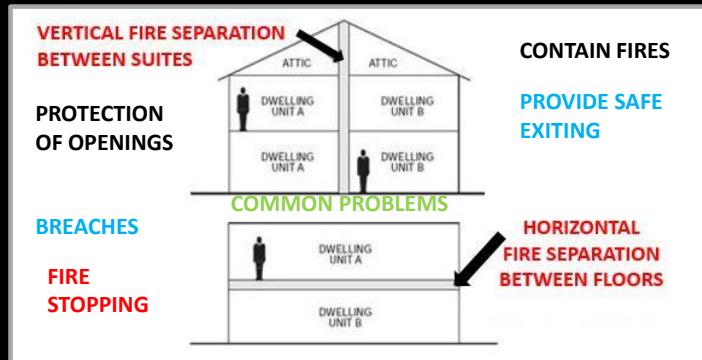


UNIT 3 FIRE SEPARATIONS



Welcome to Unit 3, Fire Separations. In this unit we will discuss:

- The way in which fire separations can limit the spread of fire vertically and horizontally in a building
- Identify how fire separations can contain the fire to the room of origin and provide safe exiting
- Fire separation requirements between suites
- Protection for openings that are allowed in fire separations
- Common fire separation problems
- Self-closing and hold open devices for doors
- Clearances around doors
- Breaches in fire separations
- Penetrations through fire separations
- Fire stopping

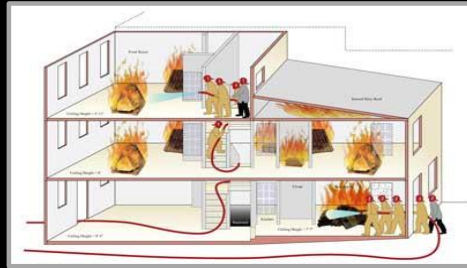


Fire separations along with early fire detection and adequate exiting are the three most important aspects of a fire safe building. Fire separations are structural elements made in accordance to building code requirements that prevent the spread of fire for a given period of time. Fire separations are provided in buildings to limit the spread of fire and the premature collapse of the building under fire conditions.

Rooms, areas and suites in buildings are usually separated into fire compartments. These compartments contain the fire and reduce fire spread allowing people to escape. They also contain the fire until the fire department arrives and extinguishes the fire.

Think of a fire compartment like a box. Most multi-tenant buildings have many fire compartments (boxes), which are situated side by side and on top of each other. Generally, each fire compartment has walls, a floor and a ceiling. The walls are fire separations that limit the spread of fire horizontally from one fire compartment to an adjoining fire compartment. The top and bottom of each fire compartment are floor ceiling assemblies that separate one storey from another. The floor and ceiling assemblies limit the spread of fire vertically from one fire compartment or from one floor in the building to another.

FIRE SEPARATIONS



DESIGNED TO KEEP THE FIRE IN THE ROOM OF ORIGIN



Fire separations are designed to divide buildings into compartments so that a fire starting in one area will not spread to other compartments in the building.



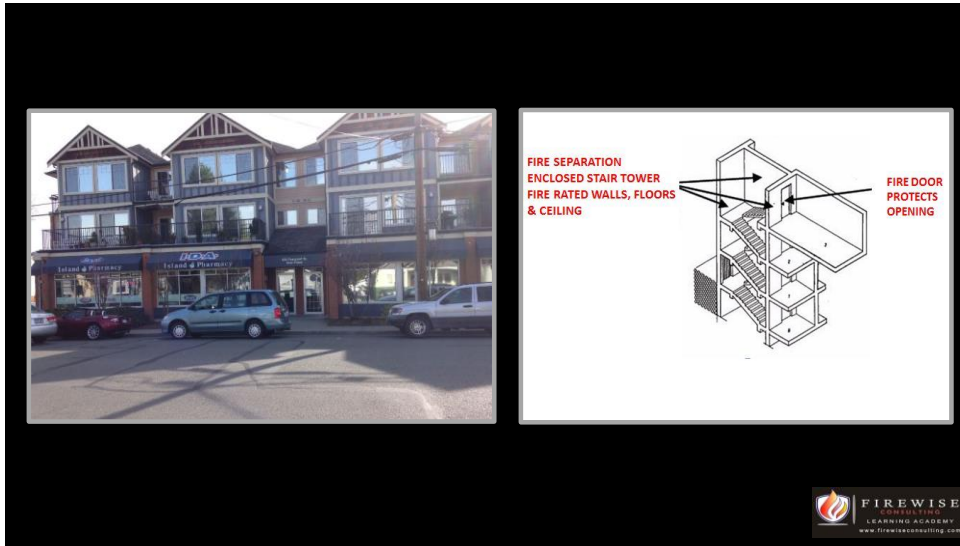
Fire separations are intended to contain the fire in the room where it started. If they work effectively they will extend the time people have to safely evacuate the building. When fire separations contain the fire they reduce the amount of fire loss to the structure making it easier to repair and put back in use. Fire separations also make it safer for firefighters as they act as a barrier to fire travel.

