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Glossary of abbreviations and acronyms used in this section:

TERM

- **AHJ** - Authority Having Jurisdiction
- **ANSI** - American National Standards Institute
- **DHI** - Door and Hardware Institute
- **FEH** - Fire Exit Hardware (Exit devices which are listed for both fire and panic applications)
- **FM** - Factory Mutual
- **IBC** - International Building Code
- **ITS/WHI** - Intertek Testing Services / Warnock Hersey
- **MPD** - Mortise Panic Device
- **NFPA** - National Fire Protection Agency
- **NFPA 80** - Nationally accepted standard for the use and installation of fire frames and doors
- **RPD** - Rim Panic Device
- **SDI** - Steel Door Institute
- **UL** - Underwriters Laboratories
- **VRPD** - Vertical Rod Panic Device

HOURLY RATINGS

Steel fire doors are rated by time (hours or minutes) that a door assembly can withstand exposure to fire test conditions. Hourly (minute) ratings are shown below.

Hourly Ratings		Description
Door	Wall	
3 hour (180 minutes)	4 hour	Opening in walls separating buildings or dividing a building into fire areas.
1-1/2 hour (90 minute)	2 hour	Openings in enclosed or vertical communications through buildings. These could be stairwells or elevator shafts.
1 hour (60 minute)	1 hour	Openings in corridors and room partitions dividing building into areas of occupancy. Historically, the 1 hour ratings have been wood door ratings. Steel doors are starting to be used in these openings depending on the AHJ.
3/4 hour (45 minute)	1 hour	Openings in corridors and room partitions.
1-1/2 hour (90 minute)	2 hour	Openings in walls where there is the potential of severe fire exposure from the exterior of the building.
3/4 hour (45 minute)	1 hour	Openings in walls where there is the potential of moderate to light fire exposure from the exterior of the building.
20 minute	1 hour	Openings in corridors where smoke and draft control is required.

FIRE DOOR ASSEMBLIES:

Steelcraft fire rated doors, three sided frames, transom and/or sidelight frames and fire window frames are required to comply with building codes and the local AHJ. This section of the manual has been compiled as an aid to help understand the ratings of the door and frame products, and to provide a broad overview of the products Steelcraft offers to meet the increasingly stringent needs of the fire protection community.

FIRE DOOR ASSEMBLY COMPONENTS:

Care should be taken in the selection of the components used in a Fire Door Assembly. If any of the listed components are omitted, or if a non-rated component is substituted, the door assembly rating will be violated. Fire rated components (with the exception of the wall) are listed in the UL Certifications Directory or the IT/WHI Directory of Listed Products.

Required Fire Door Assembly components are as follows:

- **Listed frames** – Frames are required to be labeled with the appropriate fire door frame label.
Generally, the frame label does not carry an hourly rating. The frame rating is based on the hourly rating of the wall into which it is constructed.
- **Listed doors** – Doors are required to be labeled with the appropriate fire door label. The fire door label carries an hourly rating.
Doors can be labeled with a higher hourly rating than required, but, it is not acceptable to substitute a door with a lower hourly rating than required.
- **Listed hardware** – Most hardware components are also required to be labeled with the appropriate fire label.
The location and type of label will vary with the device being used. The required minimum hardware components for a fire door assembly are as follows:
- **Listed latch or locking device** – may be single point locks, latches, fire exit devices or other listed devices.
- **Approved hinge(s)** – may be butt hinges, pivots, continuous hinges or other approved hinge constructions.
Hinges generally are not labeled.
- **Listed closing device** – may be surface mounted or concealed attachment to the door and frame.

Fire rated wall – Wall construction must be fire rated as dictated by the building code and the AHJ.

THE AHJ (AUTHORITY HAVING JURISDICTION):

The local AHJ must be the final authority in fire door assembly issues. Steelcraft Fire Doors and Fire Door Frames are produced under the listing programs of Underwriters' Laboratories Incorporated (UL) Warnock Hersey (IT/WHI) and FM Global (FM).

INSTALLATION:

Installation of all Steelcraft doors and frames shall conform to the published Steelcraft installation instructions, and ANSI/SDI A250.11 Recommended Installation Instructions for Steel Frames, ANSI A250.11 and HMMA 840. All fire rated frames must be installed in accordance with NFPA 80, and/or the local AHJ.

FUNCTIONS OF FIRE DOOR ASSEMBLIES:

Fire Doors must serve four main functions:

1. Serve as a regular door at all times.
2. Provide ready egress from a fire area during a fire.
3. Inhibit the spread of fire and smoke throughout the building or to an adjacent building.
4. Protect life and property by reducing smoke hazards.

When a fire starts, it is most important to evacuate the people safely from the building. After evacuation, the doors must serve as a fire and smoke barrier. It is a well known fact, that in a fire more people are killed by either smoke asphyxiation or by panic, than by the fire.

The same length of protection from the fire is not required of all openings in buildings. The location in the building determines the length of time that the door must withstand a fire. It is the responsibility of the building code and the AHJ to indicate the type of Fire Doors Assemblies that are to be used at the required locations in a building.

FIRE RATED STEEL FRAMES AND DOORS:

Manufacturers of steel frames and doors choose from several methods of classifying their product as Fire Doors. Municipalities, state governments, insurance regulations and building codes vary in the requirements for Fire Doors.

Users of fire doors can specify the type of label that offers the desired fire protection. Regardless of the label chosen, serious consideration should be given to the company manufacturing the product and the performance expected.

The National Fire Protection Association publishes NFPA Pamphlet 80, which is the generally accepted standard throughout the United States for the installation of fire doors and windows. This standard is generally accepted by state fire code officials and municipal building officials.

Some of the topics covered in NFPA Pamphlet 80 are:

- allowable glass area in doors for different locations and ratings
- maximum sizes for various kinds of fire doors
- latching device and hinge quantity
- dimensional requirements, as they relate to different ratings, sizes and types of fire door classifies a door or a frame only if it meets the following conditions

It is the responsibility of the architect and/or specification writer to specify the proper materials for complete safety. They should be aware of the issues that constitute maximum safety in Fire Frames and Doors. All persons responsible for the design, installation and operation of any building involving people or valued property should insist upon the type of labeled door and frame that will afford the maximum fire protection.

LISTING AGENCIES:

There are currently two (2) listing systems available from Steelcraft.

- 1. Underwriters Laboratories (UL)** Fire Testing and Certification Program. UL is an independent agency with testing, listing, in-plant inspection, and labeling capabilities.
 - The manufacturer's design has been accepted by UL (under their performance standard UL10C*) which uses NFPA Pamphlet 80 as the basis for their decision.
 - The door or frame is manufactured in accordance with the accepted design in the presence of a UL inspector.
 - The product passes the UL10C fire test conducted by UL.
 - UL finds that the product meets the additional criteria (such as durability, stability, etc.) in addition to passing the fire test.
 - It is subject to a continual follow-up service, including unannounced, in-plant inspections during the manufacturing process to be sure that the frames and doors continue to be made exactly the same as tested.
- 2. Intertek Testing Services / Warnock Hersey (ITS/WHI)** Fire Testing and Certification Programs. ITS/WHI is an independent agency with testing, listing, in-plant inspection, and labeling capabilities.
 - The manufacturer may, at their option, submit drawings of the product to be tested to ITS/WHI for review. If potential problem areas are noted ITS/WHI will notify the manufacturer of these so that he may consider design changes.
 - IT/WHI personnel witness manufacturing of the product to be tested and verify components and assembly methods.
 - The product is then tested by ITS/WHI to determine if it meets the stringent requirements of the fire door test standards.
 - A factory follow-up inspection, listing and labeling agreement is issued. This agreement allows ITS/WHI to make unannounced in-plant inspections.
- 3. FM Global/Approvals** follow-up certification programs. FM Global is an independent underwriting agency with listing, in-plant inspection, and labeling capabilities.
 - Examine and test production samples
 - Examine manufacturing facilities and audit quality control procedures.
 - A factory follow-up inspection, listing and labeling agreement is issued. This agreement allows FM to make unannounced in-plant inspections.

DOORS, FRAMES AND WALLS:

Frames and doors are normally rated at three-quarters of the rating of the walls. If the rating for the wall is 4 hours, the rating for the door and frame is generally 3 hours. If the rating for the wall is 2 hours, the rating for the door and frame would be 1 1/2 hours, etc. There are two current exceptions to this practice which deal with smoke control openings, namely 20 minute openings which are normally used in 1 hour walls.

The reason that door and frame assemblies are normally rated at 75% of the total ratings of the wall is that the actual fire testing program for walls is completely different than that of frames and doors and the requirements and acceptance criteria vary. It should also be noted that the severity of fire is generally considered to be less at a door opening than at a wall. Normally doorways are open for passage of pedestrians and walls have a tendency to have furniture and other items stored against them.

STEPS TO FOLLOW:

The following steps should be followed in specifying fire door requirements.

1. Investigate the appropriate building code(s).
2. Determine the fire resistance of the wall or partition in which the opening is to be located and select a door assembly (frame, door and hardware) having a proper fire-protection rating. The effectiveness of the entire assembly as a fire barrier may be destroyed if any component is omitted or one of substandard quality is used.
3. Make sure that fire doors, frames and hardware are produced under the auspices of a nationally recognized certification agency.
4. Insure products comply with the AHJ
5. Insure products comply with NFPA 80. This pamphlet is the widely accepted standard for the use and installation of fire frames and doors.

FIRE TESTING:

Steel frames and doors have historically been subjected to full scale fire tests as a standard method for evaluating their performance and integrity relative to fire protection of property and life safety. Hollow metal doors were first submitted to Underwriters Laboratories for investigation and fire exposure testing in 1904. The agencies now associated with the testing, listing and labeling of products are two well known entities, Underwriters Laboratories and ITS/Warnock Hersey.

While the agencies have remained a constant in the industry, the standards against which products are evaluated are undergoing significant changes. This document will provide an overview of the changes and describe how Steelcraft has positioned their product line in compliance with NFPA 252 and UL10C Positive Pressure Fire Tests of Door Assemblies.

STEELCRAFT FRAMES AND DOORS APPROVED FOR POSITIVE PRESSURE:

The products that conform to the positive pressure criteria (UL10 C) or NFPA252-1999 are shown on the following sheets. These products also conform to the negative pressure test criteria (ASTM E152, UL10 B, etc.) and may be used in areas that do not require positive pressure fire frames and doors.

Steelcraft products do not require the use of intumescent seals to comply with UL10 C or NFPA252.

GUIDELINES & REQUIREMENTS:

All fire door applications are subject to product and component limitations and requirements. The following are general guidelines in the use and selection of fire rated assemblies and their components

1. Listed or approved fire door components are published and listed in Underwriters Laboratories' "Certifications Directory", the ITS/Warnock Hersey "Directory of Listed Products" or the online FM "Approval Guide".
2. Only labeled doors and frames can be used in a fire rated opening.
3. Every labeled swing type fire door must include an approved self latching device, closing device and hinges.
4. Viewers must be listed in the Underwriters Laboratories "Certifications Directory", the ITS/Warnock Hersey "Directory of Listed Products" or the online FM "Approval Guide".
5. The actual fire rating of a Fire Door Assembly is the rating of the least rated component (door, frame or hardware)
6. Approved electronic monitoring devices can be used on fire doors.
7. The local AHJ is the final authority in application acceptance.

ASTRAGALS:

1. Astragals are required per the manufacturer's published listings.
 - Astragals are not required on double egress applications or doors in 1-1/2 hour (90 minutes) ratings or less. Refer to the appropriate listing pages in this section.
2. Astragals must be steel overlapping type. Weather stripping astragals rated for 3 hours (180 minutes) do not satisfy the astragal requirements for steel fire doors.
3. When astragals are used on pairs of doors equipped with fire exit hardware, a coordinator must be used to insure proper closing and latching sequence.
4. An astragal may be used on a pair of doors equipped with a mortise exit device on the active leaf and a vertical rod on the inactive leaf.
5. An astragal can not be used on pairs of doors swinging in the same direction equipped with double vertical rods, since the astragal will prevent the operation of one of the door leaves. Since 3 hour (180 minute) rated openings require an astragal, double vertical rod applications can not be used in pairs swinging in the same direction.
6. Astragals can be either screw attached or welded to the appropriate door.
7. Astragals are not used on pairs of doors with an open back strike.

CLEARANCES: All clearances must be in accordance with NFPA Pamphlet # 80.

CLOSING DEVICES:

1. An approved closing device must be installed on every swinging fire door. Exception:
 - The inactive leaf of mechanical equipment room doors may omit a closer. Verify acceptance with the local building code and the AHJ.
2. Fire doors must be internally reinforced for closing devices. Exceptions:
 - Internal reinforcement is omitted if the closer is attached with sex bolts
 - Internal reinforcement is omitted if spring hinges are used.
3. Overhead stops may be used if they do not inhibit the door from closing and latching.
4. Door holder/release devices are permitted when acceptable to the AHJ. These fail-safe devices release the door in the event of fire.
5. Labeled opening may incorporate concealed closers and stops

COORDINATORS:

1. A coordinator is required if an astragal or projecting latch bolt prevents the inactive door from closing before the active door.
2. A coordinator is not required if both leaves of a pair of doors closes and latches independently of each other.
3. When astragals are used on pairs of doors equipped with fire exit hardware, a coordinator must be used to insure proper closing and latching sequence.

DUTCH DOORS:

1. The upper and lower leaf may latch into the frame or the upper leaf may latch into the lower leaf, which latches into the frame.
2. The opening must include a closing device located on the upper leaf, and a horizontal astragal which will coordinate the closing and latching of the bottom leaf.
3. A label is required on each leaf of a dutch door and one on the frame.

EXIT DEVICES:

1. Listed Fire Exit Hardware must be used. These exit devices are listed for both fire and panic applications.
2. The door size must not exceed the maximum listed size for the individual hardware manufacturers' listing for the device being used.
3. Doors which are reinforced for Fire Exit Hardware must bear a label which states "Fire Door to be Equipped with Fire Exit Hardware".
4. Vertical rod FEH may not be used on single doors. The exception would be a listed 3 point exit device.
5. Pairs of doors with vertical rod FEH on both leaves can not be used in 3 hour (180 minute) applications.
6. Rim FEH can not be installed with blade strikes in double door applications.
7. Rim FEH in pairs must include the use of a listed hardware mullion.

GASKETING & EDGE SEALS:

1. Only listed gasket material can be used. Refer to the UL Fire Resistive directory or the ITS/WHI Directory of Listed Products.
2. Smoke and draft control assemblies must include gaskets listed for smoke and draft control.
3. Steelcraft fire rated doors do not require the use of edge seal (intumescent) systems.

GLASS & GLAZING:

1. Only approved glass can be installed in a fire door assembly.

HINGES:

1. The proper quantity of hinges must be used. Based on NFPA Pamphlet 80:
 - Doors up to 60 inches in height shall be provided with 2 hinges and an additional hinge for each additional 30" of door height or fraction thereof.
2. Steelcraft doors over 96 inches may be prepared for .134" standard weight hinges.
3. Listed continuous hinges, electric hinges and pivots can be used on Steelcraft fire rated doors.
4. Doors with 4" hinges are limited to 20 gage and a maximum door size of 3'0" X 7'0".

LABELS:

1. Steelcraft supplies a variety of door and frame labels.
 - Doors – metal (riveted on or attached with drive screws) or mylar.
 - Frames – tin plated metal (welded, riveted or attached with drive screws), or mylar.

NOTE – UL authorizes the use of Tin plated metal labels which are welded on frames. To avoid excessive rusting, the tin plated label must be factory prime painted with the frame. UL authorizes and approves of the factory painting of these labels since all labeling information is embossed and legible after paint.

2. Labels are attached only at the factory or at an authorized labeled distributors' shop.
3. All jobsite labeling must include a field (jobsite) inspection by the labeling agency and may require involvement of the AHJ.
4. Fire rated doors with continuous hinges have the fire label attached in the top channel of the door.

LOCKS:

1. The door size must not exceed the maximum listed size for the individual hardware manufacturers' listing.
2. Dead locks may not be used on doors which are in a means of egress. Locks with deadbolts that are interconnected with latch bolts are retracted simultaneously when the latch bolt is retracted may be used with in a means of egress.
3. Deadbolts may be used on doors in addition to an active latch bolt on doors not in the means of egress, or as otherwise permitted by the AHJ.

