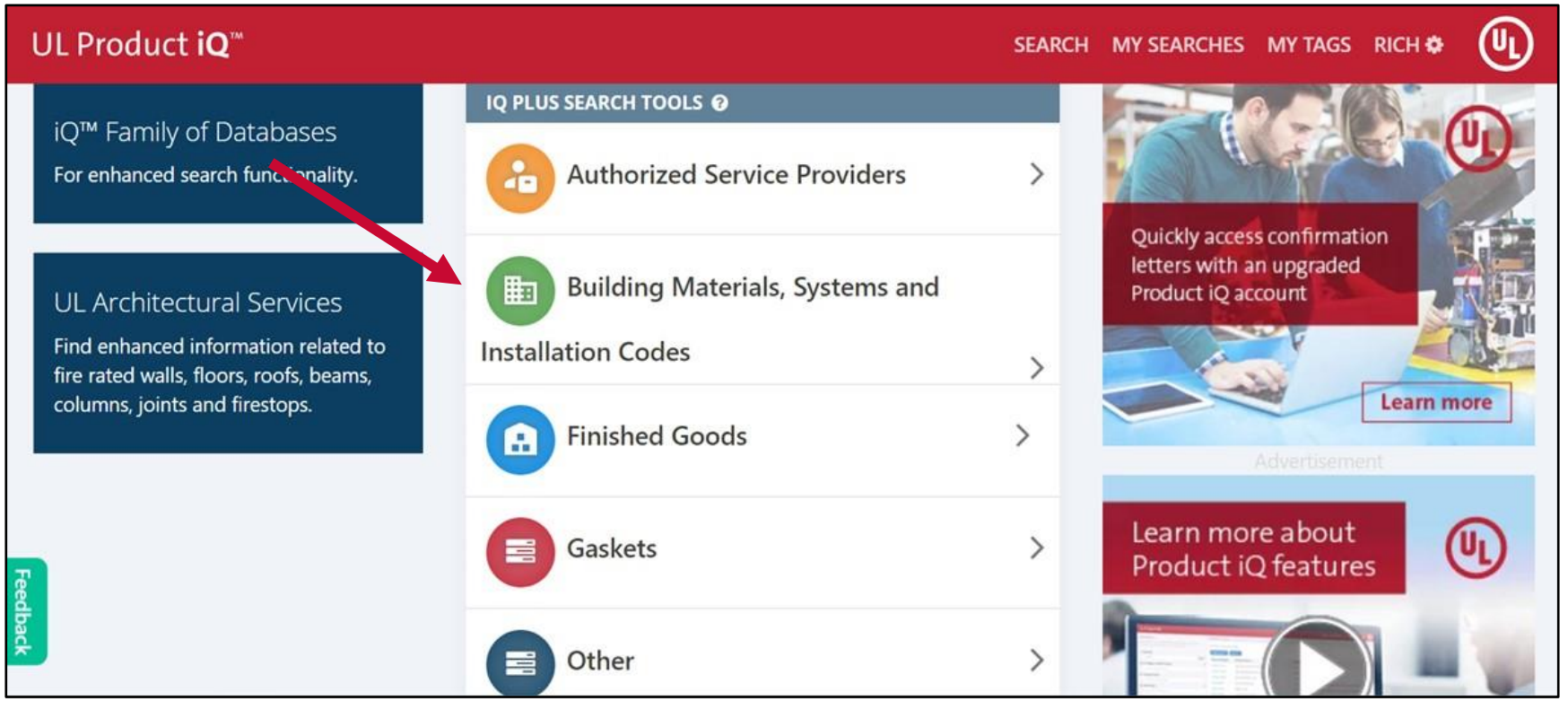

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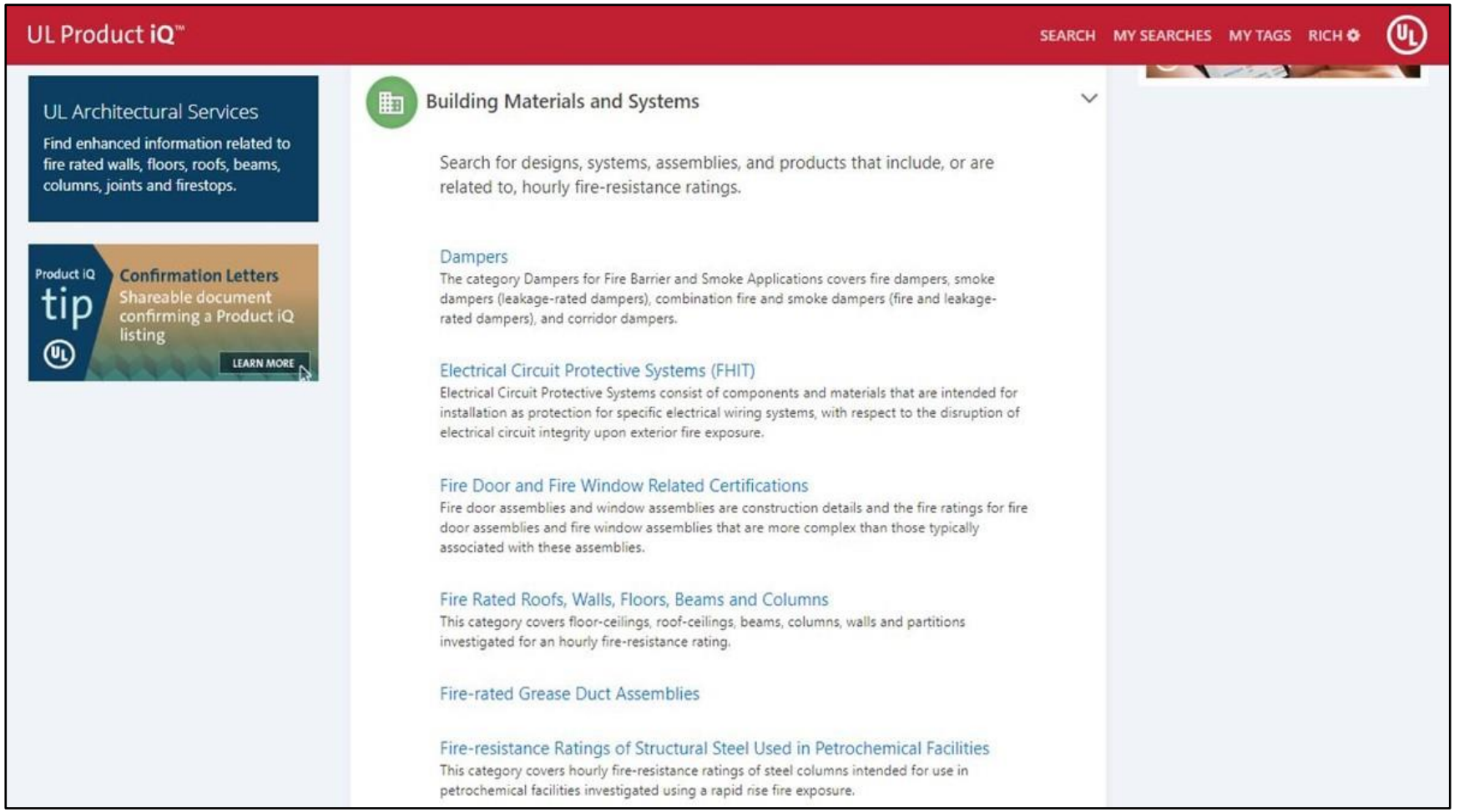