FIRE SEPARATIONS

FIRE SEPARATIONS DESIGNED AND INSTALLED TO DIVIDE A BUILDING INTO COMPARTMENTS THAT WILL INHIBIT THE SPREAD OF FIRE.



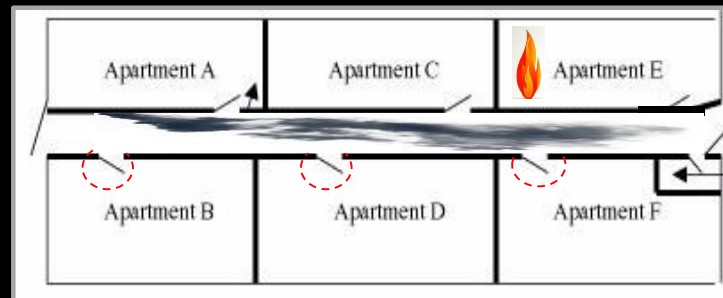
Fire separations are designed and installed in the construction phase to divide a building into compartments that will inhibit the spread of fire. They are part of the building design and construction but must be maintained after the building is occupied to work effectively.



This photo shows a building with commercial businesses on the ground floor and residential suites on the second and third floors. Each floor must be fire separated from the other floors to inhibit the spread of fire. This is accomplished by enclosed stairways and all openings are protected with approved closures. Each suite must also be fire separated from the other suites so that a fire starting in one suite is contained within the suite of origin to allow time for the fire to be detected and the alarm to activate.

A suite is any room or group of rooms operated by a single tenant. It is not necessarily a distinct real estate entity. "Suite" is a general classification that can be a single dwelling unit in an apartment or condominium building, a store in a plaza or an office in a multi-use building operated by a single tenant.

FIRE SEPARATION IS REQUIRED BETWEEN RESIDENTIAL SUITES



SUITE DOORS REQUIRE SELF-CLOSING DEVICES

In residential occupancies like an apartment building each individual suite must be fire separated from other suites and the exit corridor. This is usually accomplished by continuous layers of drywall and suite doors that automatically close and positively latch after each use. In the event of a fire in a residential suite the occupant may be alerted by a smoke alarm in the suite but that device is a local alarm only and does not activate the buildings fire alarm system. In the haste to get out occupants often forget to close the suite door so smoke, hot gases and flames can enter the exit corridor. When other occupants are alerted to the fire by the fire alarm system the exit corridor may already be untenable. If the suite door is equipped with a self-closing device the smoke and hot gases are confined to the room of origin.

BUSINESSES MUST ALSO BE FIRE SEPARATED



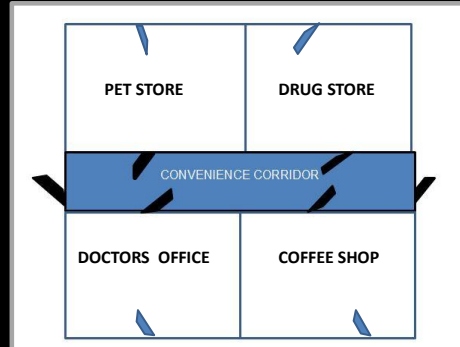
KEEP THE FIRE IN THE ROOM OF ORIGIN



Suites in commercial buildings must also be fire separated from other suites. This is usually accomplished by a continuous layer of drywall and suite doors that automatically close and positively latch after each use. In most cases even suites used for the same purpose must be fire separated from each other. For example, if there are two small retail shops operating independently in the building, each shop must be fire separated from the other. An exception to this is that most building and fire codes do not require Business and Personal Service occupancies such as a doctor's office and a lawyer's office to be fire separated from each other.