LOUVERS:

1. Any listed automatic fusible link louver can be used on a Steelcraft labeled door.
2. Glass lights are not permitted in doors equipped with louvers.
3. Fire Exit Hardware can be used on doors equipped with a louver, but only where approved by code.
4. Fire ratings for doors equipped with a louver can be either 1-1/2 hour (90 minutes) or 3/4 hour (45 minutes).
5. Maximum listed louver size 24" X 24" (one louver per door)
6. Location in the door:
 - Located in bottom half
 - Minimum 12" from door bottom
 - Minimum 5-1/2" from door edge to cutout.
7. Louvers cannot be installed in a means of egress and in:
 - The upper half of the door
 - 20 minute doors
 - Smoke & draft opening

LATCH THROW:

1. Single doors:
 - 1/2" latch bolt throw for all door series, gages and fire ratings.
2. Pairs of doors
 - A-Series = 5/8"
 - B-Series
 - a. B18, B16 = 5/8"
 - b. B14 = 5/8" For pairs of doors up to and including 1-1/2 hour (90 minute) and 3/4" over 1-1/2 hour
 - L-Series:
 - a. L20, L18, L16 = 5/8" up to 3 hours
 - b. L14 = 5/8" For pairs of doors up to and including 1-1/2 hour (90 minute). 3/4" over 1-1/2 hour
 - T-Series = 3/4"

PAIRS OF DOORS:

1. The inactive leaf of doors must be provided with self-latching top and bottom bolts or automatic flush bolts or labeled two point latches. Manual flush bolts either mortised or surface may be used on doors to rooms not normally occupied by humans.
2. Double egress doors can only be provided with concealed or surface vertical rod FEH.
3. Open back strikes can be used on pairs of doors (L18/16/14, CE18/16, B18/16/14). Maximum height of 8"0" and a maximum 1-1/2 hour (90 minute) ratings. Astragals can not be used in this application.
4. Two doors in the same frame separated by a hollow metal mullion are considered to be two single doors applications.

PROTECTIVE PLATES & PLANT-ONS:

1. Protection plates or kick plates can be a maximum 48" X 48" in size and attached to both faces of a door (3 hour maximum fire rating).
2. Plant ons can be used if covered by a manufacturer's listing service.

SMOKE & DRAFT:

1. All components used in a Smoke and Draft Control assembly must pass a 20 minute without hose stream test.
2. Only gaskets listed for smoke and draft control may be used on smoke and draft control assemblies.
3. Gaskets must be listed for the appropriate door type (hollow metal, wood, etc.).
4. Wood doors which do not have an integral intumescent seal in the door edge, may require an intumescent edge seal and draft control gasket attached to the frame. Review the wood door manufacturer's listing and requirements.

TEMPERATURE RISE DOORS:

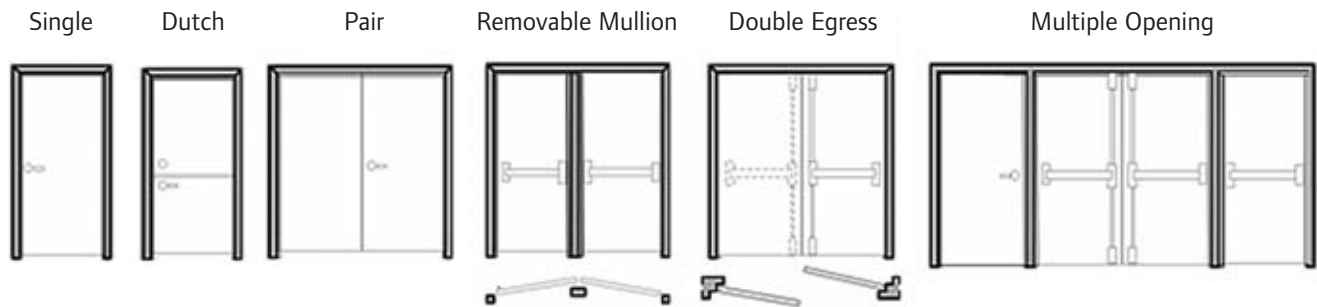
1. Steelcraft T-Series doors prepared for single point latches, rim or mortise FEH are labeled for 250 temperature rise and may be used in either 250 or 450 temperature rise location.
2. Doors prepared for vertical rod (CVR or SVR) or InPact devices carry a 450 temperature rise label and can only be installed in 450 temperature rise location.

VISION LIGHT REQUIREMENTS:

1. Glass cannot be installed in exterior locations subject to severe fire exposure.
2. Any listed fire door vision kit can be used in a Steelcraft door. Vision kits should be listed for the appropriate door construction (hollow metal, wood, etc.) used.
3. Steelcraft vision kits are not approved for use in any other door manufacturers' doors

THREE SIDED FRAMES:

Typical Elevations

**FIRE RATED THREE SIDED FRAME:**

The three sided frames covered in this section have been tested in accordance with UL10C and NFPA252-1999, and listed by either Underwriters Laboratories (UL), Warnock Hersey (IT/WHI) and FM Global (FM). The ratings and sizes available are shown on the following pages.

Three sided frames are designed to be set on the floor and anchored to the wall construction. All frame anchoring must be in accordance with the installation instructions for the appropriate frame construction.

THREE SIDED FRAMES CONFIGURATIONS:

Labeled three (3) sided frames are available in the following configurations:

- Single opening – hinge jamb, strike jamb and head.
- Double opening – two hinge jambs and a head. Commonly referred to as pairs swinging in the same direction.
- Double swing with a mullion – two hinge jambs, a head and a mullion (stationary or removable). This opening configuration is actually considered as two single door openings.
- Double egress – a unique contoured frame (profiles) with two hinge jambs and a head. This opening configuration is used in corridor applications and consists of a pair of doors, each swinging in the opposite direction.
- Dutch doors – hinge jamb, strike jamb and head, used in storeroom applications.
- Multiple opening – a unique application having a combination of hinge and/or strike jambs, vertical mullions and head.
- Communicating openings – an application including a door(s) mounted in both rabbets, usually used in the hospitality markets and installed between adjoining rooms.

APPROVED FRAME SERIES:

Frames covered in this section are F, FN, FE, DE, DW, K and MU. Regardless of the frame series being used, all frames must be installed into a fire rated wall.

LISTING INFORMATION COVERED:

All listings covered in this section are for reference and assistance in developing overall parameters of approvals. Several variables such as hardware, wall construction, installation and application will affect the fire ratings. Individual manufacturer's listings will take precedence.

All listings shown in this section conform to the requirements of UL 10C & NFPA252 test requirements.

INSTALLATION:

Installation of all Steelcraft framing systems shall conform to the published Steelcraft installation instructions, ANSI/SDI A250.11 Recommended Installation Instructions for Steel Frames and HMMA-840. All fire rated frames must be installed in accordance with NFPA Pamphlet 80, and/or the local AHJ.

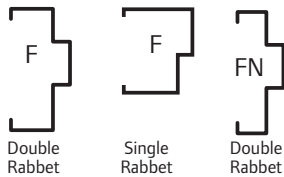
Details are subject to change without prior notice.

THREE SIDED FRAMES FOR SINGLE DOOR

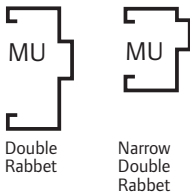
Maximum Rating	Wall Applications	Frame Series					Listings		
		Series	Jamb Depth		Corner		Maximum Sizes (Door Opening)		
			Min.	Max.	KD	Weld	UL	ITS/WHI	FM
3 Hr Max	Masonry	F16, F14	3	14	X	X	4'0" X 10'0"	4'0" X 10'0"	4'0" X 8'0"
		FN16, FN14	4-3/4	14	X	X	4'0" X 10'0"	4'0" X 10'0"	4'0" X 8'0"
		F12	4-3/4	14	N.A.	X	4'0" X 10'0"	4'0" X 10'0"	Not Listed
		MU16, MU4	3-1/4	14	X	X	4'0" X 9'0"	4'0" X 9'0"	Not Listed
		FP14	5-3/4	10-3/4	X	X	4'0" X 8'0"	Not Listed	Not Listed
	Stud	F16, F14	3	14	X	X	4'0" X 8'0"	4'0" X 8'0"	Not Listed
		F12	4-3/4	14	N.A.	X	4'0" X 8'0"	4'0" X 8'0"	Not Listed
		MU16, MU14	3-1/4	14	N.A.	X	4'0" X 8'0"	4'0" X 8'0"	Not Listed
1-1/2 Hr (90 min) Max	Masonry	F16, F14	3	14	X	X	4'0" X 10'0"	4'0" X 10'0"	4'0" X 8'0"
		FN16, FN14	4-3/4	14	X	X	4'0" X 10'0"	4'0" X 10'0"	4'0" X 8'0"
		MU16, MU14	3-1/4	14	X	X	4'0" X 9'0"	4'0" X 9'0"	Not Listed
		F12	4-3/4	14	N.A.	X	4'0" X 10'0"	4'0" X 10'0"	Not Listed
	Stud	F16, F14	3	14	X	X	4'0" X 10'0"	4'0" X 10'0"	4'0" X 8'0"
		FN16, FN14	4-3/4	14	X	X	4'0" X 10'0"	4'0" X 10'0"	4'0" X 8'0"
		MU16, MU14	3-1/4	14	X	X	4'0" X 9'0"	4'0" X 9'0"	Not Listed
		F12	4-3/4	14	N.A.	X	4'0" X 10'0"	4'0" X 10'0"	Not Listed
		DW16, DW14	3-1/4	14	N.A.	X	4'0" X 9'0"	4'0" X 8'10"	4'0" X 8'0"
		K16, K14	3-1/4	14	N.A.	X	4'0" X 9'0"	4'0" X 8'10"	4'0" X 8'0"

NOTES: 1. Frames over 9' 0" in height and installed in stud walls require the jamb anchors to be welded to the frame.
2. 4" heads are approved for all applications.

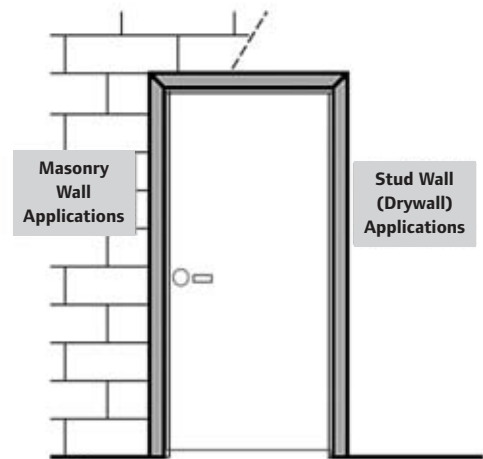
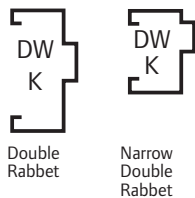
F-Series Frame Construction



MU-Series Frame Construction



DW and K-Series Frame Construction



Minimum Hardware Requirements:

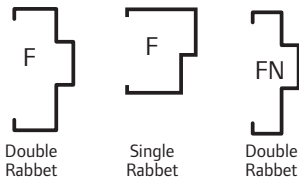
- Strike for single point latch
- Closer
- Approved hinges

THREE SIDED FRAMES FOR DOUBLE DOORS

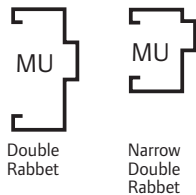
Maximum Rating	Wall Applications	Frame Series					Listings		
		Series	Jamb Depth		Corner		Maximum Sizes (Door Opening)		
			Min.	Max.	KD	Weld	UL	ITS/WHI	FM
3 Hr Max	Masonry	F16, F14	3	14	X	X	8'0" X 10'0"	8'0" X 10'0"	8'0" X 8'0"
		FN16, FN14	4-3/4	14	X	X	8'0" X 10'0"	8'0" X 10'0"	8'0" X 8'0"
		MU16, MU14	3-1/4	14	X	X	8'0" X 9'0"	8'0" X 9'0"	Not Listed
		FP14	5-3/4	10-3/4	X	X	8'0" X 8'0"	Not Listed	Not Listed
		F12	4-3/4	14	N.A.	X	8'0" X 10'0"	8'0" X 10'0"	Not Listed
	Stud	F16, F14	3	14	X	X	8'0" X 8'0"	8'0" X 8'0"	Not Listed
		MU16, MU14	3-1/4	14	N.A.	X	8'0" X 8'0"	8'0" X 8'0"	Not Listed
		F12	4-3/4	14	N.A.	X	8'0" X 8'0"	8'0" X 8'0"	Not Listed
1-1/2 Hr (90 min)	Masonry	F16, F14	3	14	X	X	8'0" X 10'0"	8'0" X 10'0"	8'0" X 8'0"
	Stud	MU16, MU14	3-1/4	14	X	X	8'0" X 9'0"	8'0" X 9'0"	Not Listed
	Stud	DW16, K16	3-1/4	14	X	N.A.	8'0" X 9'0"	8'0" X 8'10"	8'0" X 8'0"

NOTES: 1. Frames over 9' 0" in height and installed in stud walls require the jamb anchors to be welded to the frame.
2. 4" heads are approved for all applications.

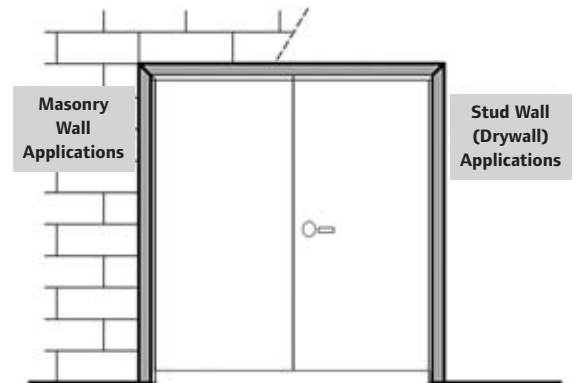
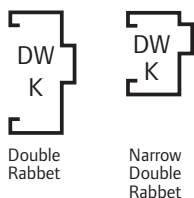
F-Series Frame Construction



MU-Series Frame Construction



DW and K-Series Frame Construction



Minimum Hardware Requirements:

- Strike(s) depending on application for either:
 - Flush, surface or automatic bolt in head
 - Vertical rod inactive or both leaves
- Closer(s) depending on hardware applications and AHJ
 - Active leaf
 - Both leaves
- Approved hinges

THREE SIDED FRAMES FOR DOUBLE DOORS WITH REMOVABLE MULLIONS

Double doors with removable mullions are used at entrances to buildings, corridor and equipment room applications.

There are 2 types of removable mullion applications:

- Removable hardware mullion - for Rim FEH on each leaf application. Mullion must be fire rated
- Removable hollow metal mullion - for either Rim or Mortise FEH or listed latching hardware (8'0" X 8'0" maximum).

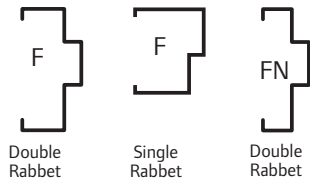
Maximum Rating	Wall Applications	Frame Series					Listings		
		Series	Jamb Depth		Corner		Maximum Sizes (Door Opening)		
			Min.	Max.	KD	Weld	UL	ITS/WHI	FM
3 Hr Max	Masonry	F16, F14	3	14	X	X	8'0" X 10'0"	8'0" X 10'0"	8'0" X 8'0"
		FN16, FN14	4-3/4	14	X	X	8'0" X 10'0"	8'0" X 10'0"	8'0" X 8'0"
		MU16, MU14	3-1/4	14	X	X	8'0" X 9'0"	8'0" X 9'0"	Not Listed
		FP14	5-3/4	10-3/4	N.A.	X	8'0" X 8'0"	Not Listed	Not Listed
	Stud	F16, F14	3	14	X	X	8'0" X 8'0"	8'0" X 8'0"	Not Listed
		MU16, MU14	3-1/4	14	N.A.	X	8'0" X 8'0"	8'0" X 8'0"	Not Listed
1-1/2 Hr (90 min) Max	Masonry/Stud	F16, F14	3	14	X	X	8'0" X 10'0"	8'0" X 10'0"	8'0" X 8'0"
		MU16, MU14	3-1/4	14	X	X	8'0" X 9'0"	8'0" X 9'0"	Not Listed
	Stud	DW16, DW14 K16, K14	3-1/4	14	X	N.A.	8'0" X 9'0"	8'0" X 8'10"	8'0" X 8'0"

NOTES:

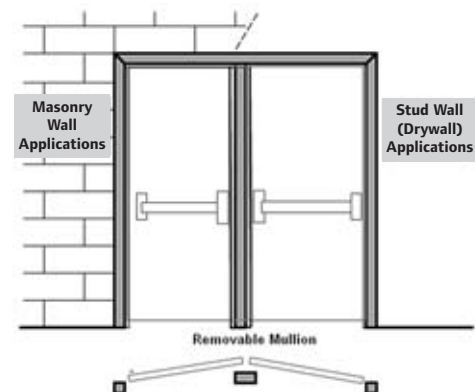
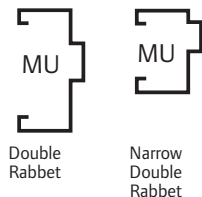
Three sided frame options for double doors:

1. Removable hardware mullion
 - Maximum 3 hour rating.
 - Check hardware manufacturer's listings for maximum ratings & height.
2. Removable Steelcraft Hollow metal mullion
 - 2" face – only
 - 1 1/2 hour rating maximum, 8' 0" maximum height
 - Application for either FEH or listed latching hardware
3. Frames with fixed (welded) Steelcraft mullions are considered to be two (2) single door frames.
 - 2" face minimum, 4" face maximum
 - Maximum 3 hr. rating

F-Series Frame Construction



MU-Series Frame Construction



Minimum Hardware Requirements:

- Listed hardware mullion or Steelcraft hollow metal mullion
- Strike for both leafs
- Closer for both leafs
- Approved hinges

THREE SIDED FRAMES FOR DOUBLE EGRESS:

Double Egress frames are designed to separate corridors into fire areas. The frame incorporates a pair of doors, which swing in opposite directions, without the use of a center mullion. Once the door and frame are installed, the doors line up in the center of the frame.