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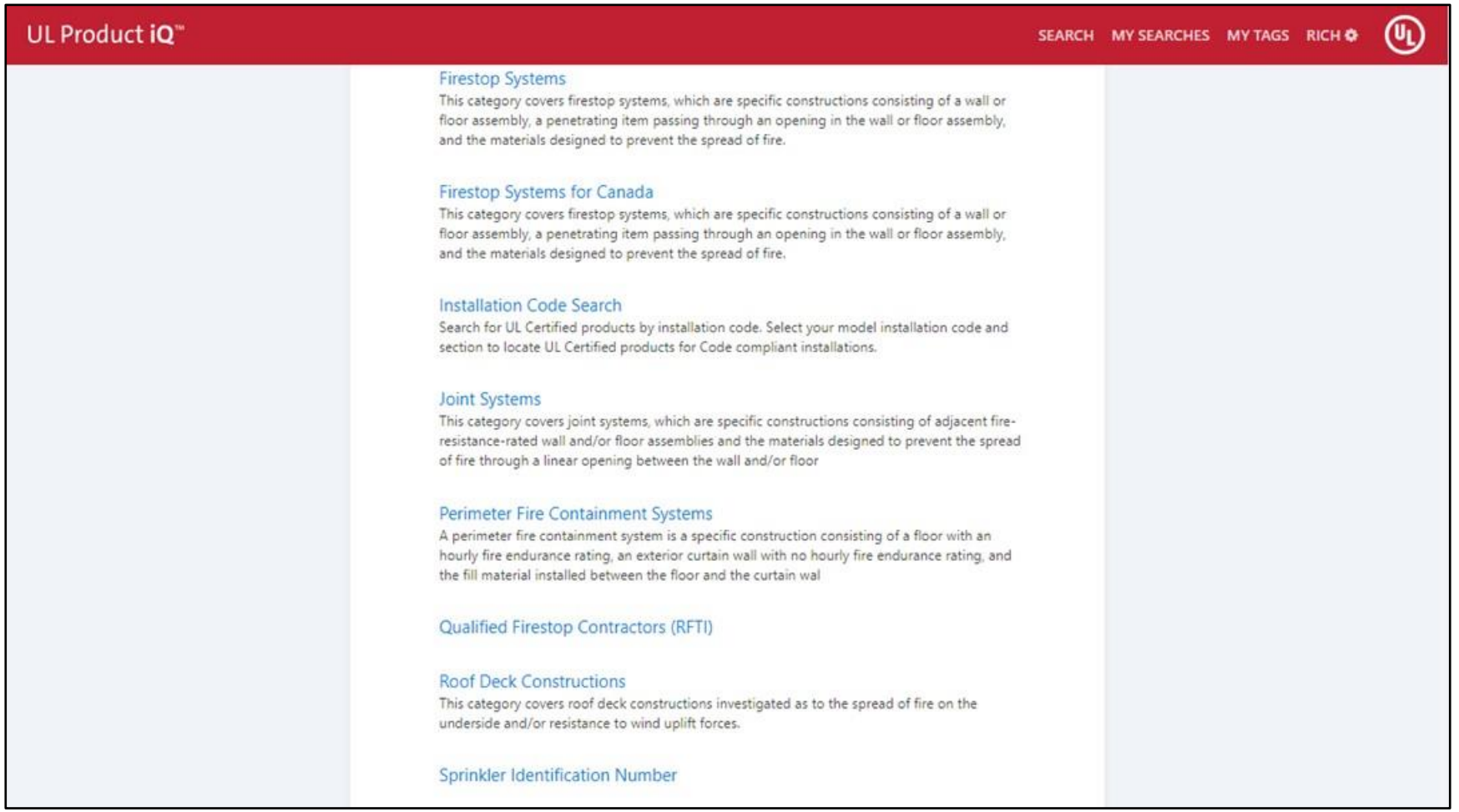

