



SMCA & LOCAL 19

Providing **Clean Air** Solutions

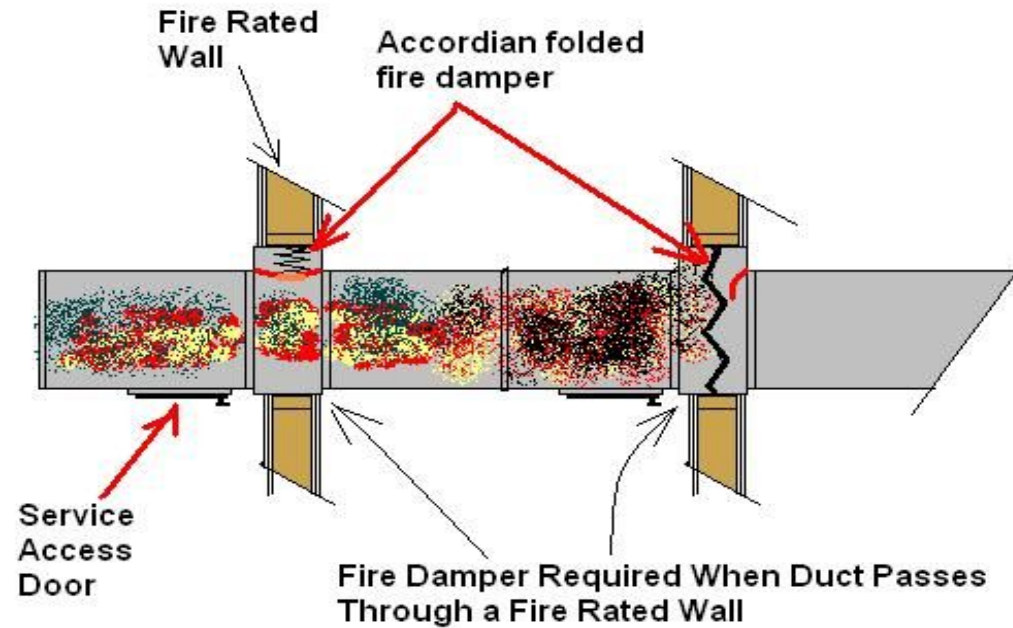
Life Safety Damper
Inspection Requirements for
Building Owners and Facility Managers

OVERVIEW

- Importance of properly functioning dampers.
- What is a life safety damper and how do they function.
- What are the building owner's responsibilities.
- Code requirements for damper inspections.
- How building owners can comply with code requirements.



PROPERLY FUNCTIONING DAMPER



If a fire occurs and is passing through the duct a fusible link melts and drops the accordion folded door to block the fire.

HVAC DUCTING THROUGH A FIREWALL



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IMPORTANCE OF A PROPERLY FUNCTIONING DAMPER

- Fire dampers, smoke dampers, combination fire smoke dampers, ceiling radiation dampers, or any other type of damper must function properly during a fire or life-safety emergency.
- Periodic inspection, performance testing, and maintenance are required by code to ensure these dampers function as intended in an emergency.



THE PROTECTION OF LIFE, HEALTH AND PROPERTY

“The successful operations of all building systems can mean the difference between a nuisance fire and a fire of catastrophic consequence.” Paraphrased from the SMACNA Life Safety Manual



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CALIFORNIA NOVEMBER 1974

- 15 story office building.
- Fire accidently started by workers renovating eighth floor suite.
- Heavy smoke was spread throughout the entire building.
- 2,000 workers evacuated.



ONTARIO CANADA JANUARY 1981

- 23-story hotel fire.
- Fire spread through the elevator shafts, one stairway and a pipe chase from the second floor.
- Heavy smoke was spread throughout the building by the HVAC system.
- 6 people died and 67 were injured.

MICHIGAN JULY 1983

- Fire in a 9-story hotel.
- Smoke spread throughout the building by the HVAC system, elevator shafts and through the aluminum plates covering the expansion joints between the 2 wings of the building.
- 1 guest died and 10 others were injured.



NEW JERSEY OCTOBER 1984

- An incendiary fire started on the 3rd floor of an 8-story hotel.
- Smoke spread through the vertical ventilation shafts servicing the guests rooms.
- 15 guests died and 50 were injured.