- **FE-Series Double Egress Frames** – The jamb profile reduces the corridor width by 5 1/4" (133mm). Swing clear hinges cannot be used with a standard FE-Series frame. A special profile FE-Series frame can accommodate swing clear hinges.
- **DE-Series Double Egress Frames** – The DE-Series frame is designed to maximize corridor clear opening width. The jamb profile accommodates the use of swing clear hinges which is a major consideration in areas where the code requires a minimum clear opening width in corridor applications.

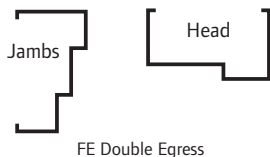
Maximum Rating	Wall Applications	Frame Series					Listings		
		Series	Jamb Depth		Corner		Maximum Sizes (Door Opening)		
			Min.	Max.	KD	Weld	UL	ITS/WHI	FM
3 Hr Max	Masonry	FE16, FE14	5-3/4	14	X	X	8'0" X 10'0"	8'0" X 10'0"	Not Listed
		DE16, DE14 (Notes #3,4)	5-3/4	14	N.A.	X	8'0" X 10'0"	8'0" X 10'0"	Not Listed
	Stud	FE16, FE14	5-3/4	14	X	X	8'0" X 8'0"	8'0" X 8'0"	Not Listed
		DE16, DE14 (Notes #3,4)	5-3/4	14	N.A.	X	8'0" X 8'0"	8'0" X 8'0"	Not Listed
1-1/2 Hr (90 min) Max	Masonry/Stud	FE16, FE14	5-3/4	14	X	X	8'0" X 10'0"	8'0" X 10'0"	Not Listed
		DE16, DE14	5-3/4	14	N.A.	X	8'0" X 10'0"	8'0" X 10'0"	Not Listed

NOTES:

Double Egress frame options

1. Net head width is 1/8" narrower than standard double door frames.
2. Surface or concealed vertical rod FEH is the only approved latching hardware.
3. DE-Series frame depth refers to the frame depth of the head section.
4. DE-Series frames must be supplied welded
5. Mullions are not approved

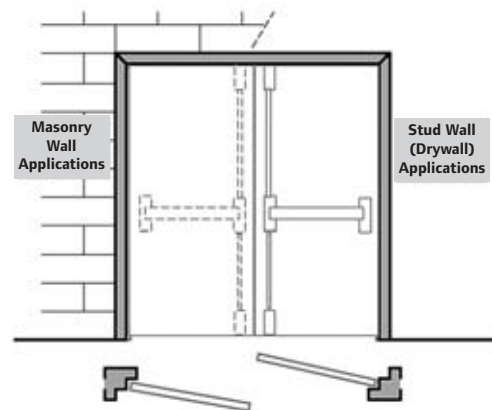
FE and DE-Series Double Egress Frame Construction



FE Double Egress



DE Double Egress



Minimum Hardware Requirements:

- Vertical rod on both leaves
- Closers both leaves
- Approved hinges

THREE SIDED FRAMES FOR MULTIPLE DOOR OPENINGS

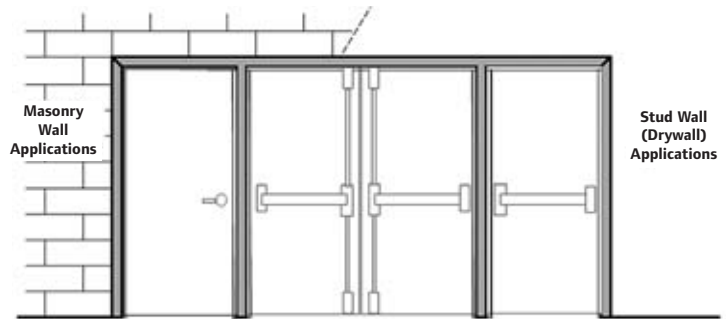
Multiple opening frames include 3 or more doors in one frame and are usually used in corridor applications which lead to theater or arena locations.

Maximum Rating	Wall Applications	Frame Series					Listings		
		Series	Jamb Depth		Corner		Maximum Sizes (Door Opening)		
			Min.	Max.	KD	Weld	UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	Masonry/Stud	F16, F14	4-3/4	14	N.A.	X	12'8" X 8'4"	12'8" X 8'4"	Not Listed
		FN16, FN14	4-3/4	14	N.A.	X	12'8" X 8'4"	12'8" X 8'4"	Not Listed
		MU16, MU14	4-3/4	14	N.A.	X	12'8" X 8'4"	12'8" X 8'4"	Not Listed

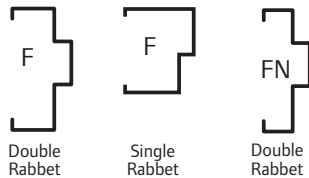
NOTES:

Three sided frame options for multiple door openings:

1. Frames must be welded
2. Hollow metal hinge mullions must be welded in place
3. Face dimensions:
 - Jamb & head 4" maximum
 - Mullion face dimensions = 2" minimum 4" maximum
4. Elevation options:
 - Single doors
 - 4'0" X 8'0" max door size
 - Double doors (vertical mullion optional)
 - 8'0" X 8'0" max door size
 - doors must swing in same direction
 - Frames can not include transoms or side lights or panels



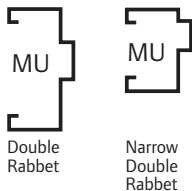
F-Series and FN-Series Frame Construction



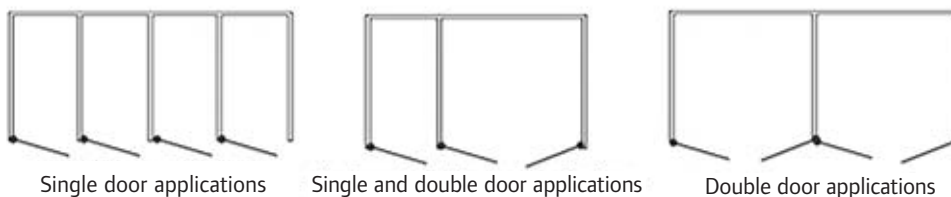
Minimum Hardware Requirements:

- Strike for each leafs
- Closer for each leafs
- Approved hinges

MU-Series Frame Construction



Elevation variations:



THREE SIDED FRAMES FOR DUTCH DOOR FRAMES:

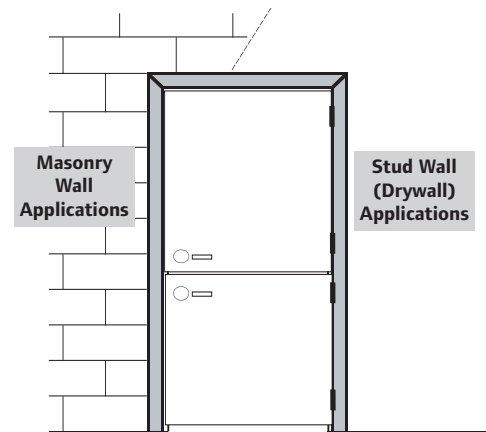
Dutch door frames are designed for use with Steelcraft labeled dutch doors, and are used in storeroom areas.

Maximum Rating	Wall Applications	Frame Series				Listings			
		Series	Jamb Depth		Corner		Maximum Sizes (Door Opening)		
			Min.	Max.	KD	Weld	UL	ITS/WHI	FM
3 Hr Max	Masonry/ Stud	F16, F14	3	14	X	X	4'0" X 7'2"(Single)	4'0" X 7'2"(Single)	4'0" X 7'2"(Single)
		MU16, MU14	3-1/4	14	N.A.	X	4'0" X 7'2"(Single)	4'0" X 7'2"(Single)	4'0" X 7'2"(Single)
1-1/2 Hr (90 min) Max	Masonry/Stud	F16, F14	3	14	X	X	4'0" X 7'2"(Single)	4'0" X 7'2"(Single)	4'0" X 7'2"(Single)
		MU16, MU14	3-1/4	14	X	X	4'0" X 7'2"(Single)	4'0" X 7'2"(Single)	4'0" X 7'2"(Single)

NOTES:

Three sided frame options for dutch doors:

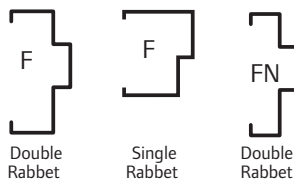
- Strike preparations are required for both the top and bottom leafs, unless the top leaf latches into the bottom leaf.



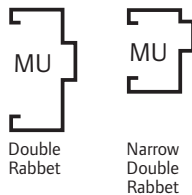
Minimum Hardware Requirements:

- Strike for top and bottom leaf (see Note 1).
- Closers (top leaf)
- Approved hinges

F-Series Frame Construction



MU-Series Frame Construction



THREE SIDED COMMUNICATING FRAMES

Communicating openings – an application including a door(s) mounted in both rabbets, usually used in the Hospitality markets and installed between adjoining rooms.

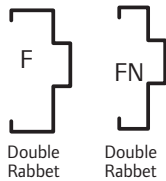
Maximum Rating	Wall Applications	Frame Series					Listings		
		Series	Jamb Depth		Corner		Maximum Sizes (Door Opening)		
			Min.	Max.	KD	Weld	UL	ITS/WHI	FM
3 Hr Max	Masonry	F16, F14	5-3/4	14	X	X	4'0" X 10'0"	4'0" X 10'0"	4'0" X 8'0"
		MU16, MU14	5-3/4	14	X	X	4'0" X 9'0"	4'0" X 9'0"	4'0" X 8'0"
	Stud	F16, F14	5-3/4	14	X	X	4'0" X 8'0"	4'0" X 8'0"	Not Listed
		MU16, MU14	5-3/4	14	N.A.	X	4'0" X 8'0"	4'0" X 8'0"	Not Listed
1-1/2 Hr (90 min) Max	Masonry/Stud	F16, F14	5-3/4	14	X	X	4'0" X 10'0"	4'0" X 10'0"	4'0" X 8'0"
		MU16, MU14	5-3/4	14	X	X	4'0" X 9'0"	4'0" X 9'0"	Not Listed
	Stud	DW16, DW14 K16, K14	5-3/4	14	X	N.A.	4'0" X 9'0"	4'0" X 8'10"	4'0" X 8'0"

NOTES:

Three sided frame options for single doors:

1. Frames over 9' 0" in height and installed in stud walls require the jamb anchors to be welded to the frame.
2. The IBC currently allows for the omission of closers on communicating door assemblies in hotel/motel applications.

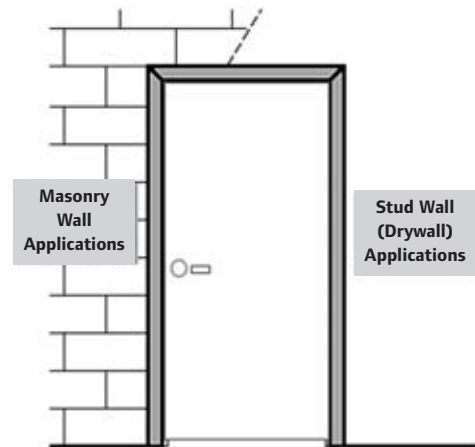
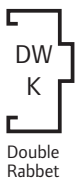
F-Series Frame Construction



MU-Series Frame Construction

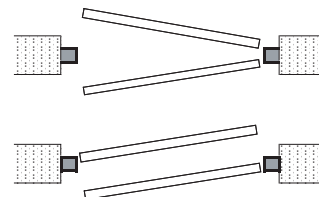


DW and K-Series Frame Construction



Minimum Hardware Requirements:

1. Strike for single point latch
2. Closer – see note # 2
3. Approved hinges



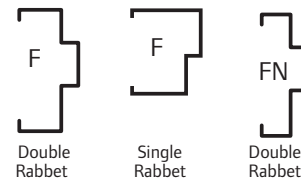
FRAME PROFILE VARIATIONS

The following frame profile variations or options may be specified on 3 sided frames and are approved as noted below by **UL**, **ITS/WH** and **FM**. For hourly ratings and approved opening sizes, refer to the appropriate frame applications pages of this manual.

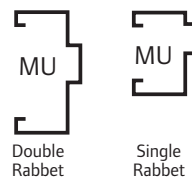
Profile Variation	FRAME APPLICATIONS					
	Single swing	Pairs	Pairs with Removable Mullion	Double Egress	Multiple Opening	Dutch (Single swing)
Hospital Stops	F, FN, MU, DW, K	F, FN, MU, DW, K	N. A.	N. A.	F, MU	F, MU
Equal Rabbet	F, FN, MU, DW, K	F, FN, MU, DW, K	F, FN, MU, DW, K	N. A.	F, MU	F, MU
Lead Lined	F*	F*	N. A.	N. A.	N. A.	N. A.

* Masonry applications only

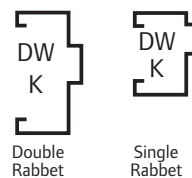
F-Series Frame Construction



MU-Series Frame Construction

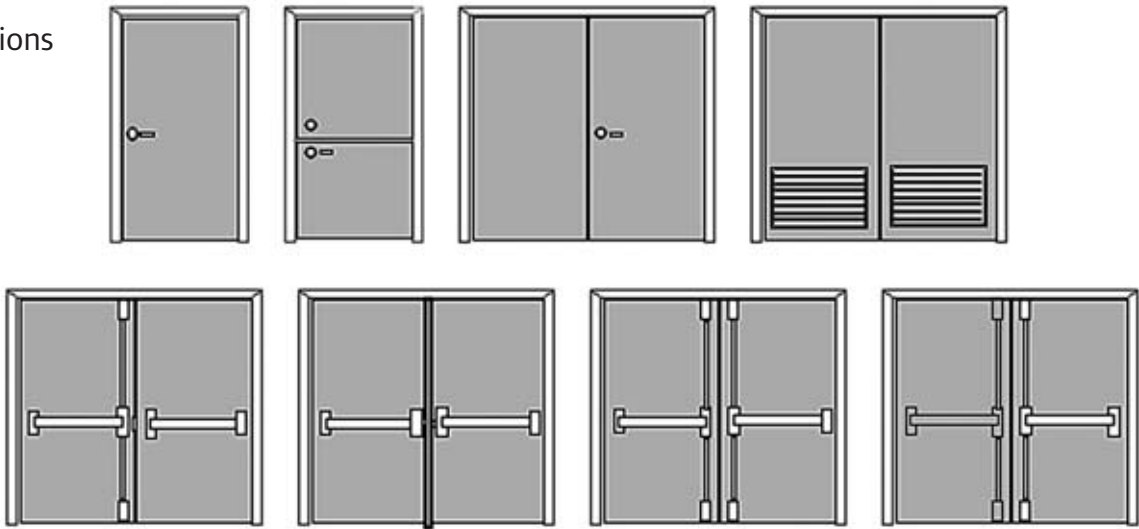


DW and K-Series Frame Construction



DOORS

Typical Elevations



FIRE RATED STEEL DOORS:

Doors covered in this section have been tested in accordance with NFPA252-1999, and listed by either Underwriters Laboratories (UL), Warnock Hersey (IT/WHI) and FM (FM). The ratings and sizes available are shown on the following pages.

