First Responder Inspector

CHAPTER FIVE
PERFORMING AN INSPECTION

Part 2

Slide 1

Welcome to Part 2 Performing the Inspection. In this part we will look at:

- Conducting the interior inspection
- Means of Egress
- Exits
- Exit signs
- Emergency lighting
- Compartmentation of Buildings
- Fire Separations
- Fire Doors
- Holes in fire separations
- Fire stopping
- Fire Detection & Suppression systems

Slide 2

When conducting the interior inspection steps should be taken to ensure a thorough & complete inspection of the property. These steps include:

- Allow yourself adequate time to perform the complete inspection including reviewing any documentation required for the premises.
- Follow a predetermined & structured route through the building such as top to bottom or front to back or left or right.
- Document your inspection as you go. In this way you are unlikely to miss or forget something that requires further attention,
- Ensure all rooms or areas are inspected if possible. If a property representative cannot accompany you then ask for keys to the locked rooms.
- If it is not possible to inspect certain rooms or areas in the building, then document which rooms or areas you did not see & why. For example, “Access to operating room number 2 was not possible due a surgery being performed”.
- Most important:
- Be thorough but do not rush. If the owner must cut the inspection short you can reschedule & return at a later date to complete the full inspection.

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All buildings are somewhat unique depending on their building & occupancy classifications, but all fire protection features should be in working order & be regularly inspected. During your interior inspection you should be looking for items such as:

- Active & Passive fire systems
- Means of egress
- Exit Signs & Emergency Lighting
- Fire separations
- Interior finish & contents
- Fire detection systems
- Fire suppression systems
- HVAC Systems
- Occupant load signs
- Commercial cooking systems
- Laundry facilities

- Refuse & Linen Chutes
- Elevators & escalators

During an inspection it may be necessary to enter or observe enclosed spaces, or areas above suspended ceilings to ensure there are no breaches in required fire separations. For your safety & the safety of others you must follow your organizations protocols for confined space entry.

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During the inspection fire protection systems, both active and passive, should be a top priority as these are the systems that reduce the spread of fire, detect the presence of smoke & fire, alert occupants, notify the fire department, activate fire suppression systems, close fire doors, open smoke vents, & control heating, ventilation, & air conditioning systems.

You should have a working knowledge of all these systems & the code requirements for maintenance of them. You should conduct a visual inspection of each system & review the inspection, testing & maintenance documentation provided by a qualified technician, but you should not do any physical testing of the systems due to potential liability for yourself & your employer.

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One of the most important life safety features in any building is the provision of adequate exiting. Not only is adequate exiting required it must be accessible whenever the building is occupied. An exit route consists of three parts:

Exit access – is the portion of an exit route that leads to an exit.

Exit - the portion of an exit route that is generally separated from other areas to provide a protected way of travel to the exit discharge. This could be a stair tower or a corridor.

Exit discharge - is the part of the exit route that leads directly outside or to a street, walkway, refuge area or open space with access to the outside.

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Access to exit means a clear path from any point in a room or area to the exit. In the event of an emergency people need to quickly leave the building.

People should be able to see an exit sign from where they are & be able to reach it without obstructions.

Access and egress means the path of travel to an exit including corridors, doorways, gates, stairs etc. which may provide a means of exit.
When conducting your inspection follow these guidelines to promote safe evacuation in corridors, stairways & exits:

- As a rule of thumb, there should be at least 44 inches clear width of unobstructed, clutter-free space in all corridors, stairways & exits.
- Keep all means of egress clean, clutter-free & unobstructed.
- Do not store materials or equipment in areas that are used for evacuation.
- Do not use corridors or stairways for operations related to the use of the building.

Reference:
2020 NBC Div B – 3.4.3.2.

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The building code requires that exit doors must be maintained so that they open freely when a force of 90 Newtons is applied. That means that the door must open freely in the direction of exit travel when a force of about 20 pounds is applied to the hardware. The requirement may change for accessibility for people with disabilities so you may have to do further building & fire code research depending on the situation. Section 3.8 of the building code is concerned with the design & construction of buildings & occupancies to make them accessible.