In cases where the building is fully sprinklered the fire separation may not be required but this should be referred to a fire prevention specialist or building inspector.

FIRE SEPARATION REQUIRED BETWEEN SUITES AND CONVENIENCE CORRIDORS



Fire separation is also required between suites and convenience corridors. In this case the convenience corridor is not accessible to the public and not part of required exits from the building but is there for the convenience of the tenants. There should be no storage allowed in the convenience corridor and the fire separation must be maintained.



Convenience openings are allowed in fire separations for the movement of people and things but they must be protected by closures. Closure means a device or assembly for closing an opening through a fire separation such as a door, a fire damper, wired glass or glass block and includes all components, such as hardware, closing devices, frames and anchors such as doors. Closures are provided for the convenience of the occupants but they must also slow the spread of fire, smoke and hot gasses allowing occupants to safely exit the building.

COMMON FIRE SEPARATION PROBLEMS

DOORS WON'T CLOSE &
LATCH

HOLE TO REPAIR
PLUMBING NOT REPAIRED

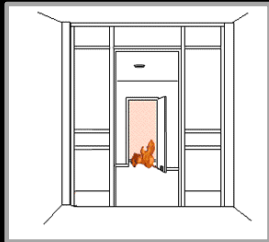


There are a number of common problems with fire separations. Doors won't close and latch or they are wedged in the open position. Holes in walls and ceilings that are part of the fire separation are made to repair plumbing or electrical problems but the holes are not repaired. Holes that are not repaired allow fire to travel into concealed spaces making it very difficult for firefighters to locate and extinguish the fire.

When fire separations are damaged they need to be repaired to protect their integrity. This applies to all fire separations including walls, ceilings, floors and closures.

FIRE SEPARATION DOORS SHOULD CLOSE & LATCH AUTOMATICALLY

**EXEMPTION
GROUP "D"
&
APARTMENTS**



FIREWISE
CONSULTING
LEARNING ACADEMY
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If the door does not close fire, smoke and hot gases can quickly spread to the rest of the compartment.

Every door used as part of a fire separation must have a permanent sign posted on the visible side of the door when it is in the open position, with the words "FIRE DOOR KEEP CLOSED" or be fitted with an acceptable hold-open device designed to be released by a signal from a fire detector, fire alarm system or sprinkler system.

Doors in personal service (Group D) occupancies like banks, beauty parlors and medical offices are exempt from the sign requirement as are doors between residential suites and a public corridor in an apartment type building. The doors between the residential suite and the corridor must however be equipped with a device that returns the door to the closed and latched position after each use.



Fire doors are a weak point in any fire separation because their primary function is to allow traffic to pass from one room into another. It is therefore important for fire doors to be kept closed when not in use. Fire doors are required to be self-closing and therefore have door closing devices which can pose significant obstacles to the young, elderly, infirm or disabled. Experience shows that convenience often takes precedence over safety and building users often seek to disable or otherwise undermine devices that inconvenience them in carrying out their work. Doors are often held open by wedges or other devices which is not only unsafe but also illegal.