Listed Steelcraft doors are for all commercial building applications. Variations in hardware and glass lights must be considered in the selection of the correct door construction.

LIGHTS:

Fire rated doors can be prepared for glass lights. The required hourly rating will dictate the approved glass lights available. All glass used in fire rated doors must be listed glass. Basic guidelines on glass are as follows:

- **3 hour** - flush door, no glass.
 - UL & ITS/WH allow one (1) light with 100 square inches (.06 square meters) maximum of glass is permitted on 3 hour L, B, & T series doors if Fire Light or other 3 hour listed glazing material is used. Maximum width of 12" (305 mm) or height of 33" (838mm).
- **1-1/2 hour** - 100 sq. in. per door leaf max.
 - UL & ITS/WH allow one 1296 square inches (.84 square meters) maximum of glass is permitted on 1 1/2 hour L & B series doors if Fire Light or other appropriately listed glazing material is used. Maximum width of 36" (914 mm) or height of 54" (1372mm). UL listed L-Series doors may have multiple lights, provided each light does not exceed 1296 square inches of exposed glass area.
- **3/4 hour** - 1296 sq. in. per light with neither dimension exceeding 54", unless listed otherwise.
 - Exception — UL, ITS/WH and FM Global/Approvals allow 3/4 hour doors with multiple lights provided the limits of 1296 square inches per light and 54 inches are not exceeded.
- **20 minute** - 1296 sq. in. per light with neither dimension exceeding 54", unless listed otherwise.

LOUVERS:

Fire rated door can be prepared for one listed fire rated louver located in the bottom half of the door. Doors with louvers can only be located in equipment and mechanical areas of the building. FM does not allow the use of louvers in fire rated doors. Basic guidelines on louvers for UL & ITS/WH are as follows:

- 3/4 hour and 1 1/2 hour listings.
- 24" X24" maximum louver size
- Glass lights can not be used in conjunction with louvers

DOOR VIEWERS:

- 1 1/2 hour maximum fire listings.
- 3/4" maximum hole size.
- 2 viewer preps maximum per door, minimum 12" apart.

DOORS

APPROVED DOOR SERIES:

Regardless of the door series being used, all doors must be installed with labeled hardware, and into labeled frames and firewalls. Door constructions covered in this section are listed below:

- A-Series – stile and rail with beveled edges
- B-Series – welded steel stiffened core with beveled edges
- CE-Series – laminated core with beveled edges and panel embossed face sheets
- H & HE-Series – specifically designed for hurricane code applications
- L-Series – laminated core with beveled edges and either honeycomb or polystyrene cores
- PW-Series – specifically designed for tornado code applications
- SL-Series – laminated core with square edges and either honeycomb or polystyrene cores
- T-Series – specially designed for maximum 250° F temperature rise applications

DOOR LIGHT DESIGNS:

Fire rated doors are available in the following door designs:

- F = Flush door with no glass cutout. 3 hour maximum listing.
- V = Vision light with a nominal 100 sq. in. located in the upper half of the door. 3 hour maximum listing with Fire Light glass.
- N3, N4, N5 = Narrow light variations, which are 100 sq. in. exposed glass area, and located at eye level, near the lock edge. 3 hour maximum listing with Fire Light glass.
- N = Narrow light varies with the door height, exceeds 100 sq. in. of exposed glass area, and is located near the lock edge. 3/4 hour or 20 min. maximum listing.
- G = Half glass light (size will vary with the door size) located in the upper half of the door. 3/4 hour or 20 min. maximum listing.
- FG = Full glass 20 minute w/o hose stream.
- FG2 / FG3 = Full glass with multiple lights (size will vary with the door size). 3/4 hour or 20 min. maximum listing.
- Door viewers = Must be fire rated construction. 1-1/2 hour maximum. 3/4" diameter hole maximum.

TEMPERATURE RISE RATINGS:

In accordance with the products listed for IBC 2006, all fire doors must state a temperature rise rating. The Steelcraft doors are rated for temperature rise as follows:

- 250°F or 450°F temperature rise = T & TH Series
- Over 650°F temperature rise = L, B, CE, H, HE, SL, and A-Series

LISTING INFORMATION COVERED:

All listings covered in this section are for reference and assistance in developing overall parameters of approvals. Several variables such as glass lights, hardware, wall construction and application will affect the fire ratings. Individual manufacturer's listings will take precedence.

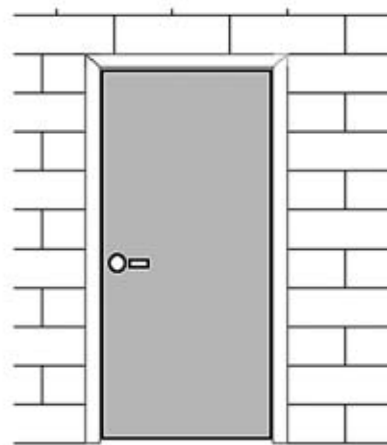
INSTALLATION:

Installation of all Steelcraft doors shall conform to the published Steelcraft installation instructions, ANSI/SDI A250.11 Recommended Installation Instructions for Steel Frames and HMMA 840. All fire rated frames must be installed in accordance with NFPA Pamphlet 80, and/or the local AHJ.

Details are subject to change without prior notice.

SINGLE DOORS WITH SINGLE POINT LOCKS AND LATCHES

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
3 Hr Max	L18, L16	4'0" x 10'0"	4'0" x 8'0"	4'0" x 8'0"
	L14	4'0" x 10'0"	4'0" x 7'2"	4'0" x 8'0"
	B18, B16	4'0" x 10'0"	N/A	N/A
	T18, T16, T14	4'0" x 9'0"	N/A	4'0" x 8'0"
	T20	3'0" x 8'0"	N/A	N/A
	SL18	4'0" x 8'0"	4'0" x 8'0"	N/A
	B14	4'0" x 8'0"	N/A	N/A
	TH16, TH14	4'0" x 8'0"	N/A	N/A
	H16, H14	4'0" x 8'0"	N/A	N/A
	HE16 (E6)	3'0" x 8'0"	N/A	N/A
	CE18, CE16 (E6)	3'0" x 8'0"	N/A	N/A
	L-20	3'0" x 7'2"	3'0" x 7'2"	N/A
	SL-20	3'0" x 7'2"	3'0" x 7'2"	N/A
	CE18* (E6)	3'8" x 7'0"	N/A	N/A
	HE16 (E6)	3'0" x 7'0"	N/A	N/A
	CE20 (E6)	3'0" x 7'0"	N/A	N/A
	CE18, CE16 (E6)	3'0" x 7'0"	N/A	N/A
1-1/2 Hr (90 min) Max	L18, L16	4'0" x 10'0"	4'0" x 9'0"	4'0" x 8'0"
	B14	4'0" x 10'0"	N/A	N/A
	L20	3'0" x 8'0"	3'0" x 8'0"	N/A
	SL20	3'0" x 8'0"	3'0" x 8'0"	N/A
	CE20 (E6)	3'0" x 8'0"	N/A	N/A
3/4 Hr (45 min) Max	A16 (FG2, FG3)	4'0" x 8'0"	N/A	N/A
20 Min without Hose Stream	A16 (FG)	4'0" x 8'0"	N/A	N/A

**Minimum Hardware Requirements:**

- Single point lock/latch
Example: 161, 61L, 160, 160-4, 86, 86ED, 86 w/sectional trim
- Closer
- Approved hinges

NOTES:

1. For maximum rating and glass size requirements refer to glass light information
- * 2. **Embossed 6 panel CE18** series door design is available and listed up to and including 3' 8" X 7' 0" door size. All other CE series doors designs are available as noted above.

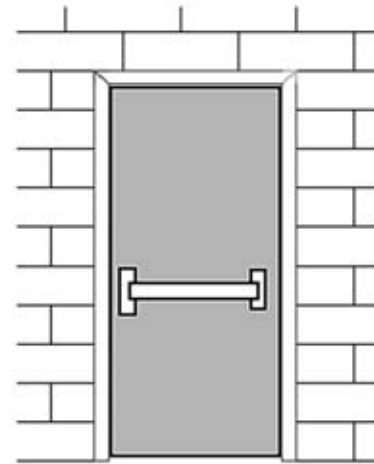
Details are subject to change without prior notice.

SINGLE DOORS WITH FIRE EXIT HARDWARE

Maximum Rating	Door Series	Maximum Door Size	
		UL	ITS/WHI
3 Hr Max	L18, L16	4'0" x 10'0"	4'0" x 8'0"
	L14	4'0" x 10'0"	4'0" x 7'2"
	B18, B16	4'0" x 10'0"	N/A
	T18, T16, T14	4'0" x 9'0"	N/A
	SL18	4'0" x 8'0"	4'0" x 8'0"
	B14	4'0" x 8'0"	N/A
	TH16, TH14	4'0" x 8'0"	N/A
	H16, H14	4'0" x 8'0"	N/A
	T20	3'0" x 8'0"	N/A
	HE16 (E6)	3'0" x 8'0"	N/A
	CE18, CE16 (E6)	3'0" x 8'0"	N/A
	L20	3'0" x 7'2"	3'0" x 7'2"
	SL20	3'0" x 7'2"	3'0" x 7'2"
	HE16 (E6)	3'0" x 7'0"	N/A
	CE20	3'0" x 7'0"	N/A
	CE18, CE16 (E6)	3'0" x 7'0"	N/A
	CE18 (E6)	3'8" x 7'0"	N/A
1-1/2 Hr (90 min) Max	L18, L16	4'0" x 10'0"	4'0" x 9'0"
	B14	4'0" x 10'0"	N/A
	CE20 (E6)	3'0" x 8'0"	N/A
3/4 Hr (45 min) Max	A16, (FG2, FG3)	4'0" x 8'0"	N/A
20 Min without Hose Stream	A16 (FG)	4'0" x 8'0"	N/A

NOTES:

1. For maximum rating and glass size requirements refer to glass light information



Minimum Hardware Requirements:

- RPD or MPD Fire Exit Hardware
- Closer
- Approved hinges

Details are subject to change without prior notice.

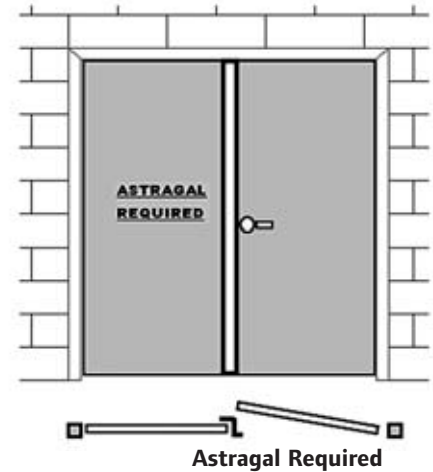
PAIRS WITH ASTRAGAL — SWING IN THE SAME DIRECTION

- Active Leaf — single point lock or latch
- Inactive leaf — closed back strike and surface or flush bolts

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
3 Hr Max	L18, L16	8'0" x 8'0"	8'0" x 8'0"	8'0" x 8'0"
	L14	8'0" x 8'0"	8'0" x 7'2"	8'0" x 8'0"
	SL18	8'0" x 8'0"	8'0" x 8'0"	N/A
	B18, B16, B14	8'0" x 8'0"	N/A	N/A
	T18, T16, T14	8'0" x 9'0"	N/A	8'0" x 8'0"
	TH16, TH14	8'0" x 8'0"	N/A	N/A
	H16, H14	8'0" x 8'0"	N/A	N/A
	T20	6'0" x 8'0"	N/A	N/A
	HE16 (E6)	6'0" x 8'0"	N/A	N/A
	CE18, CE16 (E6)	6'0" x 8'0"	N/A	N/A
	HE16 (E6)	6'0" x 7'0"	N/A	N/A
	CE16 (E6)	6'0" x 7'0"	N/A	N/A
	CE18 (E6)	7'4" x 7'0"	N/A	N/A
1-1/2 Hr (90 minute) Max	B18, B16, B14	8'0" x 10'0"	N/A	N/A
	L18, L16	8'0" x 10'0"	8'0" x 9'0"	8'0" x 8'0"
	L14	8'0" x 9'0"	8'0" x 7'2"	8'0" x 8'0"
	L20	6'0" x 7'2"	6'0" x 7'2"	N/A
	SL20	6'0" x 7'2"	6'0" x 7'2"	N/A
	CE20 (E6)	6'0" x 7'0"	N/A	N/A
3/4 Hr (45 min) Max	A16 (FG2, FG3)	8'0" x 8'0"	N/A	N/A
20 Min without Hose Stream	A16 (FG)	8'0" x 8'0"	N/A	N/A

NOTES:

1. For maximum rating and glass size requirements refer to glass light information

**Minimum Hardware Requirements:**

Active leaf

- Single point lock/latch
Example: 161, 61L, 160, 160-4, 86, 86ED, 86 w/sectional trim
- Closer
- Approved hinges

Inactive leaf

- Closed back strike
- Auto flush bolts
- Approved hinges
- Closer

Coordinator is required

Note – flush bolt sets omit bottom bolt, using Fire Latch (pin), is acceptable per hardware manufacturer's listing approval.

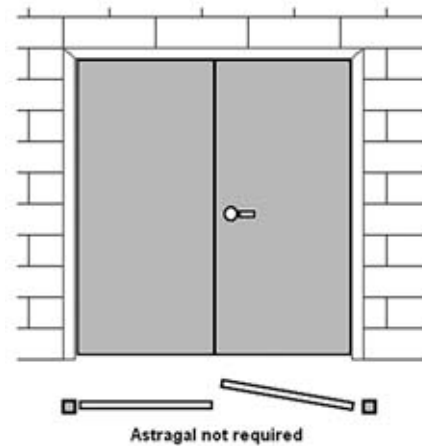
PAIRS WITHOUT ASTRAGAL — SWING IN THE SAME DIRECTION

- Active Leaf — single point lock or latch
- Inactive leaf — closed back strike and surface or flush bolts
- Coordinator required

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	B18, B16, B14	8'0" x 8'0"	N/A	N/A
	L18, L16	8'0" x 7'2"	8'0" x 7'2"	8'0" x 7'2"
	SL18	8'0" x 7'2"	8'0" x 7'2"	N/A
	CE18 (E6)	7'4" x 7'0"	N/A	N/A
	CE16 (E6)	6'0" x 7'0"	N/A	N/A

NOTES:

1. For maximum rating and glass size requirements refer to glass light information



Minimum Hardware Requirements:

Active leaf

- Single point lock/latch
Example: 161, 61L, 160, 160-4, 86, 86ED, 86 w/sectional trim
- Closer
- Approved hinges

Inactive leaf

- Wide inactive leaf
- Closer
- Strike preparation
- Auto flush bolts
- Approved hinges

Coordinator is required

Note – flush bolt sets omit bottom bolt, using Fire Latch (pin), is acceptable per hardware manufacturer's listing approval.

Details are subject to change without prior notice.