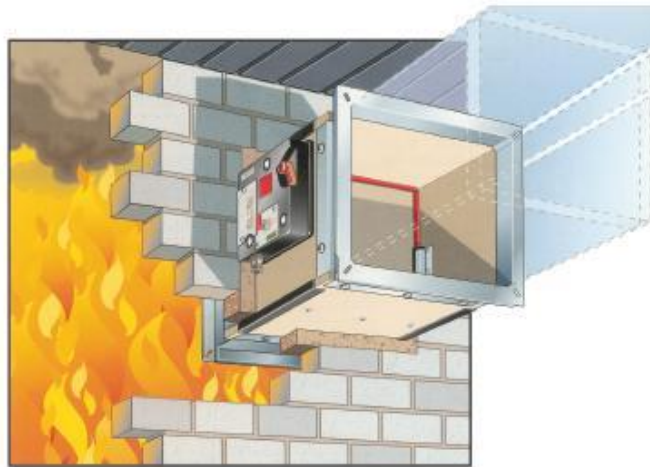
NEVADA NOVEMBER 1980

- Fire on the ground floor of a large hotel.
- Fire spread to the casino floor.
- Smoke spread throughout the high-rise tower through the stairways, seismic joints, elevator hoist ways and HVAC system.
- 85 guests died, over 600 were injured and 35 firefighters sought medical treatment.



WHAT IS A DAMPER?

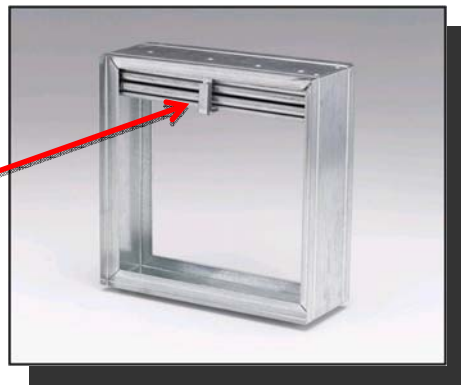
- A damper resists the spread of fire and/or smoke in the HVAC duct system of a building.
- Helps maintain the fire/smoke hourly resistance of a fire-rated assembly.



FUSIBLE LINK OPERATED DAMPERS

- Fire dampers, ceiling radiation dampers, and some combination fire smoke dampers are held in place with a fusible link.
- The link will melt at a specified temperature allowing gravity or a spring to close the damper.

Fusible Link



Curtain Style Fire Damper



Ceiling Radiation Damper



MOTOR (ACTUATOR) OPERATED DAMPER

- Smoke dampers, combination fire smoke dampers, and some fire dampers are motor operated. The actuator, responding to control signals, will position the damper open or closed.
- Cycle test each motor operated damper at least once every six months.



Combination Fire Smoke Dampers

COMMISSIONING AND ACCEPTANCE TESTING OF NEW BUILDINGS

- Commissioning and/or acceptance testing is the inspection process to determine if all components of a new building are operating as intended by the building's designer.
- The proper operation of the components needs to be documented.
- Commissioning of a building establishes a baseline for the beginning of a periodic testing and maintenance program.

STANDARDS THAT REQUIRE DAMPER INSPECTION AND MAINTENANCE

- NFPA 90A and 90B
- NFPA 92A and 92B
- NFPA 80
- NFPA 105



INSPECTION, TESTING AND MAINTENANCE

- **NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems:**
 - Each damper should be examined every 2 years.
 - Maintenance on fusible link dampers shall be performed every 4 years.



INSPECTION, TESTING AND MAINTENANCE

- **NFPA 92A Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences:**
 - Inspection of all fusible link operated dampers every 2 years.
 - Operate all fusible link operated dampers every 4 years.
 - Dedicated systems shall be tested at least semi annually.
 - Non-dedicated systems shall be tested at least annually.



INSPECTION, TESTING AND MAINTENANCE

- **NFPA 80 Standard for Fire Doors and Other Opening Protectives:**
 - Fire Damper to be tested and inspected 1 year after installation.
 - Test and inspection frequency shall be every 4 years, except in hospitals where frequency is every 6 years.
 - Operational test after installation for dynamic fire dampers and combination fire smoke dampers.
 - All inspections shall be fully documented.