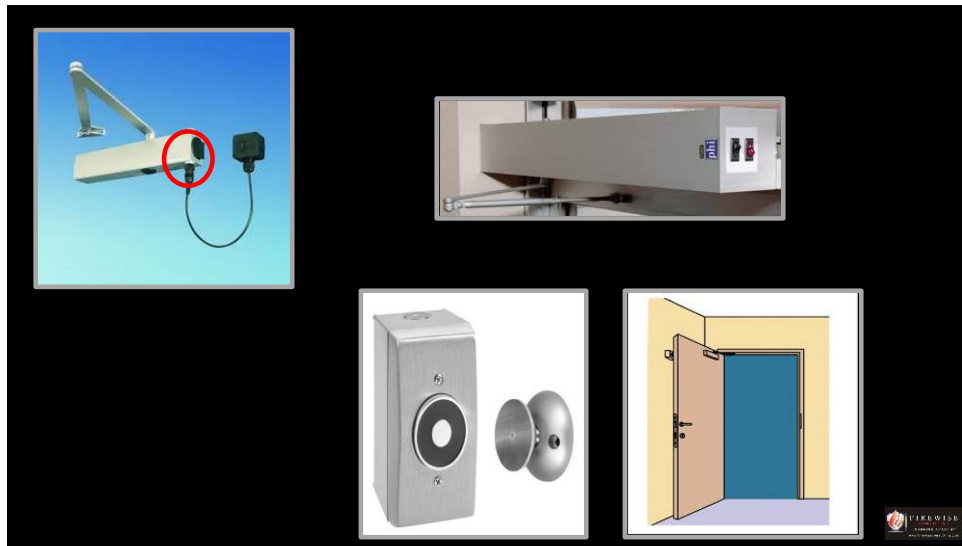


Objects like this fire extinguisher should never be used to keep the door in the open position because they prevent the door from closing and allow the fire to spread unchecked.

A fire starting in this laundry room would quickly spread to other portions of the building because the door is wedged in the open position.

Doors in fire separations should be checked at intervals not greater than 24 hours to ensure that they remain closed unless the door is equipped with an approved hold-open device.

Fire separation doors should be operated at intervals not greater than one (1) month to ensure that they are properly maintained. They should not be obstructed, “propped open” or altered in any way that would prevent the normal operation of the door.



The only acceptable method to hold fire doors in the open position is to install an approved hold open device. These are generally electro-magnetic devices that are connected to the building's fire alarm system. When the power is switched off or the fire alarm system is activated the magnet releases so the door can close and positively latch. There are a variety of different types as can be seen in these photographs.

DOORS INCLUDE

THE DOOR & COMPONENTS

LEAVES

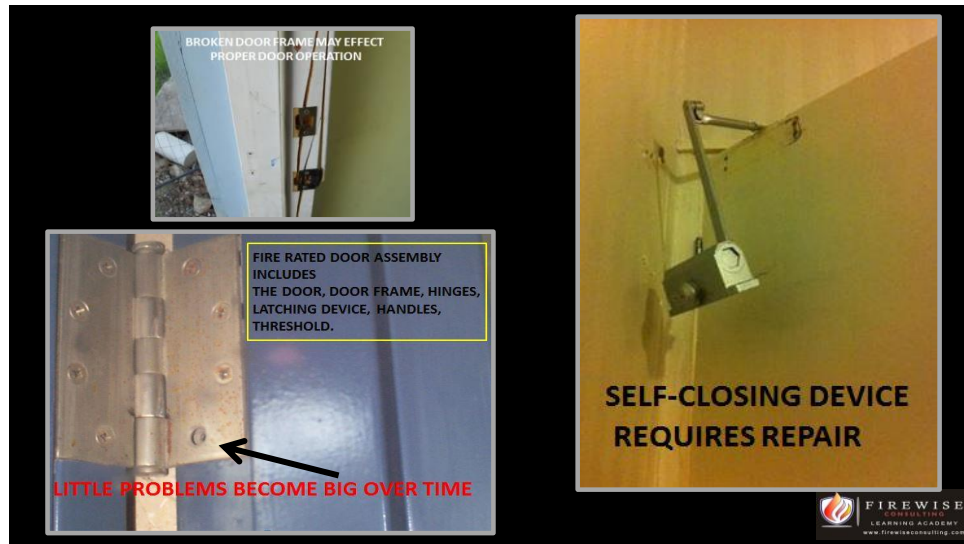
HARDWARE

DOOR FRAMES

CLOSING DEVICES ETC.



Doors include the door leaf itself (the part that swings) and all the hardware required to hang the door, the frame and the closing device. Most fire doors are designed to be kept closed at all times. Some doors are designed to stay open under normal circumstances, and close automatically in the event of a fire. Whichever method is used, the door's movement should never be impaired by a doorstop or other obstacle. Doors should be routinely checked, as should the action of the door closer and latch.



When assessing the operation of a door carefully examine all parts including the door leaf, frame, hinges, latching device, handles and the threshold. Over time things like loose or missing screws in the hinges can impede the proper operation of the door.

Check to ensure the door, frame, hinges, hardware, and threshold are secured, aligned and in working order with no visible signs of damage.