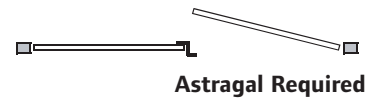
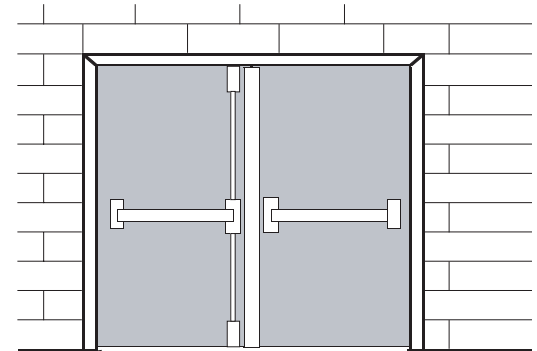
PAIRS WITH ASTRAGAL — SWING IN THE SAME DIRECTION

- Active Leaf — Mortise FEH
- Inactive leaf — Vertical Rod FEH, closed back strike
- Coordinator required

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
3 Hr Max	L18, L16	8'0" x 8'0"	8'0" x 8'0"	8'0" x 8'0"
	L14	8'0" x 8'0"	8'0" x 7'2"	8'0" x 8'0"
	B18, B16, B14	8'0" x 8'0"	N/A	N/A
	T18, T16, T14	8'0" x 9'0"	N/A	N/A
	CE18, CE16 (E6)	6'0" x 8'0"	N/A	N/A
	CE16 (E6)	6'0" x 7'0"	N/A	N/A
	CE18 (E6)	7'4" x 7'0"	N/A	N/A
1-1/2 Hr (90 min) Max	B18, B16, B14	8'0" x 10'0"	N/A	N/A
	L18, L16	8'0" x 10'0"	8'0" x 9'0"	8'0" x 8'0"
	L14	8'0" x 9'0"	8'0" x 7'2"	8'0" x 8'0"
3/4 Hr (45 min) Max	A16 (FG2, FG3)	8'0" x 8'0"	N/A	N/A
20 Min without Hose Stream	A16 (FG)	8'0" x 8'0"	N/A	N/A

NOTES:

1. For maximum rating and glass size requirements refer to glass light information
2. Pairs for 3 hour rating, the Inactive leaf with Surface or Concealed Vertical rod must be top and bottom latching (NO LBR)
3. Pairs for 1 1/2 hour rating can be equipped with LBR devices if the hardware manufacture is approved for that application.
4. Mortise Fire Exit Devices x Closed back strike, w/Surface or Flush Bolts. Flush Bolts sets omit bottom bolt, using Fire Latch (pin), is acceptable per hardware manufacturer's listing approval
5. Open back strike not permitted on this application

**Astragal Required****Minimum hardware requirements:**

Active leaf

- Mortise FEH
- Closer
- Approved hinges

Inactive leaf

- Surface or concealed vertical rod FEH. (LBR) Less Bottom Rod option is available based on hardware manufacturer's listing approval (1 1/2 hour maximum)
- Closer
- Approved hinges

Coordinator is required

Details are subject to change without prior notice.

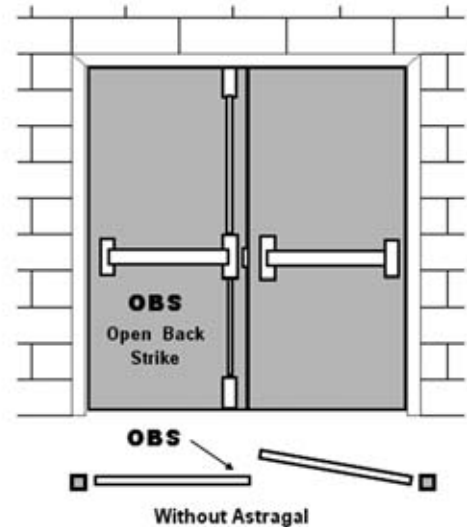
PAIRS WITHOUT ASTRAGAL — SWING IN THE SAME DIRECTION w/OBS

- Active Leaf - Mortise FEH
- Inactive leaf – Vertical Rod FEH, OBS (open back strike) strike
- Coordinator Required

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	L18, L16, L14	8'0" x 8'0"	N/A	8'0" x 7'2"
	SL18	8'0" x 8'0"	N/A	N/A
	B18, B16, B14	8'0" x 8'0"	N/A	N/A
	CE18 (E6)	7'4" x 7'0"	N/A	N/A
	CE18, CE16 (E6)	6'0" x 8'0"	N/A	N/A
	CE16 (E6)	6'0" x 7'0"	N/A	N/A

NOTE:

1. For maximum rating and glass size requirements refer to glass light information



Minimum hardware requirements:

Active leaf

- Mortise FEH
- Closer
- Approved hinges

Inactive leaf (Wide Inactive Leaf)

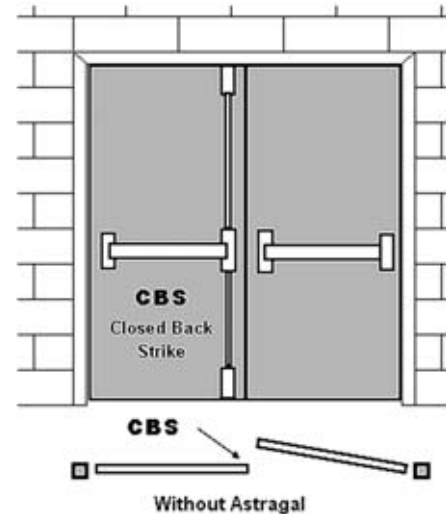
- Surface or concealed vertical rod FEH. (LBR) Less Bottom Rod option is available based on hardware manufacturer's listing approval
- Open back strike preparation
- Closer
- Approved hinges

Details are subject to change without prior notice.

PAIRS WITHOUT ASTRAGAL — SWING IN THE SAME DIRECTION

- Active Leaf - Mortise FEH
- Inactive leaf – Vertical Rod FEH, closed back strike

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	L18, L16, L14	8'0" x 8'0"	N/A	8'0" x 7'2"
	SL18	8'0" x 8'0"	N/A	N/A
	B18, B16, B14	8'0" x 8'0"	N/A	N/A
	CE18, CE16 (E6)	6'0" x 8'0"	N/A	N/A
	CE16 (E6)	6'0" x 7'0"	N/A	N/A
	CE18 (E6)	7'4" x 7'0"	N/A	N/A

**Minimum hardware requirements:**

Active leaf

- Mortise FEH
- Closer
- Approved hinges

Inactive leaf (Wide Inactive Leaf)

- Surface or concealed vertical rod FEH.
- Closed back strike preparation
- Closer
- Approved hinges

(LBR) Less Bottom Rod option is available based on hardware manufacturer's listing approval

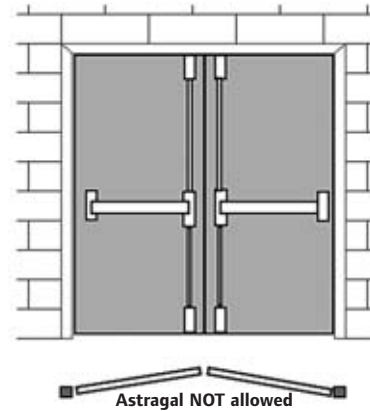
Coordinator is required

Details are subject to change without prior notice.

PAIRS WITHOUT ASTRAGAL — SWING IN THE SAME DIRECTION

- Active Leaf - Vertical Rod FEH
- Inactive leaf – Vertical Rod FEH

Maximum Rating	Door Series	Maximum Door Size	
		UL	ITS/WHI
1-1/2 Hr (90 minute) Max	B18, B16	8'0" x 10'0"	N/A
	L18, L16	8'0" x 9'0"	8'0" x 9'0"
	L14	8'0" x 9'0"	N/A
	PW14	8'0" x 8'0"	N/A
	T18, T16	8'0" x 9'0"	N/A
	SL18	8'0" x 8'0"	8'0" x 8'0"
	TH16	8'0" x 8'0"	N/A
	H16	8'0" x 8'0"	N/A
	HE16 (E6)	6'0" x 8'0"	N/A
	CE18, CE16 (E6)	6'0" x 8'0"	N/A
	HE16 (E6)	6'0" x 7'0"	N/A
	CE16 (E6)	6'0" x 7'0"	N/A
	CE18 (E6)	7'4" x 7'0"	N/A
3/4 Hr (45 min) Max	A16 (FG2, FG3)	8'0" x 8'0"	N/A
20 Min without Hose Stream	A16 (FG)	8'0" x 8'0"	N/A



Minimum Hardware Requirements:

Active leaf

- Surface or concealed vertical rod FEH
- Closer
- Approved hinges

Inactive leaf (Wide Inactive Leaf)

- Surface or concealed vertical rod FEH
- Closer
- Approved hinges

(LBR) Less Bottom Rod option is available based on hardware manufacturer's listing approval.

NOTES:

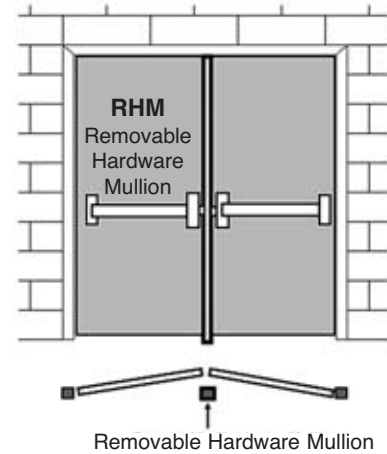
1. Pairs of doors without an astragal are not listed or available for 3 hour applications. **Astragals can not be used in this hardware application.**
2. For maximum rating and glass size requirements refer to glass light information
3. Maximum 450°F degree on all temperature rise doors.
4. Paladin (PW14-Series) tornado resistant doors require Von Duprin WS9927(F) vertical rod FEH. LBR option is not available.

Details are subject to change without prior notice.

PAIRS WITH REMOVABLE HARDWARE MULLION — SWING IN THE SAME DIRECTION

• Rim FEH x Rim FEH

Maximum Rating	Door Series	Maximum Door Size	
		UL	ITS/WHI
3 Hr Max	L18, L16	8'0" x 10'0"	8'0" x 8'0"
	L14	8'0" x 10'0"	8'0" x 7'2"
	SL18	8'0" x 8'0"	8'0" x 8'0"
	B18, B16	8'0" x 10'0"	N/A
	B14	8'0" x 8'0"	N/A
	H16, H14	8'0" x 8'0"	N/A
	T18, T16, T14	8'0" x 9'0"	N/A
	CE18, CE16 (E6)	6'0" x 8'0"	N/A
	L20	6'0" x 7'2"	6'0" x 7'2"
	SL20	6'0" x 7'2"	6'0" x 7'2"
	HE16 (E6)	6'0" x 8'0"	N/A
	CE20, CE16 (E6)	6'0" x 7'0"	N/A
	CE18 (E6)	7'4" x 7'0"	N/A
1-1/2 Hr (90 min) Max	L18, L16	8'0" x 10'0"	8'0" x 9'0"
	B14	8'0" x 10'0"	N/A
3/4 Hr (45 min) Max	A16, (FG2, FG3)	8'0" x 8'0"	N/A
20 Min without Hose Stream	A16 (FG)	8'0" x 8'0"	N/A

**Minimum Hardware Requirements:**

- RPD, Rim FEH
- Closer
- Fire rated and listed removable hardware mullion
- Approved hinges

NOTES:

1. Pairs of doors with removable mullions are treated and listed as 2 single doors
2. For maximum rating and glass size requirements refer to glass light information
3. Removable mullions must be listed. Maximum door size depends on the hardware manufacturer's approved and listed mullion height

Details are subject to change without prior notice.

PAIRS WITH STEELCRAFT REMOVABLE MULLION — SWING IN THE SAME DIRECTION

Applications:

1. Single point lock or latch x single point lock or latch
2. Mortise or Rim FEH x Mortise or Rim FEH

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
1-1/2 Hr (90 minute) Max	L18, L16	4'0" x 8'0"	4'0" x 8'0"	4'0" x 8'0"
	SL18	4'0" x 8'0"	4'0" x 8'0"	N/A
	L14	4'0" x 8'0"	4'0" x 7'2"	4'0" x 8'0"
	B18, B16, B14	4'0" x 8'0"	N/A	N/A
	T20	3'0" x 8'0"	N/A	N/A
	T18, T16, T14	4'0" x 8'0"	N/A	4'0" x 8'0"
	CE18, CE16 (E6)	3'0" x 8'0"	N/A	N/A
	CE20 (E6)	3'0" x 7'0"	N/A	N/A
	CE18 (E6)	3'8" x 7'0"	N/A	N/A
	CE18, CE16	3'0" x 7'0"	N/A	N/A
	L20 Sgl. Pt. Lock	3'0" x 8'0"	3'0" x 8'0"	N/A
	L20 Rim/Mort Panic	3'0" x 7'2"	3'0" x 7'2"	N/A
3/4 Hr (45 min) Max	A16 (FG2, FG3)	4'0" x 8'0"	N/A	N/A
20 Min without Hose Stream	A16 (FG)	4'0" x 8'0"	N/A	N/A

NOTES:

1. Pairs of doors with removable mullions are treated and listed as 2 single doors.
2. Minimum rating and glass size requirements refer to glass light information
3. AN series available with Rim Fire Exit hardware only
4. Steelcraft single or double rabbet Hollow Metal Mullion

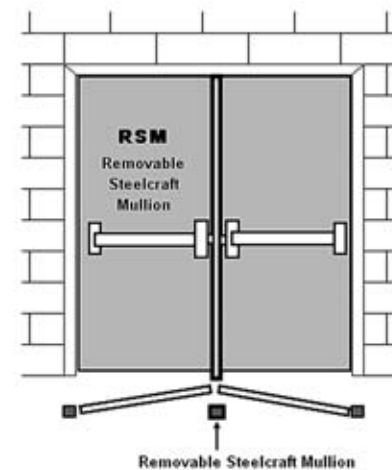
Details are subject to change without prior notice.



1. SINGLE POINT LATCH

Minimum Hardware requirements:

- Single point lock/latch
Example: 161, 61L, 160, 160-4, 86, 86ED, 86 w/sectional trim
- Closer
- Approved hinges



2. RIM or MORTISE FEH

Minimum Hardware requirements:

- Rim or Mortise FEH
Example: RPD, 86EDR
Listed FEH per manufacturers' listings
- Closer
- Approved hinges

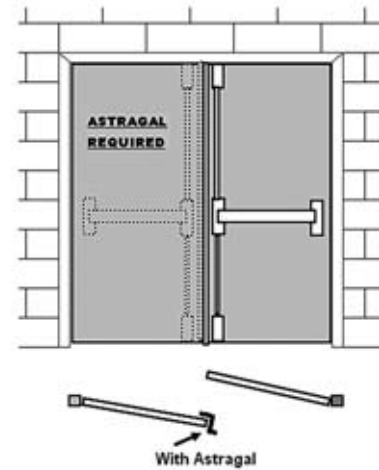
DOUBLE EGRESS PAIRS WITH ASTRAGAL — SWING IN OPPOSITE DIRECTION

1. Vertical Rod FEH
2. Vertical Rod FEH

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
3 Hr Max	B18, B16	8'0" x 10'0"	N/A	N/A
	L18, L16	8'0" x 8'0"	8'0" x 7'2"	8'0" x 8'0"
	SL18	8'0" x 8'0"	8'0" x 7'2"	N/A
	B14	8'0" x 8'0"	N/A	N/A
	T18, T16, T14	8'0" x 9'0"	N/A	N/A
1-1/2 Hr (90 min) Max	B14	8'0" x 10'0"	N/A	N/A
	L18, L16	8'0" x 9'0"	8'0" x 8'0"	8'0" x 8'0"
	L14	8'0" x 9'0"	N/A	N/A
	SL18	8'0" x 8'0"	8'0" x 8'0"	N/A

NOTES:

1. For maximum rating and glass size requirements refer to glass light information
2. Less Bottom Rod (LBR) option is available based on MFG Hardware listing approval

**Minimum Hardware Requirements:**

- Surface or concealed vertical rod FEH
- Closers
- Approved hinges

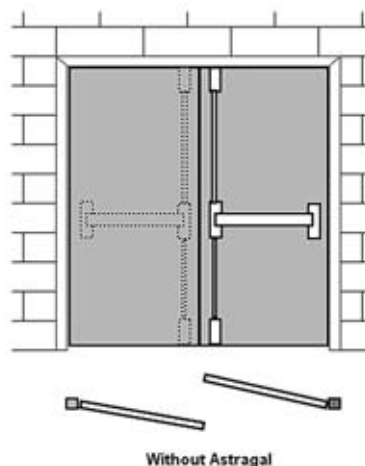
DOUBLE EGRESS PAIRS WITHOUT ASTRAGAL — SWING IN OPPOSITE DIRECTION

- Vertical Rod FEH
- Vertical Rod FEH

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
1-1/2 Hr (90 minute) Max	L18, L16	8'0" x 8'0"	8'0" x 8'0"	8'0" x 8'0"
	SL18	8'0" x 8'0"	8'0" x 8'0"	N/A
	B18, B16, B14	8'0" x 8'0"	N/A	N/A

NOTES:

1. For maximum rating and glass size requirements refer to glass light information
2. (Less Bottom Rod LBR) option is available base on MFG Hardware listing approval



Minimum Hardware requirements:

- Surface or concealed vertical rod FEH
- Closers
- Approved hinges

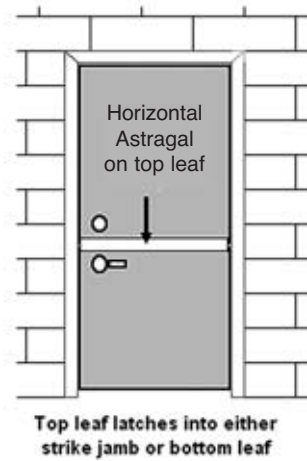
Details are subject to change without prior notice.