Barrier-free is a defined term in the building code which means that a building and its facilities can be approached, entered, and used by persons with physical or sensory disabilities.

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The building code note goes on to say “Exits include doors or doorways leading directly into an exit stair or directly to the outside. In the case of an exit leading to a separate building, exits also include vestibules, walkways, bridges
or balconies.”

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Horizontal exits allow people to move seamlessly from one building to another, but most people don’t even know they are doing it.

Horizontal exits are common is schools, hospitals, office buildings & in residential apartment buildings that are divided by fire walls. Note that the doors swing in opposite directions so exiting can be done in both directions depending where the fire is.

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This photograph shows a horizontal exit. When a building is divided into compartments by fire separations, openings through the fire separation must be protected by closers. This is most common in hospitals & care facilities where in the event of an emergency, it may not be practical to move occupants out of the building. Hospitals often move patients from the area where the event is taking place to the other side of the fire separation which is deemed to be a safe area.

Horizontal exits are also common in apartment buildings. Typically, designers choose to divide the building into fire compartments according to the size requirements specified by the applicable Building Code. This approach is often taken to reduce the construction requirements that would apply to a larger building, such as the need for non-combustible materials or the installation of a fire sprinkler system. Each side of the fire separation is treated as a separate building. To effectively prevent the spread of fire, it's crucial that doors remain closed and securely latched, or are held open with an approved magnetic hold-open device that automatically closes the door when the fire alarm or sprinkler system activates.

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Key components of a horizontal fire separation are fire rated doors, magnetic release hardware, a self-closing device, fire alarm pull stations on both sides of the doors, smoke detectors in both compartments near the exit, & exit signs on both sides of the doors. If the building is equipped with hose stations, there should be one on each side of a horizontal exit.

When performing a fire inspection, the doors should be pulled free of the magnets that hold them open & allowed to close by themselves. Operating properly, they will close & positively latch. If they do not close & latch, maintenance is required.

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Exits must always be in operable condition when the building is occupied. They must swing freely in the direction of exit travel. Any security devices that prevent the intended operation of the door must be removed when the building is occupied.

With the exception of contained use areas, exit doors must not be equipped with locking hardware that would allow an occupant to be locked inside the room or space. They cannot be equipped with secondary locking devices, such as a deadbolt or slide bolt, etc. It should be possible to open any designated exit door using a single motion, without the use of a key, tool, or special knowledge.

In some situations when certain conditions are met Electromagnetic Locks are permitted to keep exit doors in the closed position, but this requires the maglocks to be released by a motion sensor, emergency push-button, power failure, or an activation of the fire alarm or sprinkler system.

No storage or accumulation of materials should be allowed in the path of exit travel.

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During your inspection make sure the exit doors open freely outward. Make sure there is nothing on the outside of the building that can interfere with the door's operation or can block the swing of the door. Make sure that vehicles cannot accidently block the exits. If they can, suggest to the building owner that barriers be placed so the door cannot be blocked.

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Codes & standards that regulate a building's egress system can be very complex & will vary depending on the use of the particular building, area, or room & the specific requirements of the Authority Having Jurisdiction. Here are some basic requirements that apply to most exits but again they can vary depending on the applicable codes.

The number of exits required, & the size of the exit is based on the size, use & occupant load of the building. In most cases floor areas should be served by at least 2 exits. There are some exceptions for small buildings & floor spaces. For example, a floor area in a building not more than two stories high can have one exit as long as the total occupant load served by the exit is not more than 60 & the travel distance to the exit is not more than what is shown in this slide.
If the building is sprinklered the maximum floor area increases considerably.

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For any room or space with only one exit, the maximum occupant load should not exceed 60 people.