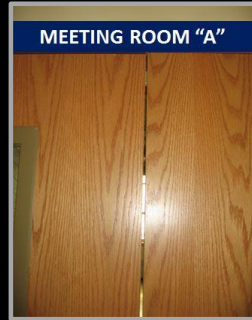
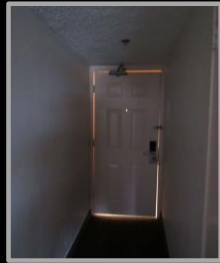
Check that the self-closing device is operational and that the door completely closes when operated from the full open position.

Make sure no parts are missing or broken.



Properly installed and maintained door closers ensure the integrity of the fire separation. The spread of smoke is an even greater threat to life and property than flames, particularly in the early stages of a fire, so doors that close properly are essential. Adjustments can be made on the device to ensure the door closes and latches after each use. There are a number of videos on YouTube dealing with the selection of the proper door closer for various uses and the maintenance and adjustment of door closers.

CHECK CLEARANCES AROUND DOORS



Check the clearances around the door top, bottom and sides to ensure there are no large gaps that would allow the spread of smoke and hot gasses in the event of a fire. If you can see light between the door and the door frame clearance issues are likely and the door may need adjustment. The same is true for double door configurations. Only a minimal clearance should be present.

DOOR CO-ORDINATOR



COORDINATES THE CLOSING SEQUENCE

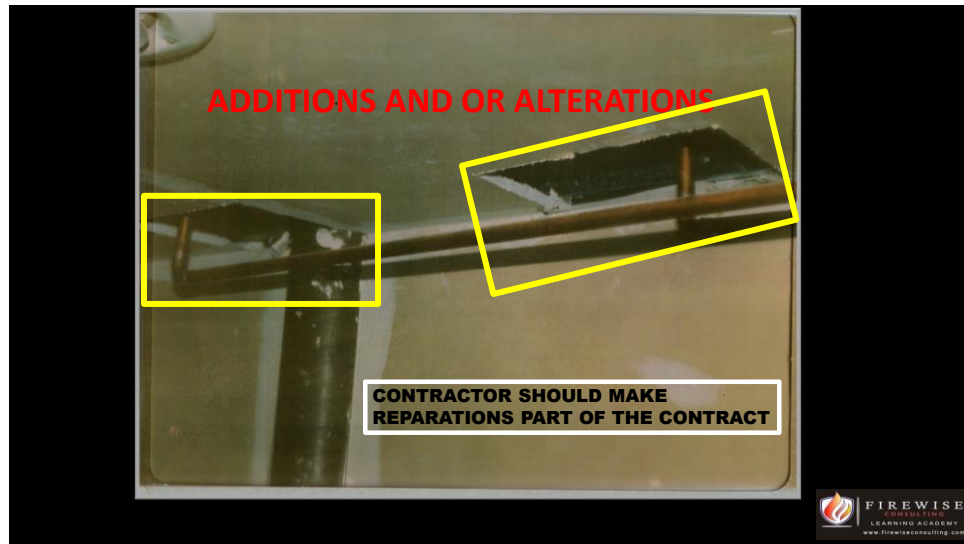
Some fire doors have double leaves. It is essential that the individual leaves close in the correct sequence, to maintain the fire integrity of the complete door set assembly. In these circumstances there is a need for a door coordinator device (also known as a door selector) to ensure that, after opening, the first opening leaf of a pair of doors is held back from closing fully, until the second opening leaf has closed fully into the frame. If the door coordinator is not working properly an experienced repair person may be required.

If a coordinator is installed, the inactive leaf closes before the active leaf. Latching hardware operates and secures the door when it is in the closed position.

**EDUCATE OWNERS &
CONTRACTORS TO
REPAIR THE HOLES
THEY CREATE**



Another common problem with fire separations are holes as the result of construction, alteration or repairs. Holes in fire separations can allow the fire to spread in concealed spaces making fire suppression more difficult and dangerous for firefighters. In this case the leak is fixed but another problem is created. The people making the repairs should be required to repair fire separations as part of the contract.



In this case water lines are re-routed by a contractor but the holes in the fire separation were never repaired. A fire in this room would quickly spread into the concealed space creating a significant suppression problem for firefighters. The people performing the renovations should be required to repair fire separations as part of the contract.