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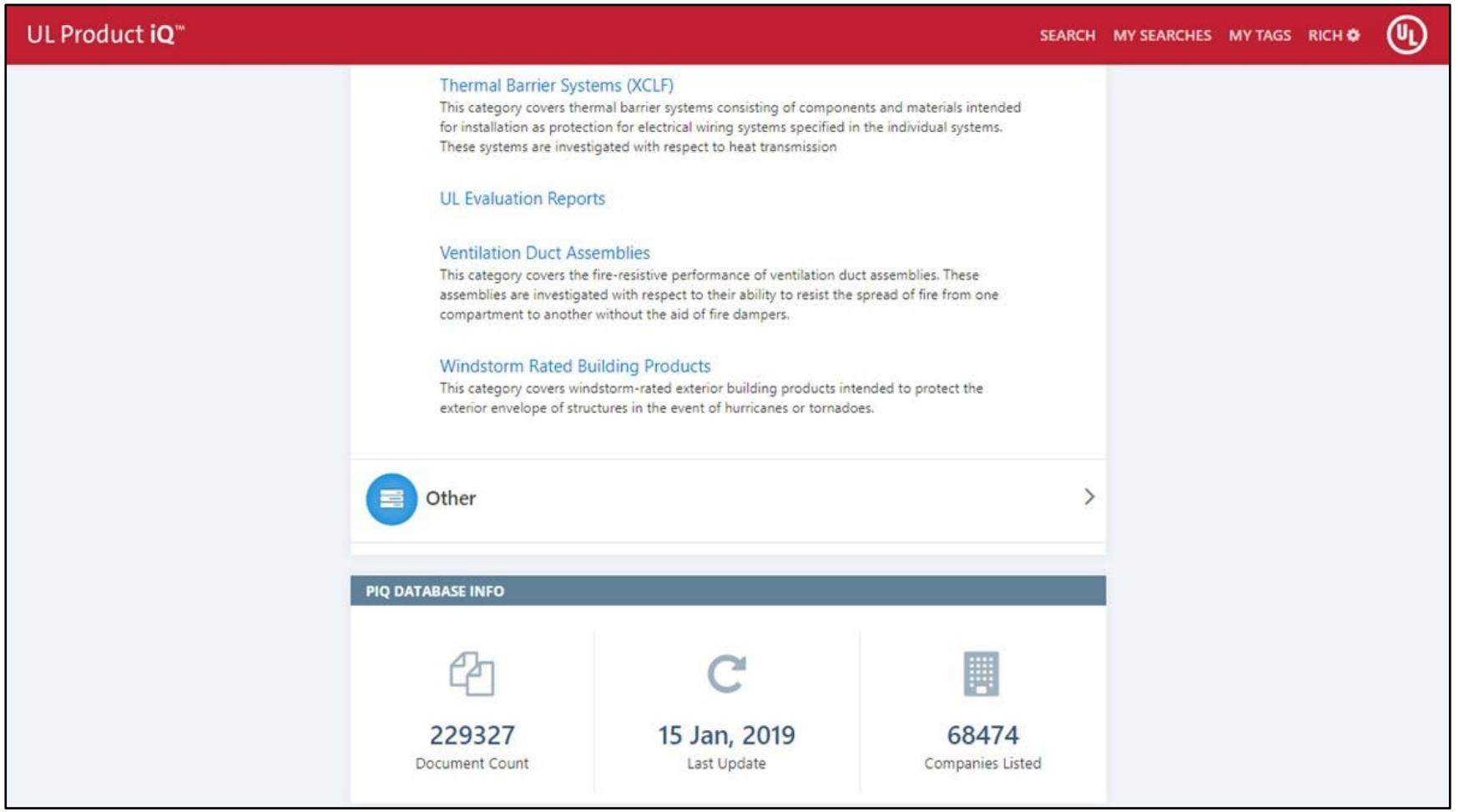
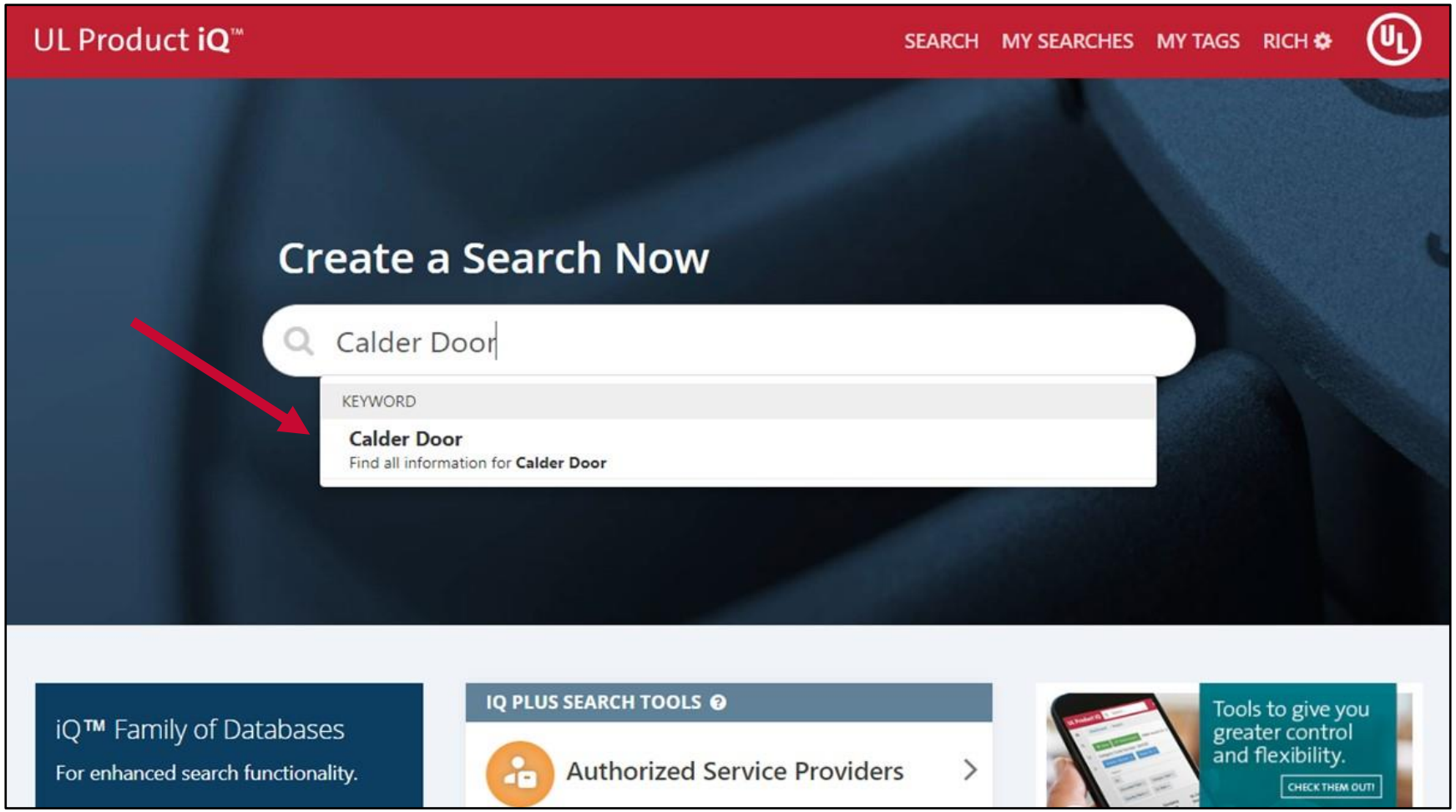