SINGLE DUTCH DOORS WITH SINGLE POINT LOCKS & LATCHES

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
3 Hr Max	L18, L16	4'0" x 7'2"	4'0" x 7'2"	4'0" x 7'2"

NOTES:

1. Door construction with honeycomb or polystyrene cores.
2. Maximum exposed glass light 100 square inches for doors 1-1/2 hour rated or less. Limited to one light in top leaf.
3. Top leaf must have a listed cylindrical lock, latching into strike jamb or into bottom leaf.
4. Bottom leaf must have a listed cylindrical lock or mortise lock design.
5. Dutch door shelf is optional, approved for 1/2 shelf only.
6. Dutch Door can only be used in single door applications, No double door configurations



Minimum Hardware Requirements:

Top leaf

- Listed cylindrical lock or latch
- Closer
- Approved hinges

Bottom leaf

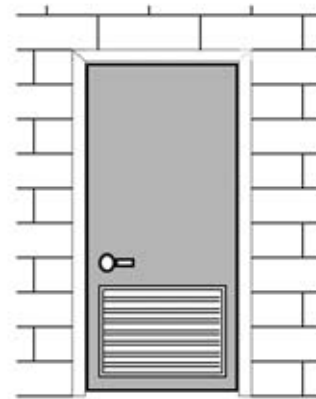
- Listed lock or latch

Details are subject to change without prior notice.

SINGLE DOORS WITH FIRE RATED LOUVERS

• WITH SINGLE POINT LOCKS AND LATCHES

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
1-1/2 Hr (90 minute) Max OR 3/4 Hr (45 minute) Max	B18, B16, B14	4'0" x 10'0"	N/A	N/A
	L18, L16	4'0" x 10'0"	4'0" x 9'0"	N/A
	L14	4'0" x 10'0"	4'0" x 7'2"	N/A
	SL18	4'0" x 8'0"	4'0" x 8'0"	N/A
	L20	3'0" x 8'0"	3'0" x 8'0"	N/A
	SL20	3'0" x 8'0"	3'0" x 8'0"	N/A
	H16, H14	4'0" x 8'0"	N/A	N/A



Minimum Hardware requirements:

Single door

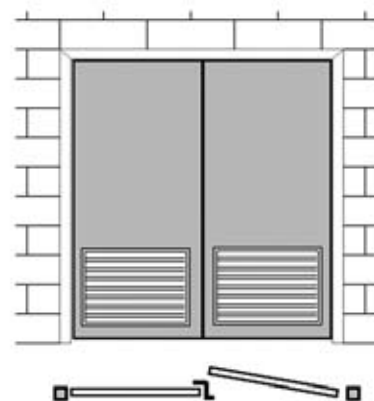
- Single point lock/latch
Example -161, 61L, 160, 160-4, 86, 86ED
- Closer
- Approved hinges

Details are subject to change without prior notice.

PAIRS WITH FIRE RATED LOUVERS & ASTRAGAL - SWING IN SAME DIRECTION

• WITH SINGLE POINT LOCKS AND LATCHES

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
1-1/2 Hr (90 minute) Max OR 3/4 Hr (45 minute) Max	B18, B16, B14	8'0" x 10'0"	N/A	N/A
	L18, L16	8'0" x 9'0"	8'0" x 9'0"	N/A
	L14	8'0" x 9'0"	8'0" x 7'2"	N/A
	SL18	8'0" x 8'0"	8'0" x 8'0"	N/A
	L20	6'0" x 8'0"	6'0" x 8'0"	N/A
	SL20	6'0" x 8'0"	6'0" x 8'0"	N/A



Astragal Required

NOTES:

1. 'L' Door construction with honeycomb or polystyrene cores.
2. Louver must be a listed fusible link louver.
3. Louver must be located at the bottom of the door.
Only one per door, maximum size 24" x 24".
4. Pairs require an Astragal.
5. Louvers permitted in 1-1/2 or 3/4 hour rated doors only.
6. Doors can not include glass lights.
7. Minimum 12" from bottom of door to cut out.
8. Flush Bolts sets omit bottom bolt, using Fire Latch (pin), is acceptable per hardware manufacturer's listing approval.

Minimum Hardware requirements:

Active leaf

- Single point lock/latch
- Closer
- Approved hinges

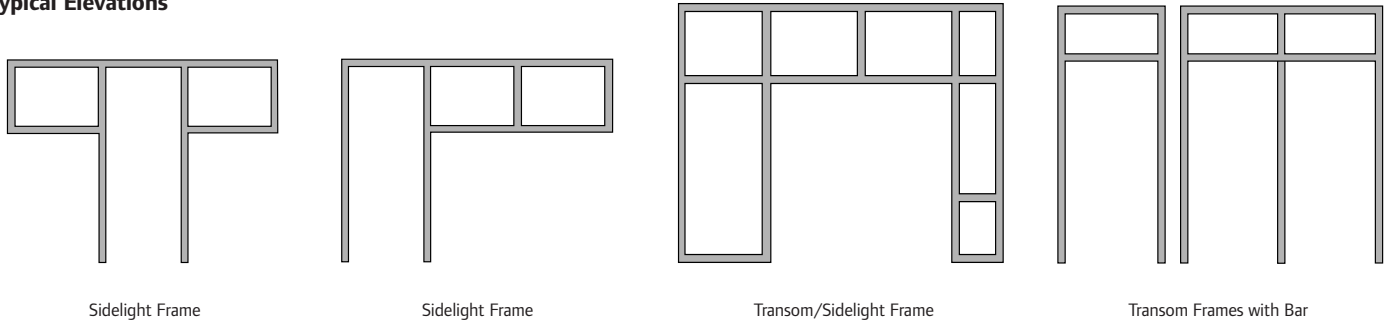
Inactive leaf

- Strike preparation
- Flush, surface auto bolts
- Approved hinges

Details are subject to change without prior notice.

TRANSOM AND SIDELIGHT FRAMES:

Typical Elevations



Sidelight Frame

Sidelight Frame

Transom/Sidelight Frame

Transom Frames with Bar

FIRE RATED TRANSOM AND SIDELIGHTS:

The transom and sidelight frames covered in this section, have been tested in accordance with UL 10C, NFPA 252 - 1999 and listed by either Underwriters Laboratories (UL), Warnock Hersey (ITS/WHI) and FM Global (FM). The ratings and sizes available are shown on the following pages.

Labeled transom and sidelight frames are welded prior to arriving at the jobsite and are available in the following configurations:

- **Transom Light frame** – A frame assembly which includes a fixed horizontal transom bar, and a light (window) directly above the door.

The transom bar separates the door opening from the transom light. The door opening can be for:

- Single door latching into end jamb or window/panel mullion
- Two single doors with a center mullion
 - Rim FEH latching into hardware manufacturer's mullion
 - Lock/latch sets latching into hollow metal mullion
- Double (pair) door without a mullion & swinging in same direction

- **Sidelight frame** – A frame assembly which includes both a fixed vertical mullion bar, and a light (window) adjacent to one or both sides of the door.

The mullion bar separates the door opening from the side light. The door opening can be for:

- Single door latching into end jamb or window/panel mullion
- Two single doors with a center mullion
 - Rim FEH latching into hardware manufacturer's mullion
 - Lock/latch sets latching into hollow metal mullion
- Double (pair) door without a mullion & swinging in same direction

- **Transom and Sidelight frame** – A frame assembly which includes a fixed horizontal transom bar, and a light directly above the door, and a fixed vertical mullion bar, and a light adjacent to one or both sides of the door. The door opening can be for:

- Single door latching into end jamb or window/panel mullion
- Two single doors with a center mullion
 - Rim FEH latching into hardware manufacturer's mullion
 - Lock/latch sets latching into hollow metal mullion
- Double (pair) door without a mullion & swinging in same direction

APPROVED FRAME SERIES:

Frames covered in this section are F and MU. Regardless of the frame series being used, all frames must be installed into a fire rated wall.

SIZE LIMITATIONS:

Transom and side light frames must be shipped as welded units. Frames may be field spliced. For splicing details, refer to the Elevation Section of this manual. Maximum width, height and ratings shown on the following pages

LISTING INFORMATION COVERED:

All listings covered in this section are for reference and assistance in developing overall parameters of approvals. Several variables such as hardware, wall construction and application will affect the fire ratings. Individual manufacturer's listings will take precedence. All listings shown on this section conform to UL 10C and NFPA 252.

INSTALLATION:

Installation of all Steelcraft framing systems shall conform to the published Steelcraft installation instructions, ANSI/SDI A250.11 Recommended Installation Instructions for Steel Frames and ANSI A250.11 and HMMA 840. All fire rated frames and doors must be installed in accordance with NFPA Pamphlet 80, and/or the local AHJ.

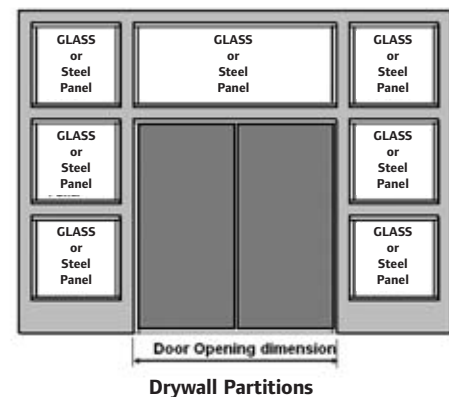
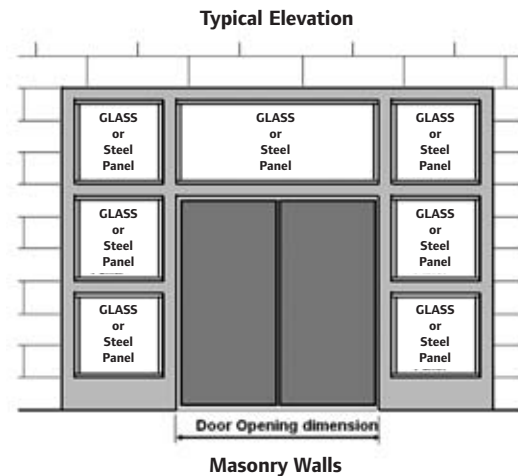
TRANSOM SIDELIGHT FRAME WITH GLASS AND/OR 1/2" STEELCRAFT LAMINATED STEEL PANELS

Maximum Rating	Wall Application	Frame Information			Listings		
		Series	Jamb Depth		Maximum Overall Frame Width & Height		
			Min.	Max.	UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	Masonry	F16, F14	3"	14"	13'6" x 12'2"	13'6" x 12'2"	N/A
	Masonry	MU16, MU14	3-1/4"	14"	13'6" x 12'2"	13'6" x 12'2"	N/A
	Stud	F16, F14	3-3/4"	14"	13'2" x 12'2"	13'2" x 12'2"	N/A
	Stud	MU16, MU14	3-3/4"	14"	13'2" x 12'2"	13'2" x 12'2"	N/A

NOTES:

- All frames must be shipped as welded units. Frames can be field spliced.
- Door opening:
 - All frames can be prepared for use with a single or double door.
 - Maximum single door size = 4'0" x 10'0".
 - Maximum double door size = Max. 8'0" x 10'0".
 - Double door can be with or without vertical mullion.
 - Frame can have up to two single door openings or one pair door opening.
 - Pair opening doors must swing in same direction.
- Glazing requirements:
 - All glass must be listed glazing material.
 - 1/2" thick laminated panels with mineral board core. Panel sizes are as follows:
 - Transom panels = 48" wide X 38" high
 - Side panels = 38" wide X 48" high
 - Glazing stop/bead requirements:
 - Stop width minimum 7/16" or as required by glazing manufacturer.
 - Stop height minimum 5/8" or as required by glazing manufacturer.
 - Glazing bead minimum 18 gage, or as required by glazing manufacturer.
- Special profile may be necessary due to special thickness of glazing.
- Frame profile variations:
 - Perimeter (Head and Jamb) frame
 - Masonry walls = minimum face 1" (FN)
 - Stud walls = minimum face 1-1/4"
 - Maximum face 4" masonry, steel or wood stud walls.
 - Interior dividing members
 - Members at door opening minimum face 1".
 - Vertical maximum face 4-1/2"
 - Horizontal maximum 8".
 - Sill section Minimum Face 2", maximum 16-1/8"
- The use and installation of frames with 1-1/2 hour (90 minute) ratings are subject to the approval of the local AHJ. These assemblies are tested and listed in accordance with UL10C and NFPA 252. Fire-protection-rated glazing materials must be installed in these assemblies. These assemblies are not tested in accordance with ASTM E119 or UL 263 (Fire Tests of Building Construction and Materials) and use of Fire-resistance-rated glazing materials will not make the frame compliant with ASTM E119 or UL 263.

Transom Frame / Sidelite Frame assemblies are tested and listed for fire protection in accordance with UL10C and NFPA 252. Where fire protection ratings are required, fire protection rated glazing shall be installed. The installation of fire resistance rated glazing does not qualify these assemblies for compliance with ASTM E119 or UL 263. The use and installation of transom sidelite frames are subject to approval of the AHJ.



TRANSOM SIDELIGHT FRAME WITH GLASS AND/OR 1-3/4" RATED WOOD PANELS

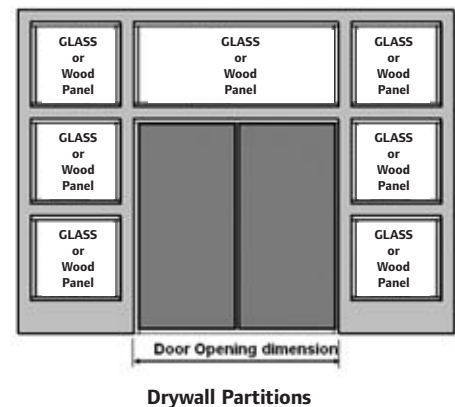
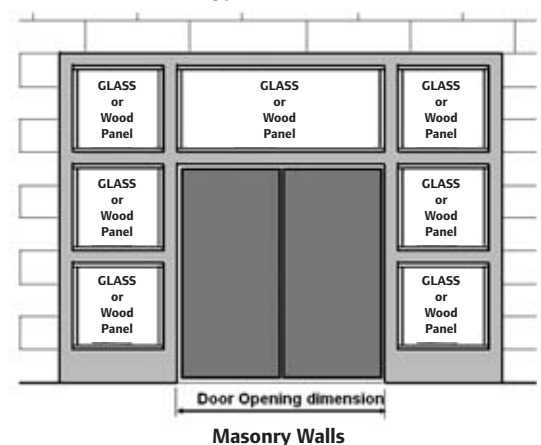
Maximum Rating	Wall Application	Frame Information			Listings		
		Series	Jamb Depth		Maximum Overall Frame Width & Height		
			Min.	Max.	UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	Masonry	F16, F14	4-3/4"	12-3/4"	13'6" x 12'2"	13'6" x 12'2"	N/A
	Masonry	MU16, MU14	4-3/4"	12-3/4"	13'6" x 12'2"	13'6" x 12'2"	N/A
	Stud	F16, F14	4-3/4"	12-3/4"	13'2" x 12'2"	13'2" x 12'2"	N/A
	Stud	MU16, MU14	4-3/4"	12-3/4"	13'2" x 12'2"	13'2" x 12'2"	N/A

NOTES:

- All frames must be shipped as welded units. Frames can be field spliced.
- Door opening:
 - All frames can be prepared for use with a single or double door.
 - Maximum single door size = 4'0" x 10'0".
 - Maximum double door size = Max. 8'0" x 10'0".
 - Double door can be with or without vertical mullion.
 - Frame can have up to two single door openings or one pair door opening.
 - Pair opening doors must swing in same direction.
- Wood doors and panels:
 - Maximum width, height, and rating based on wood door manufacturer's listing.
- Glazing requirements:
 - All glass must be listed glazing material.
 - Glazing stop/bead requirements:
 - Stop width minimum 7/16" or as required by glazing manufacturer.
 - Stop height minimum 5/8" or as required by glazing manufacturer.
 - Glazing bead minimum 18 gage, or as required by glazing manufacturer.
- Special profile may be necessary due to special thickness of glazing.
- Frame profile variations:
 - Perimeter (Head and Jambs) frame.
 - Masonry walls = minimum face 1" (FN).
 - Stud walls = minimum face 1-1/4".
 - Maximum face 4" masonry, steel or wood stud walls.
 - Interior dividing members .
 - Members at door opening minimum face 1".
 - Vertical maximum face 4-1/2".
 - Horizontal maximum 8".
 - Sill section Minimum face 2", maximum 16-1/8".
- Wood panels can be used in conjunction with metal panels or glass.
- Maximum jamb depth:
 - 14" if any glass is installed.
 - 12-3/4" if all wood panels.
- The use and installation of frames with 1-1/2 hour (90 minute) ratings are subject to the approval of the local AHJ. These assemblies are tested and listed in accordance with UL10C and NFPA 252. Fire-protection-rated glazing materials must be installed in these assemblies. These assemblies are not tested in accordance with ASTM E119 or UL 263 (Fire Tests of Building Construction and Materials) and use of Fire-resistance-rated glazing materials will not make the frame compliant with ASTM E119 or UL 263.