Penetrations in fire separations should be protected with fire stopping materials. Firestop materials restore the fire-resistance ratings of floors, walls and ceilings by impeding the spread of fire by filling the openings with fire-resistant materials. Openings in fire separations cancel out the fire-resistance ratings of the fire separations, allowing the spread of fire. It is critical therefore that the compartmentalization of a structure be maintained in order to reduce the severity of a fire and the passage of developing smoke and gases to ensure safety to both life and property.

FIRE STOPPING



**WHEREVER THE FIRE SEPARATION IS
PENETRATED IT SHOULD BE FIRE STOPPED.**



Wherever the fire separation is penetrated it should be fire stopped. When having repairs or alterations done to the building the owner should specify that fire stopping is required as part of the job. Qualified trades people know that fire stopping must be provided in fire separations and around pipes and wires that penetrate a fire separation but often they exclude that from the contract. The building owner or manager should insist fire stopping be completed properly.

MAKE CONTRACTORS COMPLETE THE JOB



Fire investigation reports often identify electricity as the form of heat that caused the fire. By providing proper fire stopping like that shown in this picture fire spread can be limited. It may look somewhat unsightly but it is usually in service rooms or electrical rooms that are not viewed by the public.

PROPER FIRE STOPPING IS NOT DIFFICULT



Fire stopping is a significant issue during the construction of a building. Architects, engineers, contractors, trades people and building inspectors will all play a role to ensure that proper fire stopping is provided. Most breaches in fire separation however occur through alteration or repair of existing buildings. Good trades people should recognize the need to provide fire stopping but many contracts specifically exclude this vital work. As can be seen in this video fire stopping is not hard to accomplish with the materials that are readily available on the market today.

Most fire stopping materials are intumescent substances which means they swell as a result of heat exposure. The key is to make sure the fire stop materials used are approved for the intended application. Most fire and building codes require fire stop systems to meet ULC or other applicable Standards.



A fire damper is a closure installed in an air distribution system or wall or floor assembly that is normally held in the open position but is designed to close automatically in the event of a fire in order to maintain the integrity of the fire separation.

Fire dampers in fire separations should be protected with a fusible link that automatically closes the vent during a fire. In this case the damper was installed because there was a problem with combustion air in the furnace room. The damper should not be there, but now that it is it should be protected with a fusible link that will melt at a given temperature causing the damper to close.

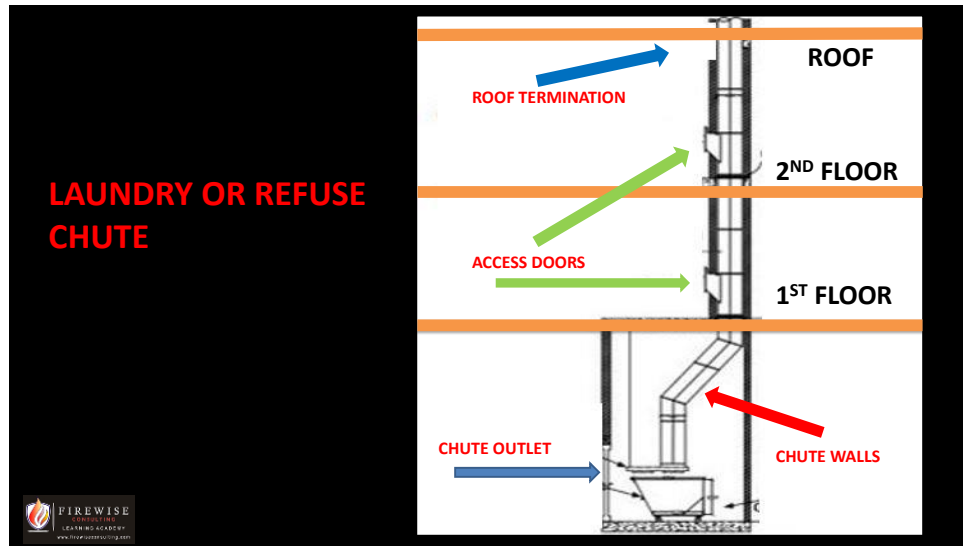
**FIRE SEPARATION
PENETRATED
BETWEEN STORAGE
ROOM AND
CORRIDOR**



For heating purposes the fire separation between the corridor and the storage room has been penetrated. A fire starting in the storage room will quickly spread to the exit corridor on the other side of the wall. In this case a sprinkler head is located in the storage room which will help contain the fire in the room but the fire separation has been breached and proper fire separation with fire stopping materials should be installed to prevent the spread of fire.