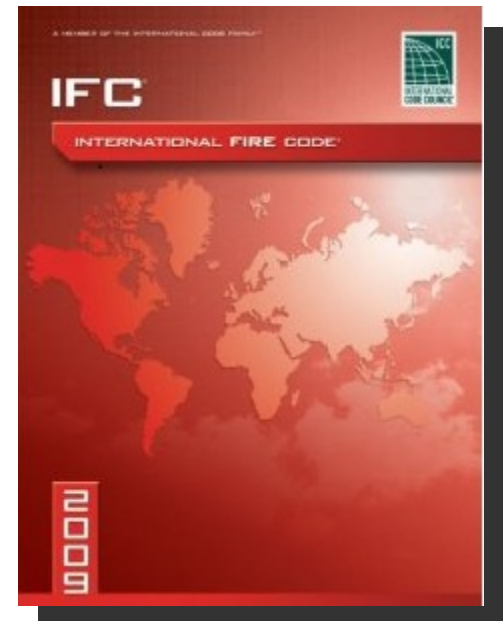


INSPECTION, TESTING AND MAINTENANCE

- **NFPA 105 Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives:**
 - Operational test shall be conducted for all smoke and combination fire smoke dampers after installation and balancing of HVAC equipment is completed.
 - Testing and inspection frequency is the same as NFPA 80.

MODEL CODE REQUIREMENTS

- **International Fire Code (IFC):**
 - 2009:
 - Section 703.1.2 – Smoke dampers inspected and maintained in accordance with NFPA 105.
 - Section 703.1.3 – Fire dampers inspected and maintained in accordance with NFPA 80.
 - 2006:
 - Section 703.2 – Opening protectives shall be maintained in accordance with NFPA 80.



NFPA 1 UNIFORM FIRE CODE

- Fire Dampers
 - Section 61.4.2.1.3 – Fire dampers shall be installed per manufacture's instructions and NFPA 90A.
- Smoke Dampers
 - Section 12.9.5.2 – Only dampers designed and tested per UL 555 and UL 555S shall be installed.



NFPA 101 LIFE SAFETY CODE AND JCAHO

- NFPA 101
 - Section 8.5.5.4.1 – HVAC equipment and ductwork shall be installed per NFPA 90A and NFPA 105.
 - Section 8.5.5.4.2 – Smoke dampers and combination fire smoke dampers shall be inspected, tested and maintained per NFPA 105.
 - Section 9.2.1 – HVAC equipment and ductwork shall be in accordance with NFPA 90A.
 - Section 9.3.1 – Smoke control systems shall be installed, inspected, tested, and maintained per NFPA 92A.
- The Joint Commission (JCAHO)
 - JCAHO accredits and certifies health care organizations. They use the NFPA standards in their own standards.



STATE AND JURISDICTIONAL FIRE CODES

Pennsylvania -

State wide adoption of the 2009 IFC.

Counties under 2009 IFC include:

- Montgomery
- Delaware
- Bucks
- Chester
- Philadelphia



STATE AND JURISDICTIONAL FIRE CODES

New Jersey -

State wide adoption of the 2006 IFC.

Counties include:

- Camden
- Gloucester
- Salem



STATE AND JURISDICTIONAL FIRE CODES

Delaware -

2009 State Fire Code.

Modeled from NFPA 1.

Fire Code references NFPA 80, 90A, 90B, 92A and 92B for damper requirements.

- Counties include:
 - New Castle
 - Kent
 - Sussex



SAMPLE INSPECTION SCHEDULE

An Example of a Local Jurisdiction Periodic Inspection and Test Schedule

Every Six Months	<ul style="list-style-type: none">• Cycle Test (open and closed) all motorized fire and smoke dampers• Test all dedicated smoke-control systems
Every Twelve Months	<ul style="list-style-type: none">• Test all non dedicated smoke-control systems
Every Two Years	<ul style="list-style-type: none">• Visually inspect all fire dampers, ceiling radiation dampers, smoke dampers, and combination fire smoke dampers
Every Four Years	<ul style="list-style-type: none">• Manually operate (open and close) all fusible link operated fire dampers and ceiling radiation dampers

AMCA

- The Air Movement and Control Association (AMCA) is a international association of the world's manufacturers of related air system equipment. Most of the damper manufacturers are members of AMCA.
- AMCA recommends the following in addition to the requirements stated previously:
- Cleaning (when required):
 - Obstructions, dirt build up, and any rust or corrosion on or around any damper should be removed.
- Fuse Link Operated Damper Inspection:
 - Remove fuse link to test damper. Inspect fuse link and re-install or replace as needed.