Transom Frame / Sidelite Frame assemblies are tested and listed for fire protection in accordance with UL10C and NFPA 252. Where fire protection ratings are required, fire protection rated glazing shall be installed. The installation of fire resistance rated glazing does not qualify these assemblies for compliance with ASTM E119 or UL 263. The use and installation of transom sidelite frames are subject to approval of the AHJ.

Typical Elevation



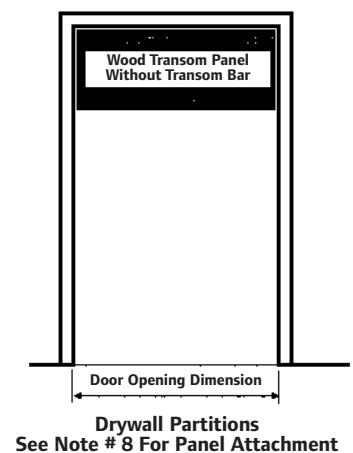
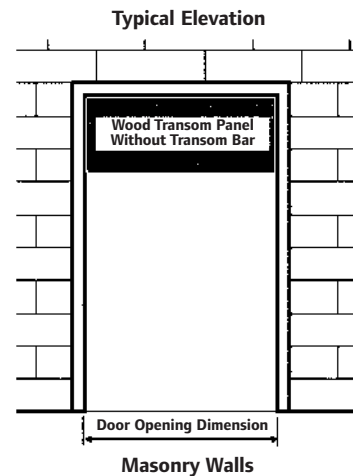
TRANSOM FRAME WITHOUT TRANSOM BAR (1-3/4" wood panel installations)

NOTE - Listed for Neutral Pressure - Wood door manufacturers may have positive pressure listings

Maximum Rating	Wall Application	Frame Information			Listings		
		Series	Jamb Depth		Maximum Door and Panel Opening Width & Height		
			Min.	Max.	UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	Masonry	F16, F14	4-3/4"	12-3/4"	4'0" x 11'0"	4'0" x 11'0"	N/A
	Masonry	FN16, FN14	4-3/4"	12-3/4"	4'0" x 11'0"	4'0" x 11'0"	N/A
	Masonry	MU16, MU14	4-3/4"	12-3/4"	4'0" x 11'0"	4'0" x 11'0"	N/A
	Stud	F16, F14	4-3/4"	12-3/4"	4'0" x 11'0"	4'0" x 11'0"	N/A
	Stud	MU16, MU14	4-3/4"	12-3/4"	4'0" x 11'0"	4'0" x 11'0"	N/A

NOTES:

- Sizes may vary based on wood door manufacturer's listings.
- 'F' series frames can be knocked down(KD)
- 'MU' series must be shipped as welded units.
- Maximum door size:
 - Single doors = see wood door manufacturer's listing.
 - Double doors = not approved
- Panel requirements:
 - 1-3/4 thick wood panel.
 - Maximum panel size = 4' 0" wide x 4' 0" high.
 - Wood panel installed with spring bolts requires reinforcing or frame preparations.
- Frame profile variations
 - Perimeter (Head and Jambs) frame
 - Masonry walls = minimum face 1" (FN)
 - Stud walls = minimum face 1-1/4"
 - Maximum face 4" masonry, steel or wood stud walls.
- Hardware applications:
 - Single door - follow standard label requirements.
- Refer to wood panel manufacturer's listing for spring bolt attachment into the frame.



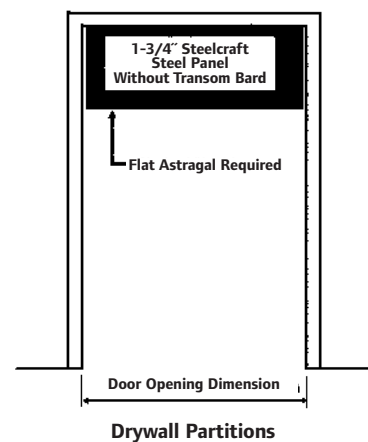
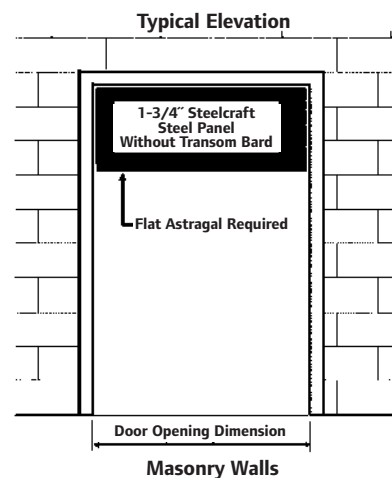
TRANSOM FRAME WITHOUT TRANSOM BAR (1-3/4" Steelcraft Steel panel installed)

NOTE - Listed for Neutral Pressure

Maximum Rating	Wall Application	Frame Information			Listings – Maximum Door and Panel Opening Width and Height		
		Series	Jamb Depth		UL & ITS/WHI		FM
			Min.	Max.	Single Doors	Double Doors	
3 Hr Max	Masonry	F16, F14	4-3/4"	12-3/4"	4'0" x 11'2"	8'0" x 11'2"	N/A
	Masonry	FN16, FN14	4-3/4"	12-3/4"	4'0" x 11'2"	8'0" x 11'2"	N/A
	Masonry	MU16, MU14	4-3/4"	12-3/4"	4'0" x 11'2"	8'0" x 11'2"	N/A
1-1/2 Hr (90 min) Max	Stud	F16, F14	4-3/4"	12-3/4"	4'0" x 10'0"	8'0" x 10'0"	N/A
	Stud	MU16, MU14	4-3/4"	12-3/4"	4'0" x 10'0"	8'0" x 10'0"	N/A

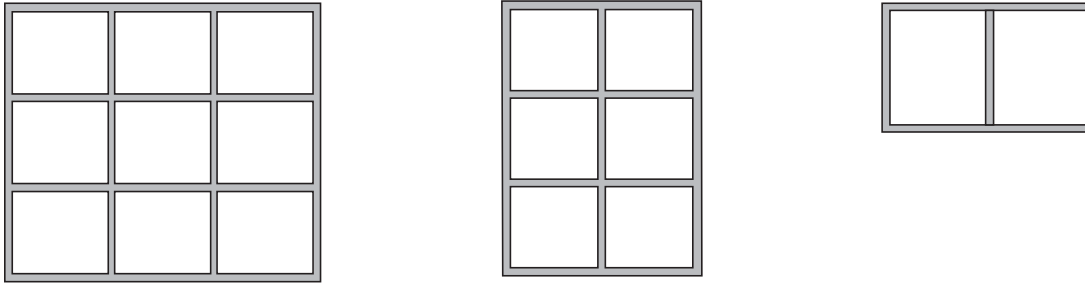
NOTES:

- 'F' series frames can be knocked down(KD)
- 'MU' series must be shipped as welded units.
- Maximum door size:
 - Single doors = 4080
 - Double doors = 8080 must swing in same direction
- Panel requirements:
 - 1-3/4 thick steel panel
 - Maximum panel size:
 - Single doors = 48" wide X 48" high
 - Double doors = 96" wide X 48" high
- Frame profile variations
 - Perimeter (Head and Jambs) frame
 - Masonry walls = minimum face 1" (FN)
 - Stud walls = minimum face 1-1/4"
 - Maximum face 4" masonry, steel or wood stud walls.
- Hardware applications:
 - Single door - follow standard label requirements.
 - Double doors – limited to flush bolts x single point latch or Mortise FEH.



WINDOW FRAMES

Typical Elevations



FIRE RATED WINDOW FRAMES:

The fire window (borrowed light) frames covered in this section, have been tested in accordance with NFPA 257, and UL9 and listed by either Underwriters Laboratories (UL), Warnock Hersey (IT/WHI) and FM Global (FM). The ratings and sizes available are shown on the following pages.

Fire window frames are commonly referred to as Labeled Borrowed Light Frames, and can be installed in labeled masonry, wood and steel stud wall constructions. They are available in both single and multiple lights and in the following applications:

- Sitting on the floor – Frame is located on the floor and anchored to both the floor and adjacent wall structures
- Above the floor – Frame is located above the floor line and is anchored into the surrounding wall structure.

The overall size of the fire window will vary with the type of wall construction it is installed in, and the location of the window in the wall. Generally, fire windows that sit on the floor can be of a larger size than those located above the floor and in the wall.

APPROVED FRAME SERIES:

Frames covered in this section are F, DW and MU-Series. Regardless of the frame series being used, all frames must be installed into fire rated walls.

SIZE LIMITATIONS:

F and MU-Series Fire Window frames with multiple lights must be shipped as welded units. Single glass pane F, MU and DW-Series lights can be supplied KD (knock-down). Some frames may be field spliced. For splicing details, refer to the Elevation Section of this manual. Maximum width, height and ratings shown on the following pages

Width and height dimensions as shown in this manual can not be reversed.

LISTING INFORMATION COVERED:

All listings covered in this section are for reference and assistance in developing overall parameters of approvals. Several variables such as wall construction and application will affect the fire ratings. Individual manufacturer's listings will take precedence.

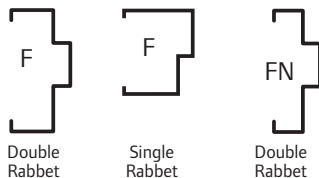
INSTALLATION:

Installation of all Steelcraft framing systems shall conform to the published Steelcraft installation instructions, ANSI/SDI A250.11 and HMMA 840.

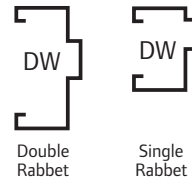
All fire rated doors and frames must be installed in accordance with NFPA Pamphlet 80, and/or the local AHJ.

All listings shown in this section conform to the requirements of NFPA 257, and UL9.

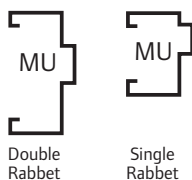
F-Series Frame Construction



DW Series Frame Construction



MU-Series Frame Construction



MASONRY WALLS - FIRE WINDOW LOCATED ON OR ABOVE THE FLOOR

Maximum Rating	Wall Application	Frame Information			Listings		
		Series	Jamb Depth		Maximum Overall Frame Width & Height		
			Min.	Max.	UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	Masonry Wall	F16, F14	3"	14"	13'6" x 12'0"	13'6" x 12'0"	N/A
	Masonry Wall	MU16, MU14	3-1/4"	14"	13'6" x 12'0"	13'6" x 12'0"	N/A

NOTES:

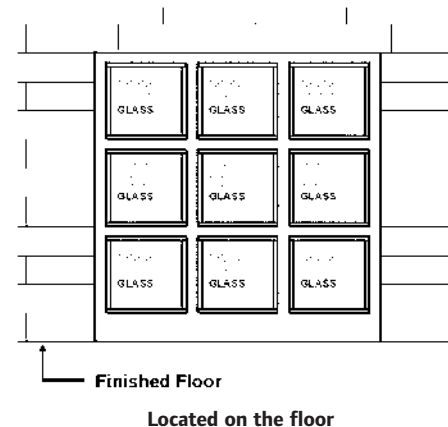
- All frames must be shipped as welded units, except single four sided frames with one light opening the maximum size depends on the glazing being used.
- Glazing requirements:
 - All glass must be listed glazing material.
 - Glazing stop/bead requirements:
 - Stop width minimum 7/16" or as required by glazing manufacturer.
 - Stop height minimum 5/8" or as required by glazing manufacturer.
 - Glazing bead minimum 18 gage, or as required by glazing manufacturer.
- Special profile may be necessary due to special thickness of glazing.
- Frame profile variations:
 - Perimeter (Head and Jamb) frame.
 - Minimum face 1".
 - Maximum face 4".
 - Interior dividing members .
 - Minimum face 1".
 - Maximum face 4-1/2".
 - Horizontal maximum 8".
 - Sill section.
 - Minimum face 2".
 - Maximum face 16-1/8".

NOTE: The use and installation of fire window frames with 1-1/2 hour (90 minute) ratings are subject to the approval of the local AHJ. These assemblies are tested and listed in accordance with UL9 and NFPA 257. Fire-protection-rated glazing materials must be installed in these assemblies.

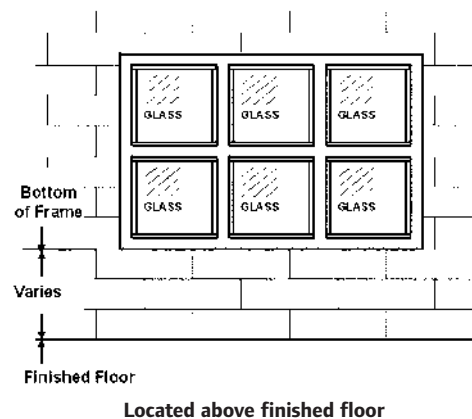
These assemblies are not tested in accordance with ASTM E119 or UL 263 (Fire Tests of Building Construction and Materials) and use of Fire-resistance-rated glazing materials will not make the frame compliant with ASTM E119 or UL 263.

Fire Window assemblies are tested and listed for fire protection in accordance with UL9, and NFPA 257. Where fire protection ratings are required, fire protection rated glazing shall be installed. The installation of fire resistance rated glazing does not qualify these assemblies for compliance with ASTM E119 or UL 263. The use and installation of transom sidelite frames are subject to approval of the AHJ.

Typical Elevation



Located on the floor



Located above finished floor

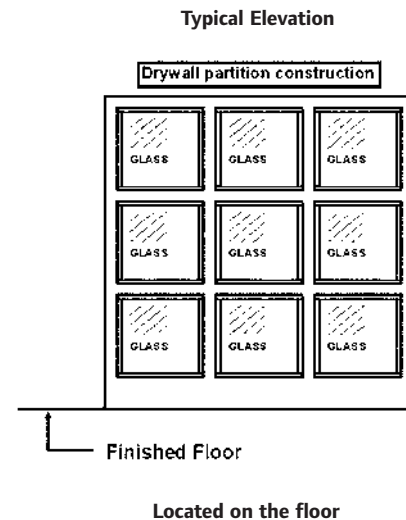
Details are subject to change without prior notice.

STUD WALLS – FIRE WINDOW LOCATED ON THE FLOOR

Maximum Rating	Wall Application	Frame Information			Listings		
		Series	Jamb Depth		Maximum Overall Frame Width & Height		
			Min.	Max.	UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	Stud	F16, F14	3-3/4"	14"	13'2" x 11'7"	13'2" x 11'7"	N/A
	Stud	MU16, MU14	3-3/4"	14"	13'2" x 11'7"	13'2" x 11'7"	N/A

NOTES:

- All frames must be shipped as welded units, except single four sided frames with one light opening the maximum size depends on the glazing being used.
- Glazing requirements:
 - All glass must be listed glazing material.
 - Glazing stop/bead requirements:
 - Stop width minimum 7/16" or as required by glazing manufacturer.
 - Stop height minimum 5/8" or as required by glazing manufacturer.
 - Glazing bead minimum 18 gage, or as required by glazing manufacturer..
- Special profile may be necessary due to special thickness of glazing.
- Frame profile variations:
 - Perimeter (Head and Jambs) frame
 - Minimum face 1-1/4".
 - Maximum face 4".
 - Interior dividing members
 - Minimum face 1"
 - Maximum face 4-1/2"
 - Horizontal maximum 8"
 - Sill section
 - Minimum face 2".
 - Maximum face 18".



NOTE: The use and installation of fire window frames with 1-1/2 hour (90 minute) ratings are subject to the approval of the local AHJ. These assemblies are tested and listed in accordance with UL9, and NFPA 257. Fire-protection-rated glazing materials must be installed in these assemblies.

These assemblies are not tested in accordance with ASTM E119 or UL 263 (Fire Tests of Building Construction and Materials) and use of Fire-resistance-rated glazing materials will not make the frame compliant with ASTM E119 or UL 263.