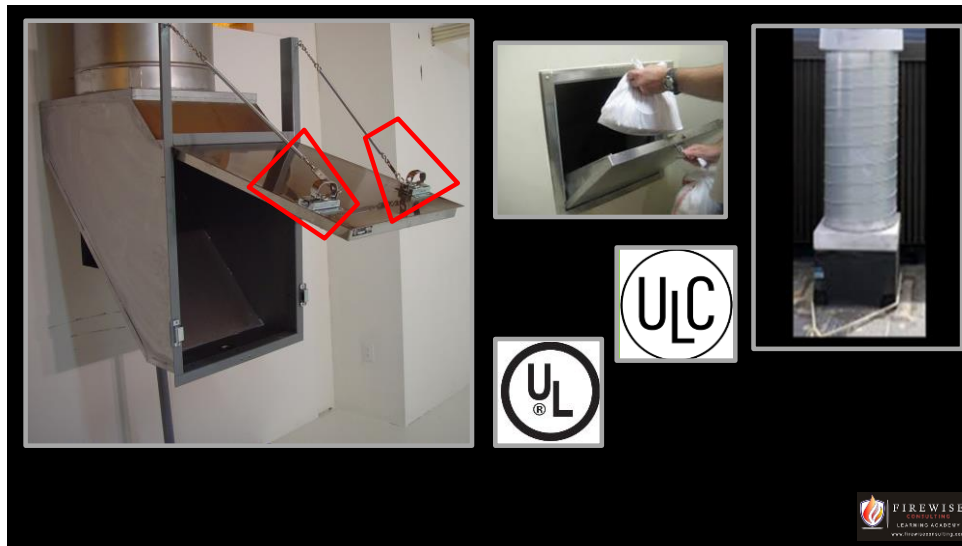


This is a fire separation door between a storage room and an exit corridor. For some reason the fire separation was voided by the installation of this louvered damper. It may be possible to install a damper in the door but it would have to be fire rated and close automatically in the event of a fire. These types of alternations should be discussed with the fire safety authority to ensure they are acceptable. Because this is a required fire separation the door should be equipped with a self-closing device so the door returns to the close and latched position after each use. The elephant's foot on the door should also be removed.



Many residential and institutional buildings are equipped with refuse or laundry chutes for the convenience of the occupants.

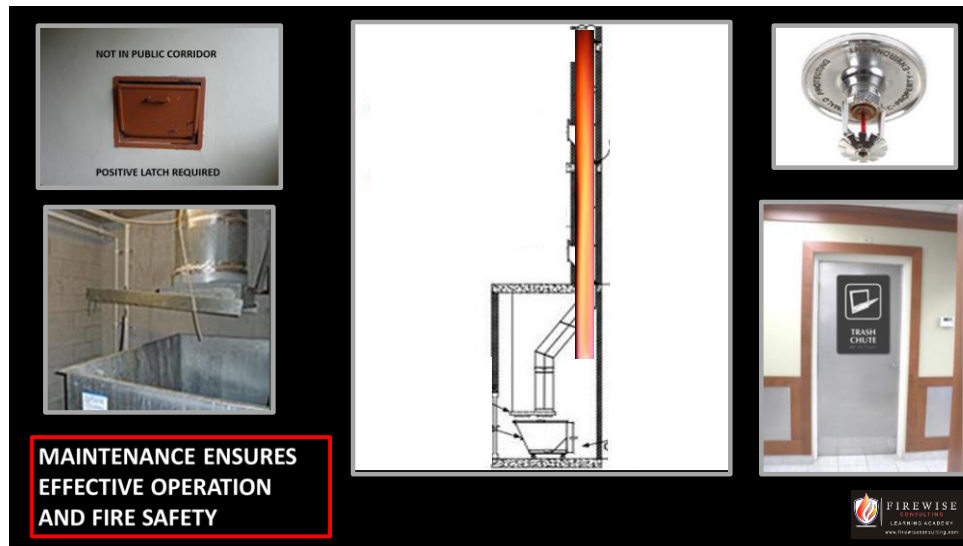
There are four basic parts to such chutes: The outlet is where the chute empties into a laundry or garbage room, the doors where occupants access the chute at each floor level, the roof termination where a sprinkler head must be located, and the walls of the chute which must be able to contain a fire.