AMCA

- Renovation and Remodeling Re-Commission and Acceptance Testing:
 - Repeating the original acceptance tests or commissioning procedure after a renovation or remodeling is recommended to insure dirt or debris will not interfere with damper operation.
- Periodic Inspection:
 - Perform a visual inspection of a motor operated damper while performing the required cycle testing.
- Actuator Failure:
 - If an actuator fails during a periodic cycle test, replace the damper per the manufacturer's installation requirements.
- Record Keeping:
 - A record or log should be established for each fire or life safety related damper installed in a building.



WHAT ARE THE BUILDING OWNER'S RESPONSIBILITIES?

- Ensure that the proper damper maintenance is being performed.
- Ensure that inspections are conducted per code requirements set forth by the local jurisdiction.



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MINIMUM INSPECTION POINTS

1. Fusible links (where applicable) shall be removed.
2. All dampers must be operated to verify that they close fully.
3. The latch, if provided, shall be checked.
4. Moving parts shall be lubricated as necessary.
5. Inspect fuse link and re-install or replace as needed.

DAMPER INSPECTION

- Identify dampers, floor, location, and system name and tag.
- Identify the size, number of sections, and vertical or horizontal mounting.
- Determine that there is adequate work space, accessible ceiling and /or wall construction, and conflict-free passage to damper site.
- Identify the gage, end connectors (rigid or breakaway), sleeve length, retaining angles, adequate annular space around the sleeve, and duct or sleeve access door are of adequate size.

DAMPER INSPECTION

- Identify the gage, end connectors (rigid or breakaway), sleeve length, retaining angles, adequate annular space around the sleeve, and duct or sleeve access door are of adequate size.
- Document the condition of blades, status of seals, satisfactory jackshafts and linkages, interior free of rust and dirt build-up, blades within the plane of the barrier, damper manufacturer's label in conformity with the hourly rating of the barrier, and damper size limits.

DAMPER INSPECTION

- Determine that the actuator/linkage is clear of the barrier, the heat responsive device temperature, whether single or dual temperature, actuator condition, adequate wiring or pneumatic tubing, and external or internal actuator mounting.
- Blade connected, actuator auxiliary switch, or shaft.
- Number of read-out circuits, condition of wiring.
- Verify that the barrier is complete and uncompromised and connecting duct intact.

ACTUATOR INSPECTION

- Verify that appropriate power (voltage or pneumatic air pressure) is being supplied to the actuator.
- Determine what condition and specific control signal (from a thermostat, smoke detector, etc.) are required to cause a damper's operation. Verify that the appropriate control signal is being generated.



ACTUATOR INSPECTION

- If this is impractical, disconnect any system wiring or piping and provide the appropriate voltages and signals from a separate reliable source.
- If appropriate power and signal is being supplied to the actuator but the actuator fails to operate, it should be replaced.



FORMS

- Actuator Test Log
- Fire Damper Inspection Log
- Life Safety Damper Inspection and Function Report

QUESTIONS OR COMMENTS?

Thank you for your attention.



SOURCES

- 2009 International Fire Code (IFC)
- 2006 International Fire Code (IFC)
- NFPA 80, Fire Doors and Windows
- NFPA 90A, Installation of Air Conditioning and Ventilation Systems
- NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems
- NFPA 92A, Smoke Control Systems
- NFPA 92B, Smoke Management Systems in Malls, Atria, and Large Areas
- NFPA 105, Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives
- Ruskin Life Safety Dampers Presentation, Ruskin Air and Sound Control, 3900 Dr. Greaves Rd., Kansas City, MO 64030
- National Energy Management Institute “Life Safety Damper Study Guide”