UL Product iQ Cont.

Smart Search for a swinging fire door manufactured by Calder Door

UL Product iQ Cont.
Smart Search



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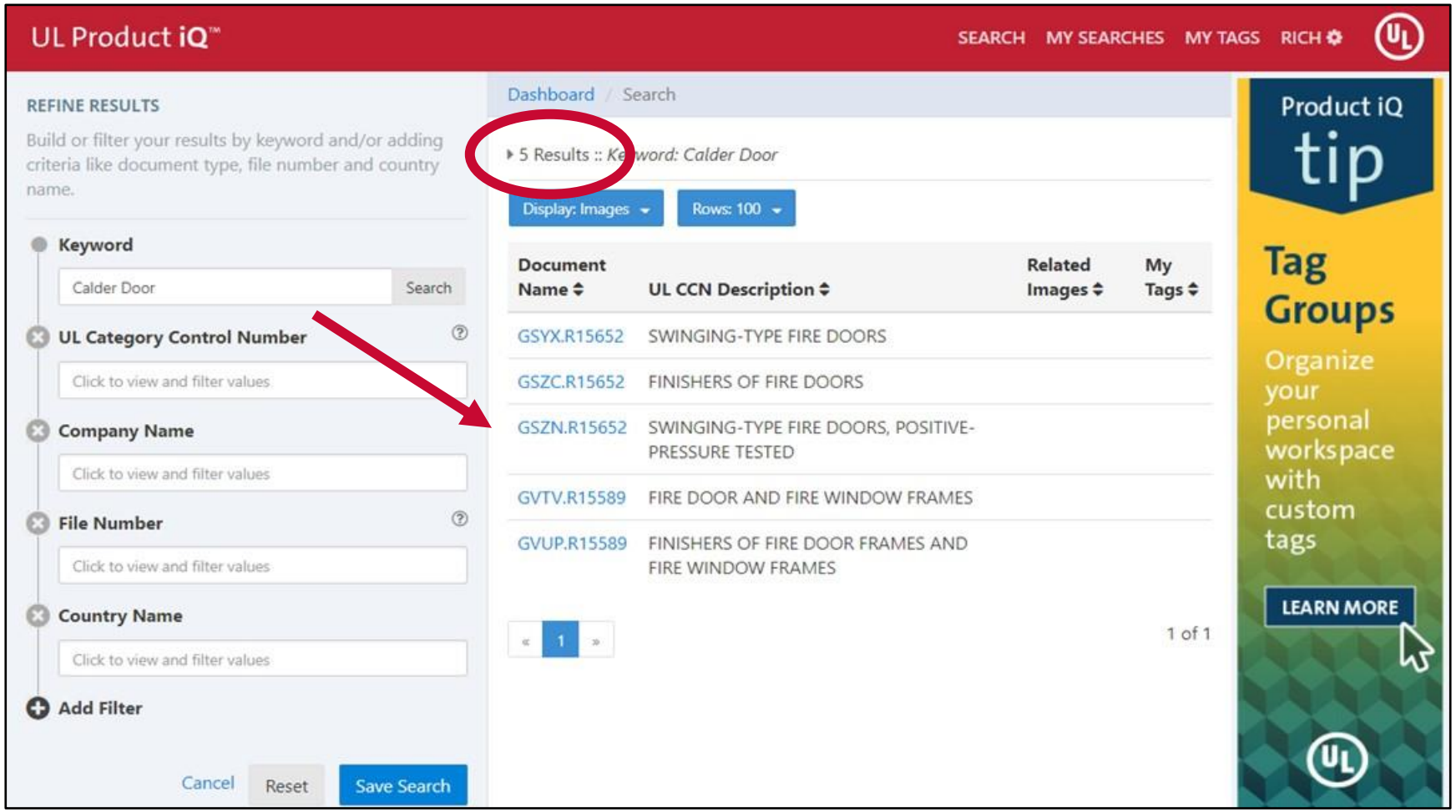