Fire Window assemblies are tested and listed for fire protection in accordance with UL9, and NFPA 257. Where fire protection ratings are required, fire protection rated glazing shall be installed. The installation of fire resistance rated glazing does not qualify these assemblies for compliance with ASTM E119 or UL 263. The use and installation of transom sidelite frames are subject to approval of the AHJ.

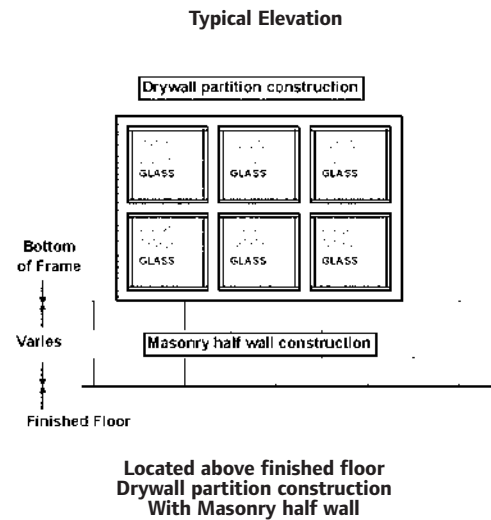
Details are subject to change without prior notice.

MASONRY SILL WITH STUD WALLS – FIRE WINDOW LOCATED OFF THE FLOOR

Maximum Rating	Wall Application	Frame Information			Listings		
		Series	Jamb Depth		Maximum Overall Frame Width & Height		
			Min.	Max.	UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	Stud	F16, F14	4-1/2"	14"	13'2" x 11'7"	13'2" x 11'7"	N/A
	Stud	MU16, MU14	4-1/2"	14"	13'2" x 11'7"	13'2" x 11'7"	N/A

NOTES:

- All frames must be shipped as welded units, except for single four sided frames with one light opening the maximum size depends on the glazing being used.
 - All glass must be listed glazing material.
 - Glazing stop/bead requirements:
 - Stop width minimum 7/16" or as required by glazing manufacturer.
 - Stop height minimum 5/8" or as required by glazing manufacturer.
 - Glazing bead minimum 18 gage, or as required by glazing manufacturer.
- Special profile may be necessary due to special thickness of glazing.
- Frame profile variations:
 - Perimeter (Head and Jamb) frame
 - Minimum face 1 1/4".
 - Maximum face 4".
 - Interior dividing members
 - Minimum face 1"
 - Maximum face 4-1/2"
 - Horizontal maximum 8"
 - Sill section
 - Minimum face 2".
 - Maximum face 16-1/8".



NOTE: The use and installation of fire window frames with 1-1/2 hour (90 minute) ratings are subject to the approval of the local AHJ. These assemblies are tested and listed in accordance with UL9, and NFPA 257. Fire-protection-rated glazing materials must be installed in these assemblies.

These assemblies are not tested in accordance with ASTM E119 or UL 263 (Fire Tests of Building Construction and Materials) and use of Fire-resistance-rated glazing materials will not make the frame compliant with ASTM E119 or UL 263.

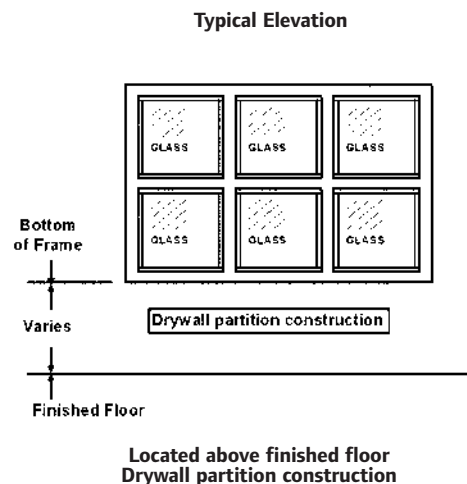
Fire Window assemblies are tested and listed for fire protection in accordance with UL9, and NFPA 257. Where fire protection ratings are required, fire protection rated glazing shall be installed. The installation of fire resistance rated glazing does not qualify these assemblies for compliance with ASTM E119 or UL 263. The use and installation of transom sidelite frames are subject to approval of the AHJ.

STUD WALLS – FIRE WINDOW LOCATED ABOVE THE FLOOR

Maximum Rating	Wall Application	Frame Information			Listings		
		Series	Jamb Depth		Maximum Overall Frame Width & Height		
			Min.	Max.	UL	ITS/WHI	FM
1-1/2 Hr (90 min) Max	Stud	F16, F14	3-3/4"	14"	12'10" x 11'4"	12'10" x 11'4"	N/A
	Stud	MU16, MU14	3-3/4"	14"	12'10" x 11'4"	12'10" x 11'4"	N/A

NOTES:

- All frames must be shipped as welded units, except for single four sided frames with one light Opening the maximum size depends on the glazing being used.
- Glazing requirements:
 - All glass must be listed glazing material.
 - Glazing stop/bead requirements:
 - Stop width minimum 7/16" or as required by glazing manufacturer.
 - Stop height minimum 5/8" or as required by glazing manufacturer.
 - Glazing bead minimum 18 gage, or as required by glazing manufacturer.
- Special profile may be necessary due to special thickness of glazing.
- Frame profile variations:
 - Perimeter (Head and Jamb) frame
 - Minimum face 1-1/4" steel or wood stud walls.
 - Maximum face 4" steel or wood stud walls.
 - Interior dividing members
 - Minimum face 1"
 - Maximum face 4-1/2"
 - Horizontal maximum 8"
 - Sill section
 - Minimum face 1 1/4".
 - Maximum face 4".



NOTE: The use and installation of fire window frames with 1-1/2 hour (90 minute) ratings are subject to the approval of the local AHJ. These assemblies are tested and listed in accordance with UL9, and NFPA 257. Fire-protection-rated glazing materials must be installed in these assemblies.

These assemblies are not tested in accordance with ASTM E119 or UL 263 (Fire Tests of Building Construction and Materials) and use of Fire-resistance-rated glazing materials will not make the frame compliant with ASTM E119 or UL 263.

Fire Window assemblies are tested and listed for fire protection in accordance with UL9, and NFPA 257. Where fire protection ratings are required, fire protection rated glazing shall be installed. The installation of fire resistance rated glazing does not qualify these assemblies for compliance with ASTM E119 or UL 263. The use and installation of transom sidelite frames are subject to approval of the AHJ.

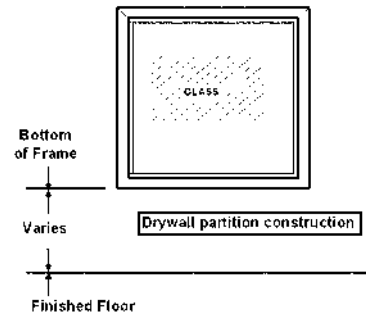
STUD WALLS – FIRE WINDOW LOCATED ABOVE THE FLOOR DW SERIES

Maximum Rating	Wall Application	Frame Information			Listings UL, ITS/WHI and FM			
		Series	Jamb Depth		Maximum Rabbet to Rabbet Dimension			FM
			Min.	Max.	Width	Height	Area	
60 minutes	Stud	DW16, DW14	4-1/2"	14"	78-1/4"	78-1/4"	2721 squ. inches	N/A
45 minutes	Stud	DW16, DW14	3-3/4"	14"	55-1/4"	55-1/4"	1296 squ. inches	N/A
20 minutes without hose	Stud	DW16, DW14	3-3/4"	14"	72"	72"	3307 squ. inches	N/A

NOTES:

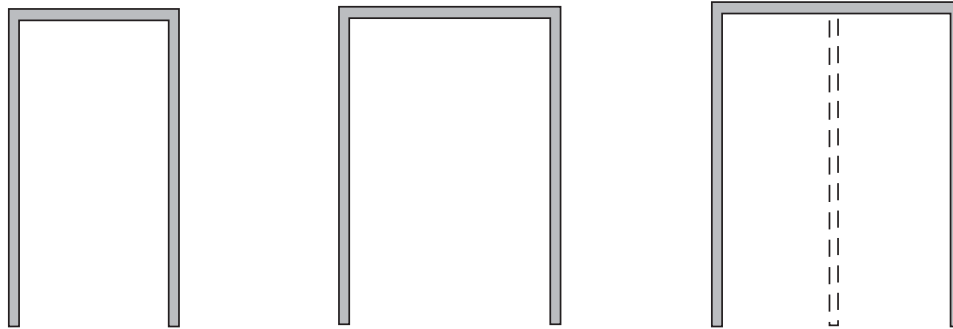
- All frames with one light opening (without mullion dividers) are with KD corner connections.
- Glazing requirements:
 - 60 Min. requires special listed glazing material. (see glazing charts)
 - Glazing stop/bead requirements:
 - a. Stop width minimum 7/16" or as required by glazing manufacturer.
 - b. Stop height minimum 5/8" or as required by glazing manufacturer.
 - c. Glazing bead minimum 18 gage, or as required by glazing manufacturer.
 - Frame profile variations:
 - Perimeter (Head and Jambs) frame
 - a. Perimeter frame Minimum face 2"
 - b. Perimeter frame Maximum face 2"

Typical Elevation



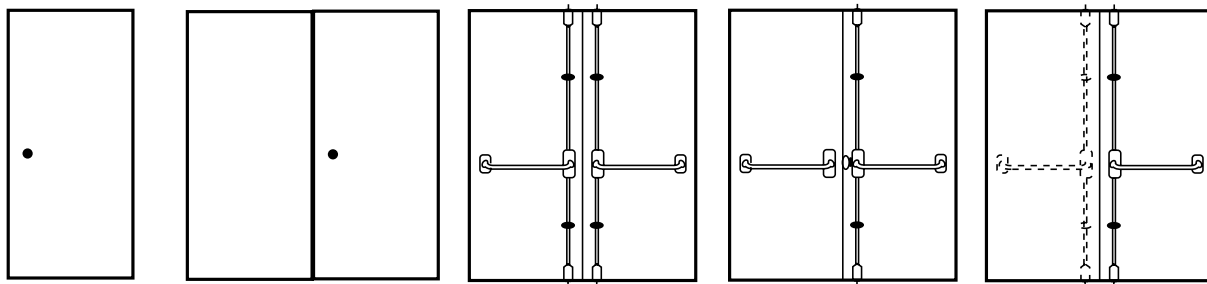
SMOKE AND DRAFT RATED PRODUCTS:

Typical Frame Elevations:



All three (3) sided frame series and elevations shown in **Section 9.2 of this manual** are approved for Smoke and Draft label applications.

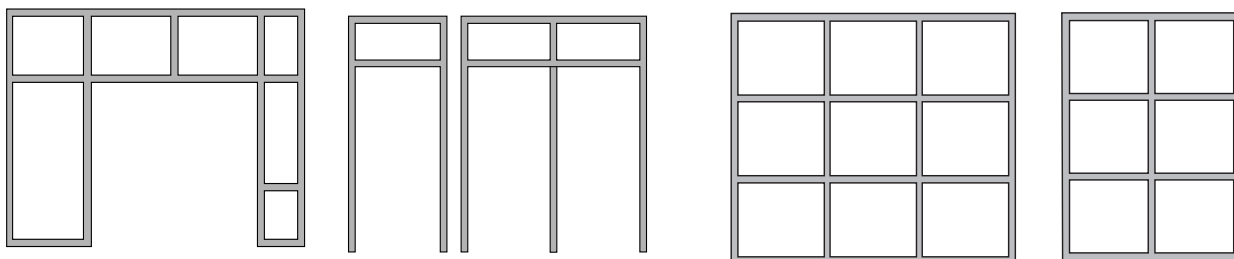
Typical Door Elevations:



All door series and elevations shown in **Section 9.3 of this manual** are approved for Smoke and Draft label applications except:

- Fusible Link Louvers are not approved for smoke and draft applications

Transom and Side Light Frames Fire Window (Borrowed Light) Frames



Transom/Sidelight Frame elevations are listed for Smoke and Draft Control applications.

Fire Window (Borrowed Light) Frame elevations are not required to be listed for Smoke and Draft Control applications.

Doors and frames covered in this section have been tested or evaluated in accordance with UL 10C, and UL 1784 listed by either Underwriters Laboratories (UL) or Warnock Hersey. FM Global (FM) does not offer listings for Smoke and Draft rated products. The main components of a Smoke and Draft Rated assembly are:

1. Frame (steel fire rated)
2. Door (steel fire rated)
3. Hardware (fire rated and required)
4. Smoke Seals (fire/smoke control rated)
5. Fire Rated Wall

SMOKE AND DRAFT RATED DOORS AND FRAMES:

FRAMES (Steel):

Smoke and Draft Rated Assemblies must include a Fire Rated Door Frame. Three sided frames are designed to be set on the floor anchored to the wall construction. All frame anchoring must be in accordance with the installation instructions for the appropriate frame construction.

DOORS (Steel):

Smoke and Draft Rated Assemblies must include a Fire Rated Door. Steelcraft doors are listed for most commercial building applications. Variations in hardware and glass lights must be considered in the selection of the correct door construction. Smoke and Draft Rated doors can be prepared for glass lights. The required hourly rating will dictate the approved glass lights available. All glass used in fire rated doors must be listed glass, and be either 1/4" wire or other listed glazing material. Basic guidelines on glass are as follows:

- **3 hour** – flush door, no glass.
 - Exception – one (1) light with 100 square inches (.06 square meters) maximum of glass is permitted on 3 hour L, B, & T series doors if Fire Light or other 3 hour listed glazing material is used. Maximum width of 12" (305 mm) or height of 33" (838mm).
- **1-1/2 hour** – 100 sq. in. per door leaf max.
 - 1296 square inches (.84 square meters) maximum of glass is permitted on 1 1/2 hour L & B series doors if Fire Light or other appropriately listed glazing material is used. Maximum width of 36" (914 mm) or height of 54" (1372mm). UL listed doors may have multiple lights, provided each light does not exceed 1296 square inches of exposed glass area.
- **3/4 hour** – 1296 sq. in. per light with neither dimension exceeding 54", unless listed otherwise.
 - Exception – 3/4 hour doors may have multiple lights provided the limits of 1296 square inches per light and 54 inches are not exceeded.
- **20 minute** – 1296 sq. in. per light with neither dimension exceeding 54", unless listed otherwise.

Doors with louvers are not listed for use in areas requiring Smoke and Draft Ratings.

HARDWARE:

Hardware used on Smoke and Draft rated assemblies conform to the same requirements as a conventional fire rated door assembly.

GASKETING:

Smoke and Draft Rated Assemblies must include the appropriate Fire/Smoke Rated Seals.

Steelcraft frames: Must have a UL10C/UL1784 Listed/Classified gasketing applied to the frame head and jambs, installed in accordance with the gasketing manufacturer's installation instructions.

Steelcraft doors: Recommend a UL10C/UL1784 Listed/Classified gasketing applied to the meeting stile edges of pairs of doors which do not include an astragal.

Door bottom gasketing is not required unless required by the local authority having jurisdiction.

Intumescent gasketing is not required for hollow metal doors installed in hollow metal frames.

The clearance between the door and frame, meeting edges of pairs of doors, and the floor and the bottom of the door must meet the requirements specified in NFPA-80.

Wood doors in steel frames: Refer to the wood door manufacturer's listing for gasketing required for their product to comply with UL10C/UL1784 listings.

FIRE RATED WALL:

The wall requirements for Smoke and Draft Control Assemblies are the same as conventional Fire Door Assemblies.

HOURLY RATINGS:

Smoke and Draft Rated Assemblies are mainly intended for use in 20 minute with out hose stream applications. Depending on building code requirements and the AHJ, they may be required in areas requiring 3/4, 1-1/2 or 3 hour listings.

APPROVED PRODUCTS:

- Frames – F, FN, DW, K, FE, DE, and MU Series
- Doors – L, B, CE, H, HE, SL, TH, T, A, and AN Series

LISTING INFORMATION COVERED:

All listing covered in this section are for reference and assistance in developing overall parameters of approvals. Several variables such as hardware, wall construction and application will affect the fire ratings. Individual manufacturer's listing will take precedence.

INSTALLATION:

Installation of all Steelcraft framing systems shall conform to the published Steelcraft installation instructions, ANSI/SDI A250.11 "Recommended Installation Instructions for Steel Frames", and HMMA 840. All fire rated frames must be installed in accordance with NFPA 80, and/or the Local AHJ.