If you are asked if an exit door may be closed or blocked off, you will need to calculate the exit requirements for the building or area the exit serves. It is recommended that you consult with the building inspector for your area as many factors determine the need for the exit. The best position to take is, when a safety installation is present it must always be maintained in operable

condition until such time approvals have been granted to make a change.

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Exits are required to be separated some distance apart, to provide for a more even flow of occupants during an evacuation, and to provide for an additional level of safety in a space, should one of the exits become unsafe due to fire conditions or another life safety hazard.

Except for doors serving a single dwelling unit and some sliding and revolving doors, all exit doors should be the swing type that open outward in the direction of exit travel. If a revolving door is used a swing door providing equivalent exiting capacity should be located next to it. For buildings and rooms with more than 100 occupants, doors should be equipped with panic hardware.

There should be no mirrors, drapes or other items placed in or adjacent to an exit in a manner that would confuse the direction of exit travel.

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Automatic sliding doors can obstruct the path of exit travel so a traditional swing type door may also be required to allow effective & unobstructed escape for the building occupants. When traditional swing type doors are not provided the release hardware on the sliding doors should automatically open the doors in the event of a power failure. Many automatic sliding doors have breakaway devices to permit the doors to swing on their vertical access in the event of a power failure. These must be identified as a swinging door by
means of a label or decal affixed to the door.

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In case of fire, it's good to have 2 means of exit because smoke or heat can block the path to safety. In this example, a scissor stair provides two means of egress for residents of this apartment building. However, this corridor has two dead ends. This means that in case of fire, residents coming out of apartment 203 have 2 directions to choose from but the rest of the apartments have only one possible direction they can go to get to an exit stair. Therefore, most building codes limit dead end corridors to about 6 meters or 20 feet.

Alterations to buildings can create dead-end corridors. If, during your inspection, you find a dead-end corridor longer than 6 meters, it should be identified and reported to a Fire Inspector and/or your local Building Inspector. Unpermitted alterations to the building may have occurred, and the building owner may be required to obtain a permit, including the necessary Building Inspections, to ensure the work complies with the life safety requirements of the Building and Fire Codes.

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Exits must be located so they are clearly visible, or their locations must be clearly indicated.

Exits and exit routes should be clearly marked so that anyone in the building can easily tell the direction of escape, from any point in the building.
Every exit door must have an exit sign placed over or adjacent to it if the exit serves:

- A building more than 2 stories in building height
- A building having an occupant load of more than 150
- A room or floor area that has a fire escape as part of a required means of egress.

Where photoluminescent signs are used, they must be provided with an external light source,

powered by an emergency supply, to ensure the sign always remains functional.

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Newer editions of the building code require exit signs to consist of a green-and-white pictogram depicting a human figure exiting through an open doorway. Where directional signage is needed along the egress route, green-and-white arrows are required to direct occupants toward the exit.

Examples of the required signage are provided in these photos.

This change marks a departure from the traditional exit sign design used in Canada for decades, which featured a red-and-white sign spelling out the word "Exit." The shift to pictograms was made because these signs are already widely used internationally, green is universally associated with "go" (as opposed to red, which is commonly linked to "stop"), and the meaning of the sign does not depend on language comprehension.

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The Building Code is not retroactive, so the green-and-white pictograms are only required for buildings constructed after the code changed, or for new construction, additions, substantial alterations, or where there has been a change of use within the building.
Therefore, replacing traditional signs with similar designs is typically permitted.

However, special consideration should be given in cases where portions of a floor area being renovated require updated signage, while other sections retain the traditional signs. In such instances, it may be advisable to upgrade all exit signage on the entire floor to avoid confusion caused by using two different signs with the same meaning in the same space.

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Most fire and building codes require emergency lighting in exits, principal routes providing access to exit in an open floor areas, & corridors used by the public to exit a building.
Emergency lighting is required to give enough lighting to enable occupants of a building to evacuate the building safely in the event of an emergency or power failure. Emergency lights are designed to come on when the power goes out. Every model, therefore, requires some sort of a battery or generator system that will provide electricity to them during a power failure. Most individual light sources can be rotated and aimed where light is needed most in an emergency, such as toward fire exits.