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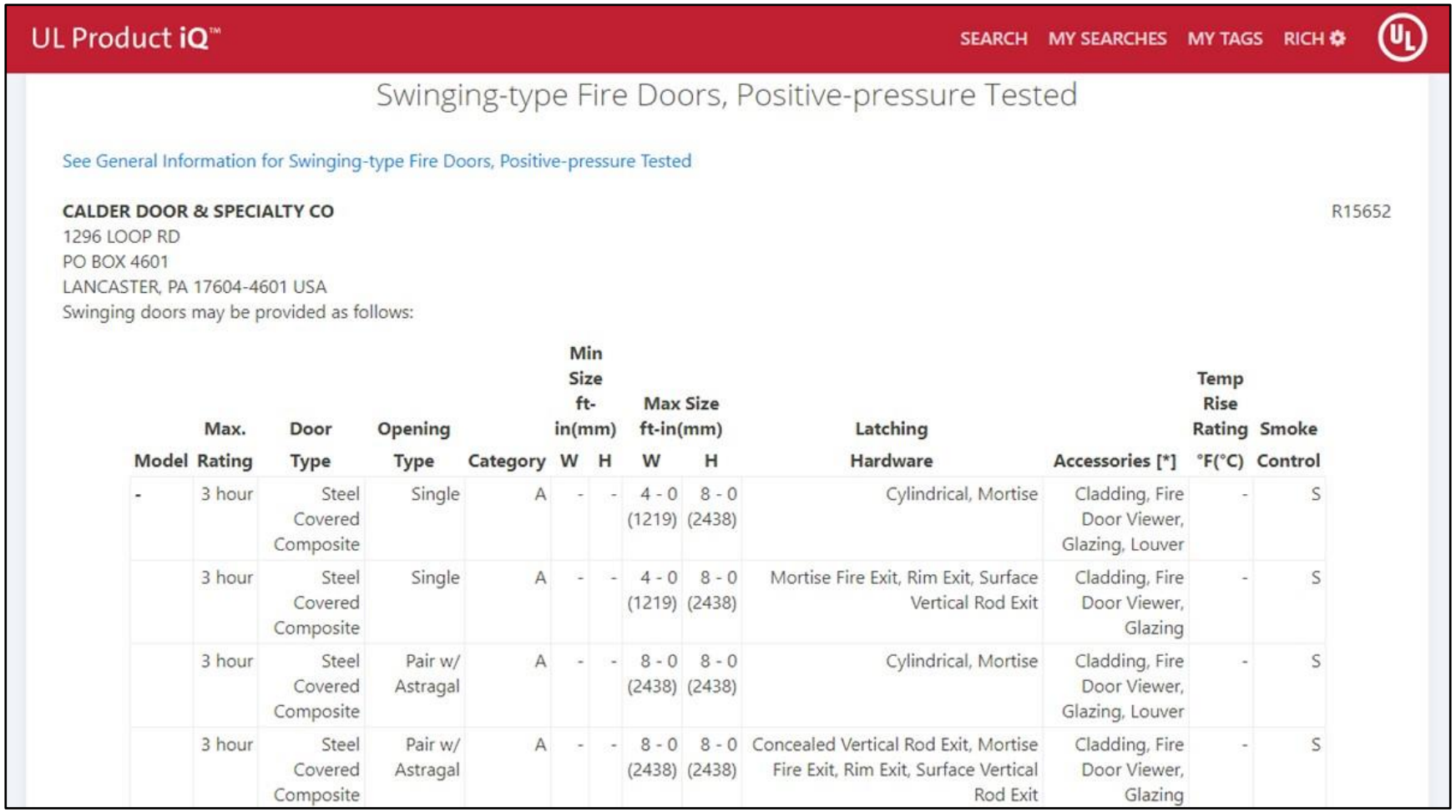

UL Product iQ™ SEARCH MY SEARCHES MY TAGS RICH

Swinging-type Fire Doors, Positive-pressure Tested

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

CALDER DOOR & SPECIALTY CO R15652
1296 LOOP RD
PO BOX 4601
LANCASTER, PA 17604-4601 USA
Swinging doors may be provided as follows:

Model	Max. Rating	Door Type	Opening Type	Category	Min Size ft-in(mm) W	Min Size ft-in(mm) H	Max Size ft-in(mm) W	Max Size ft-in(mm) H	Latching Hardware	Accessories [*]	Temp Rise Rating °F(°C)	Smoke Control
-	3 hour	Steel Covered Composite	Single	A	-	-	4 - 0 (1219)	8 - 0 (2438)	Cylindrical, Mortise	Cladding, Fire Door Viewer, Glazing, Louver	-	S
	3 hour	Steel Covered Composite	Single	A	-	-	4 - 0 (1219)	8 - 0 (2438)	Mortise Fire Exit, Rim Exit, Surface Vertical Rod Exit	Cladding, Fire Door Viewer, Glazing	-	S
	3 hour	Steel Covered Composite	Pair w/ Astragal	A	-	-	8 - 0 (2438)	8 - 0 (2438)	Cylindrical, Mortise	Cladding, Fire Door Viewer, Glazing, Louver	-	S
	3 hour	Steel Covered Composite	Pair w/ Astragal	A	-	-	8 - 0 (2438)	8 - 0 (2438)	Concealed Vertical Rod Exit, Mortise Fire Exit, Rim Exit, Surface Vertical Rod Exit	Cladding, Fire Door Viewer, Glazing	-	S

Navigating the Intertek Online Directory

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

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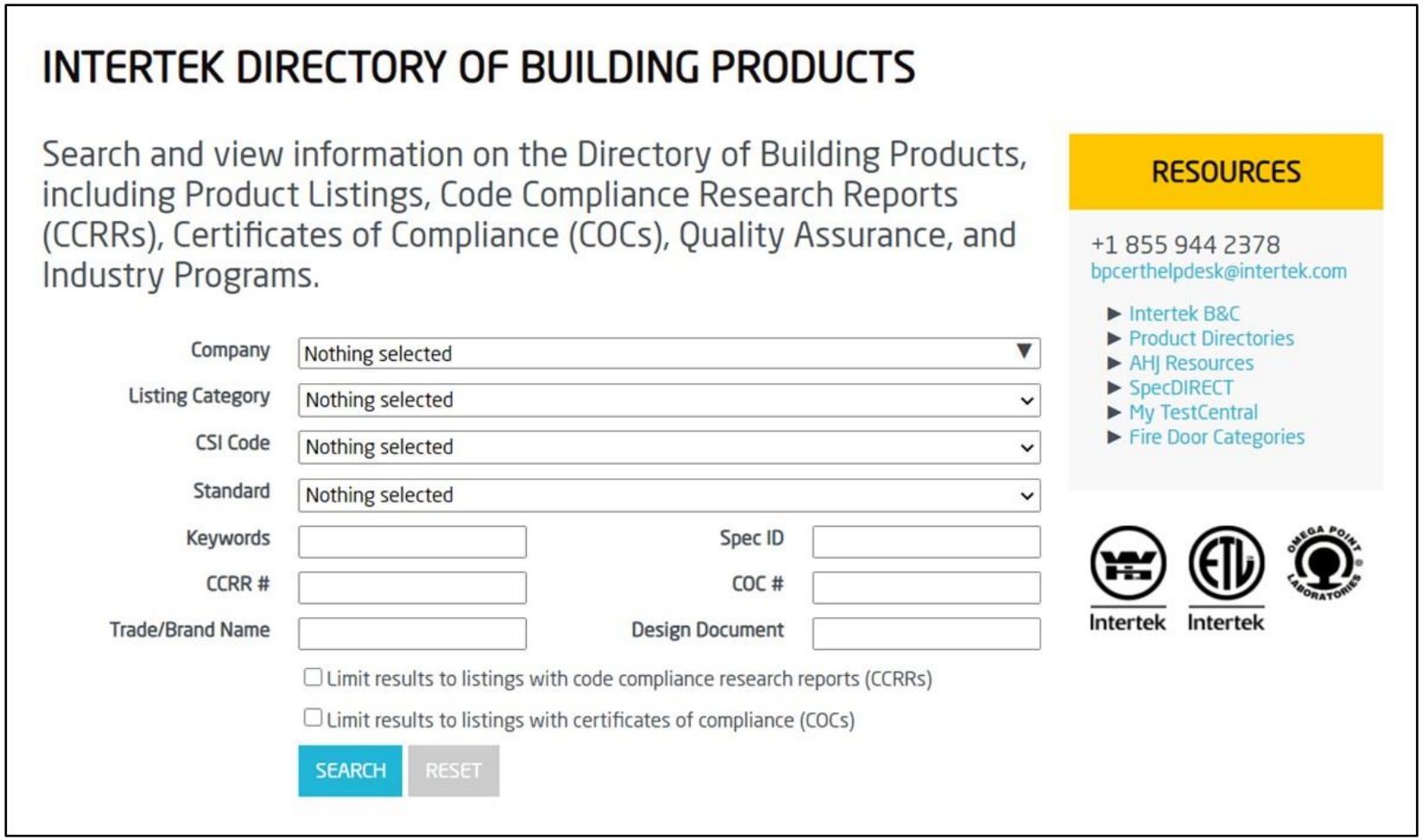
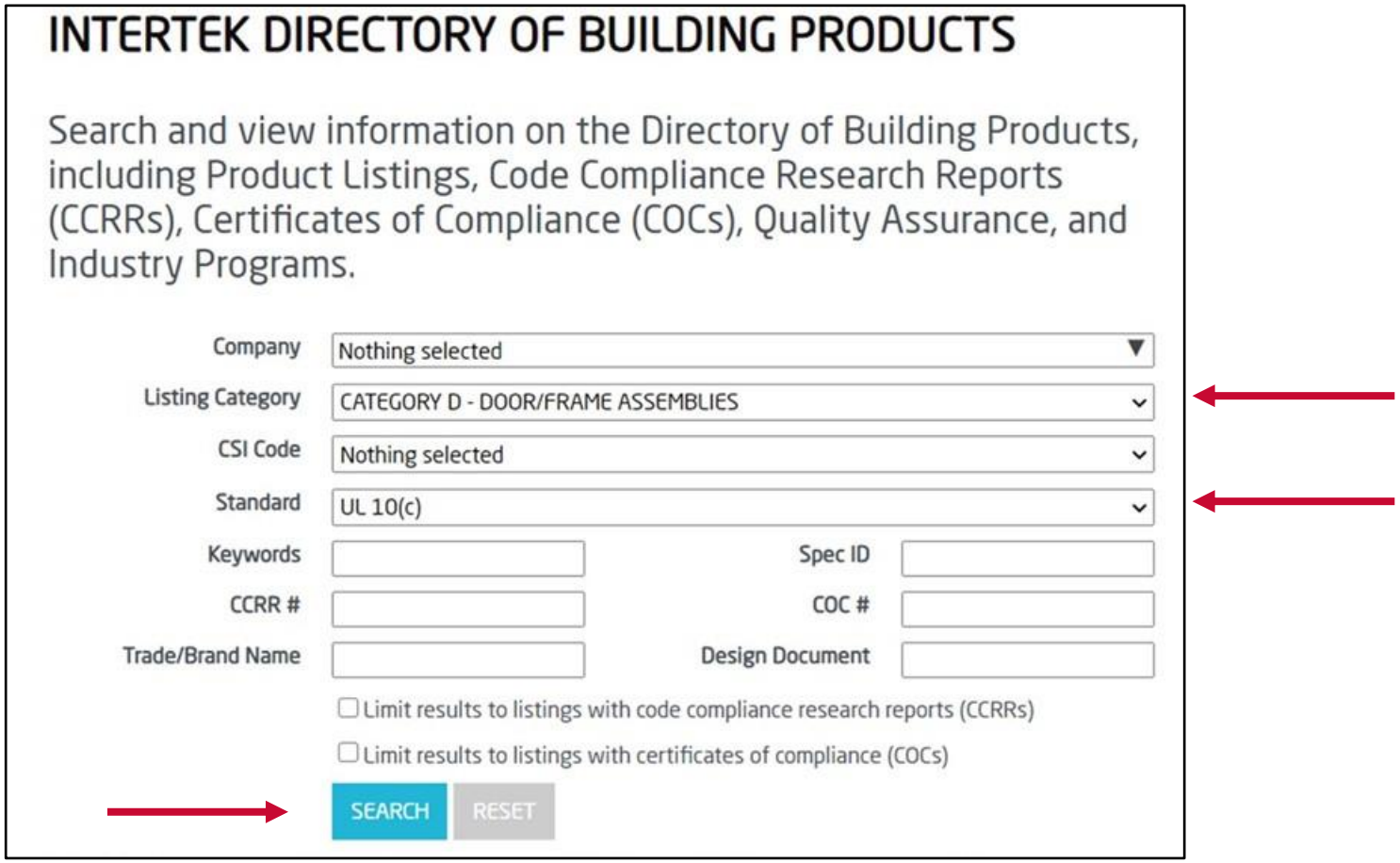