The bottom of the chute is equipped with a discharge door protected by a fusible link that will melt in case of a fire in the discharge room. Once the link melts the door must automatically close to seal off the chute. This is a simple mechanism but vital to the safety of the building. Normally, the discharge door is kept in the open position so trash will not accumulate in the shaft causing a fire hazard.

On each floor level there are access points with doors that are required to be self-closing and positive latching. The doors should be approved by a recognized testing agency and display a listing agency label. If these doors are working properly, they will prevent the spread of fire and smoke into the floor area. The access doors should only open 65 degrees so that a small child would not be able to crawl into and fall down the chute. The opening should only allow for a 'normal' bag of household garbage to fit through the door.

The top of the chute is the section that actually exits the building through the roof. Some codes require that the chute is fitted with a vent cap and that the cap be at least 48 inches above the roof. This allows air to pass across the top of the vent. Without this, fumes and gasses can build up in the chute. A sprinkler head is required at the top of the chute.



Refuse and laundry chutes must be properly fire separated or they may create a chimney that can aid in the rapid spread of fire vertically throughout the building.

The chute walls should be constructed as a fire separation to slow the spread of fire and allow the building to be safely evacuated.

Chute access doors should be in a room that is fire separated from the rest of the floor area and the door to that room should be equipped with a self-closing device. Chute access doors should not be available directly from the corridor.

Most fire codes require the discharge room to be fire separated from the remainder of the building. They also require automatic sprinklers to be installed in each linen or refuse chute at the top, at alternate floor levels, and in the room or bin into which the chute discharges.

Like other fire safety installations regular inspection and maintenance will ensure the system works as designed.

COMMON PROBLEMS

ACCESS DOORS MUST CLOSE AND POSITIVELY LATCH

ACCESS DOORS NOT FIRE SEPARATED

CHUTE OBSTRUCTIONS

SPRINKLER MAINTENANCE

ACCUMULATION OR WASTE MATERIALS



Some of the more common problems encountered with refuse and laundry chutes include:

Access doors that do not close and positively latch,

Access doors not located in a fire separated room

Obstructions in the chute can cause a material buildup

The required sprinklers are inaccessible for inspection, testing and maintenance

Waste materials are allowed to accumulate in the garbage room to the point of obstructing the intended operation of the safety systems.

UNIT REVIEW

VERTICAL & HORIZONTAL FIRE SEPARATION
FIRE CONTAINMENT
FIRE SEPARATION BETWEEN SUITES
PROTECTION OF OPENINGS
COMMON PROBLEMS
SELF-CLOSING & HOLD OPEN DEVICES
DOOR CLEARANCE
BREACHES
PENETRATIONS THROUGH FIRE SEPARATIONS
FIRE STOPPING



In this unit we discussed:

The way in which fire separations can limit the spread of fire vertically and horizontally in a building

How fire separations can contain the fire to the room of origin and provide safe exiting

Fire separation requirements between suites

Protection for openings that are allowed in fire separations

Common fire separation problems that occur in many buildings as a result of alteration or repairs or building settling

Where self-closing and hold open devices are required and how they work

Clearances around doors that can allow fire, smoke and hot gasses to spread

Breaches in fire separations

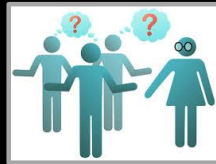
Penetrations that can destroy the integrity of the fire separation

And

The need for proper fire stopping where penetrations have occurred.

END OF UNIT 3

COMPLETE UNIT QUIZ



QUESTIONS?
CONTACT YOUR FIRE DEPART.
FIRE PREVENTION DIVISION



Congratulations that is the end of Unit 3 which dealt with fire separations. You are now read to move on to Unit 4 which deals with fire alarm systems but first please complete the Unit Quiz. If you have any questions now is a good time to contact the local fire department prevention division.