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The level of illumination required will vary depending on location & use. A general rule however is that there should be enough lighting so you can see to tie your shoes.

Many fixtures have a test button which overrides the unit & causes it to switch on the lights & operate from battery power even if the main power is still on. Emergency lights should be tested monthly but also require annual inspection, testing & maintenance by a qualified technician. Individual units should be tagged signed & dated by technician & a report should be available to the AHJ upon request.

An emergency lighting installation may be either a central standby source such as a bank of batteries or self-contained units which incorporate the lamp, battery, charger & control equipment.

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Self-contained emergency lighting units must be inspected monthly to ensure that the lights are functioning & not obviously damaged or obstructed. The terminal connections are clean, free of corrosion & lubricated when necessary & that the battery clamps are clean & tight, & the battery surface is kept clean & dry.

Emergency lighting must also be tested every 12 months by a qualified technician to ensure that the unit will provide emergency lighting for a duration equal to the design criterion under simulated power failure conditions. Written records must be kept of all inspection, testing & maintenance & be available to the Authority Having Jurisdiction upon request. Tags should be displayed on the units so you can confirm the required
inspections have taken place.

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Emergency lighting usually consists of dedicated emergency fixtures including combination exit/emergency units mounted on walls or ceilings. Some new lighting designs, however, incorporate battery backup ballasts that are installed in or adjacent to existing lighting fixtures. Upon sensing power loss, the ballasts switch to emergency mode turning the existing fluorescent fixtures into emergency lighting. Make sure to check the codes that apply in your jurisdiction before accepting an emergency lighting design or retrofit that you
are unsure of.

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Emergency lights & exit signs must be on a dedicated electrical circuit wired directly into the panel without switches that can turn the lights on & off. In this case the exit sign could be turned on or off using the switch on the right-
hand side of the exit door.

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We will now look at fire doors and their rating.

Usually, fire doors are rated for a time duration such as 20 minutes, ¾ of an hour, 1 hour, 2 hours etc. The building designer determines what rating is required based on the fire-resistance rating that is required for the fire separation in which the door is located. Doors in fire separations are known as “closures”. The Building and Fire Codes both define a closure as a device or assembly that closes an opening through a fire separation. Ratings on closures, such as door closures, are known as fire-protection ratings, rather than fire-resistance ratings, and are usually one rating less than the rating of the wall.

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For example, a 1-hour fire separation requires a ¾ hour rated door. This relaxation is based partially on the expectation that there will not be combustible items placed against or near the opposite side of a door.

Fire doors come with a label affixed to the edge of the door or it may be found on the top or bottom of the door leaf. The labels on doors should not be removed or painted over. These photographs are typical labels that are found on fire-rated doors.

Some doors are designed with windows and skylights as can be seen in this picture, but existing

doors should not be altered by adding windows or skylights as this can affect the rating or listing of the door.

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Some fire separation doors are equipped with magnetic hold open devices for the convenience of the building occupants. They are connected to the fire alarm system & will release upon activation of the alarm. When the alarm sounds, the magnets release the door so it can close & positively latch. It is important the door positively latch because fire creates sufficient pressure to partially open the door. Even small openings & cracks allow smoke, hot gases & flames to enter other parts of the building.

When doing a fire inspection pull the door free of the magnet & let it fully close without your assistance. It should positively latch. If it does not, the door or self-closing device requires adjustment.

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One of the most common problems you will encounter is door wedges, elephant feet & other objects being used to hold fire separation doors in the open position. They can defeat the purpose of the door as far as containing the fire. If the door needs to be held in the open position an approved hold open device connected to the fire alarm system should be installed. Section 2.2. of the fire code states in part that “Closures in fire separations shall not be obstructed, blocked, wedged open, or altered in any way that would prevent the intended operation of the closure.”

Reference 2.2. BCFC

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

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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 & 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 & 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.