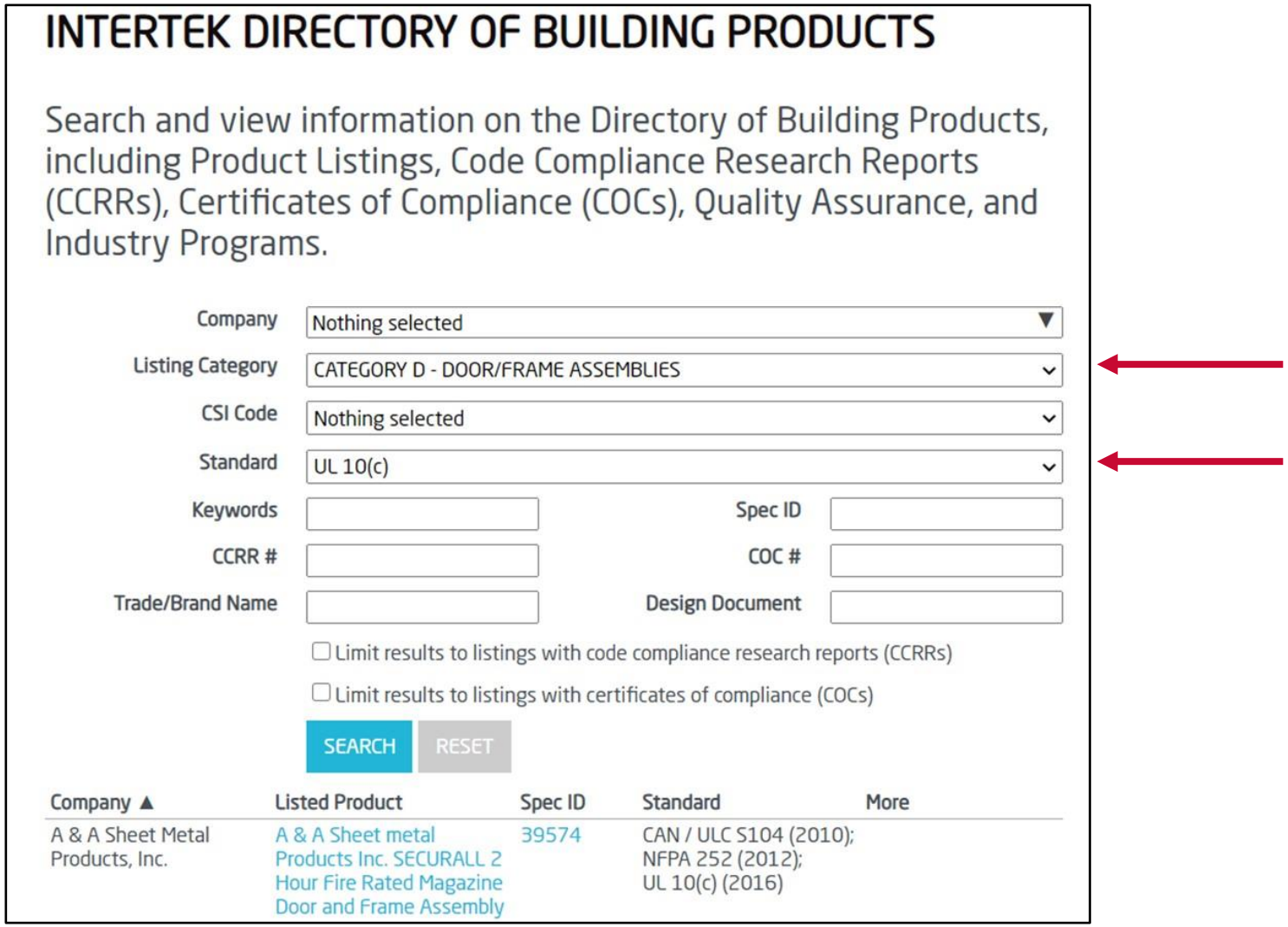
Intertek Directory of Building Products

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

Intertek Directory of Building Products



Intertek Directory of Building Products



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)	COC #: WHI18-23137127
Halspan Limited	Halspan UniversaL Plus 20 Minute without Hose Stream Wood Fire Door Assemblies	33315	UL 10(c) (2009)	COC #: WHI18-23137128
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)	

Intertek Directory of Building Products

INFERNOGARD™ Fire Rated Door System 90 Minute

Company: Global Security Glazing, LLC

INFERNOGARD™ Door Assembly System
Assembly Rating - Up To 90 Minutes

Rating:	Application:	Maximum Size of Openings:
60 Minute	Singles	4' 0" wide x 9' 0" high
	Pairs	8' 0" wide x 9' 0" high
90 Minute	Singles	4' 0" wide x 9' 0" high
	Pairs	8' 0" wide x 9' 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.

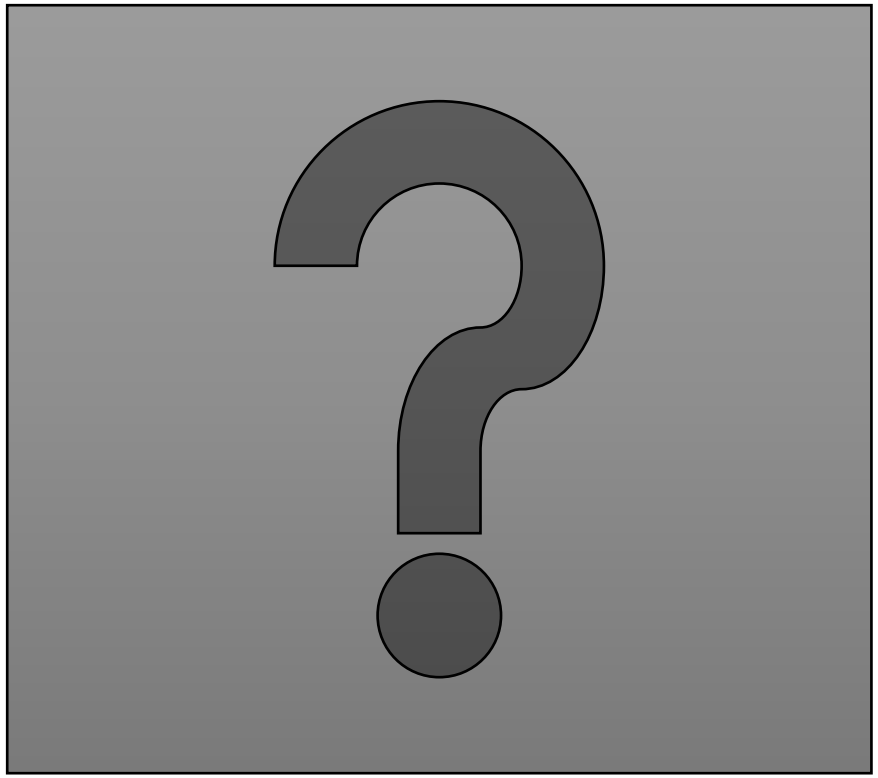
Panels - 4,952 sq. in. (1 hour), 4,876 sq. in. (1-1/2 hour).

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 kit and door assembly must be fire rated and listed and labeled for use with fire rated glazings which are at least of equivalent thickness to the respective INFERNOGARD™ products used.

Questions??



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Thanks for Attending!!!

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Firestop Contractors International Association
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