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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 & positively latch. There are a variety of different types as can be seen in these photographs.

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All fire separation doors should be equipped with a self-closing device. Self- closing devices are designed to return the door to the closed position after each use. Due to expansion, contraction & building settling fire separation doors may require adjustment to close & positively latch. Adjustments can be made to the self-closing device mechanism & other door hardware to ensure they work as designed. Sometimes the doors themselves require adjustment so they work as designed.

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Doors include the door leaf itself (the part that swings) & all the hardware required to hang the door, the frame & 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, & 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 & latch.

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When assessing the operation of a door carefully examine all parts including the door leaf, frame, hinges, latching device, handles & 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, & threshold are secured, aligned & in working order with no visible signs of damage.

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

Make sure no parts are missing or broken.

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

NFPA 80, the Standard for Fire Doors & Other Opening Protectives says that the clearance at the bottom of the door should not be more than ¾ of an inch while the clearance on the sides & top of doors should be not more than 1/8
inch plus or minus 1/16 of an inch.

Reference NFPA 80 – 7.2.3.3

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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 & secures the door when it is in the closed position.

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There are a number of other common problems with fire separations. If holes in walls & ceilings that are part of the fire separation are not repaired, they allow fire to travel into enclosed spaces making it very difficult for firefighters to locate & extinguish the fire. Often holes are the result of construction, alteration or repairs. In this case the leak is fixed but another problem is created.

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

Part 2 of the fire code states: “Damage to Fire Separations - Where fire separations are damaged so as to affect their integrity, they shall be repaired so that the integrity of the fire separation is maintained.”

Reference: BCFC 2.2.1.2

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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 enclosed space creating a significant suppression problem for firefighters. The people performing the renovations or repairs should be required to repair fire separation as part of the contract.

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This drawing is an example of how fire separations that were installed correctly will prevent the spread of fire. In this example, a vertical fire partition is installed through the suspended or T-Bar ceiling and concealed space to connect with the horizontal assembly above.

By contrast, this drawing shows an unacceptable installation of a vertical fire separation which does not extend through the T-bar ceiling. Because the vertical fire separation does not connect to the horizontal fire separation above, a fire would be free to spread through the concealed space above the T-Bar uninhibited.

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Penetrations in fire separations should be protected with fire stopping materials. Firestop materials restore the fire-resistance ratings of floors, walls & ceilings by impeding the spread of fire by filling the openings in fire separations. 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 & the

passage of developing smoke & gases to ensure safety to both life & property. Fire stopping materials must be approved by a recognized listing agency for the application.

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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 & around pipes & 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.

In this case the fire stopping material on the left has fallen out of the space it is designed to protect & was never installed in the space on the right.

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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.

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

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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 to allow for the flow of air 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 must be protected with a fusible link or other device that automatically closes the vent during a fire.

"In this case a vent was installed because there was a problem with combustion air in the furnace room. The vent voids the fire separation so it should be replaced with an approved fire damper with a fusible link that will melt at a given temperature causing the damper to close."

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For heating purposes, the fire separation between the corridor & 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 & should be brought to the building owners' attention.

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In this case the fire separation has been penetrated and the wiring does not appear to be properly installed. An electrical inspector or a qualified electrical contractor should be retained to certify &/or repair the installation, remove, or replace the extension cords & the fire separation should be repaired.

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

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That’s the end of Part Two of Performing an Inspection. In this Part we discussed:

- Conducting the interior inspection
- Means of Egress including access to exit, exit doors, horizontal exits, obstructed exits, & the number of required exits
- When panic hardware is required, distance between exits, sliding & revolving doors & that exits should not be obscured by drapes, mirrors or other objects that could confuse the direction of exit travel
- We talked about where & when exit signs & emergency lighting are required
- The importance of compartmentation & fire separation features of buildings
- Fire Doors, hold open & self-closing devices
- Common fire separation problems like holes in fire separations & clearances around doors
- The need for fire dampers & fire stopping Please move on to Part Three.