

# Fire Life Safety: The Importance of Maintaining Fire Dampers

*Pennsylvania Governor's Occupational  
Safety & Health Conference*

*Hershey Lodge & Convention Center  
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John Hamilton

Chief Operating Officer

Testing, Adjusting, & Balancing  
Bureau (TABB)

[jhamilton@tabbcertified.org](mailto:jhamilton@tabbcertified.org)

Duane Smith

Director of Training

National Energy Management  
Institute (NEMI)

[dsmith@nemionline.org](mailto:dsmith@nemionline.org)

# Fire Life Safety: Defined

- The design elements used in building construction for protection of life and property from fire and smoke.
  - Design elements:
    - Fire resistive building materials
    - Fire alarms
    - Fire suppression equipment
    - Safe occupant egress
    - Firefighting equipment access

# HVAC Fire Life Safety: Defined

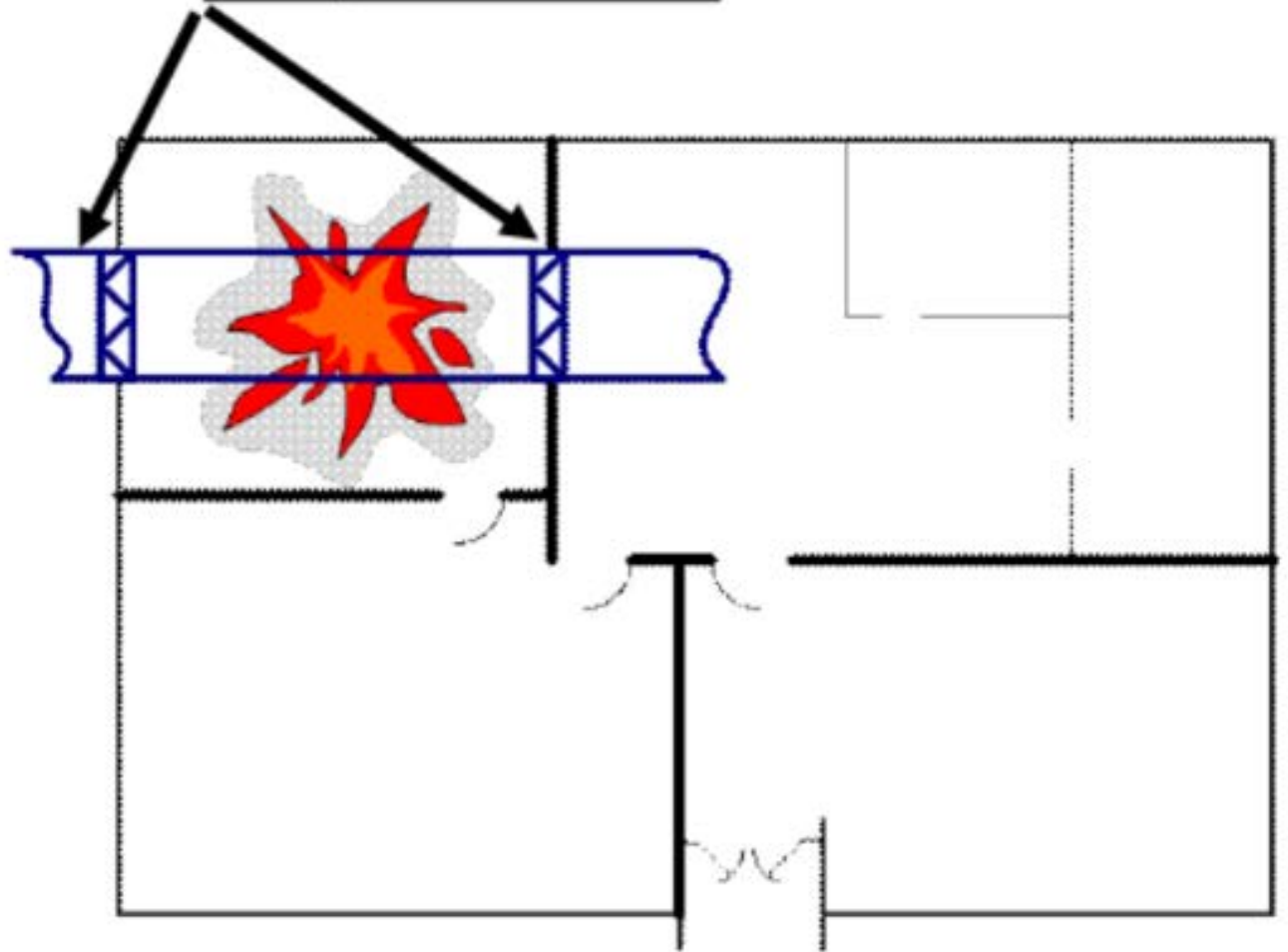
- The sum of components within the HVAC system that slow or stop the movement of fire and/or smoke.
  - Components:
    - Duct dampers
    - Fan controls in conjunction with the fire alarm system
    - Dedicated/Non-dedicated smoke control systems



# Containment Fire & Smoke dampers

***When It Works...***

Dampers in walls and ducts stop fire and smoke. Compartmentation is intact.



85% of installed fire & smoke dampers are for containment.

(Drawing courtesy Belimo Americas.)

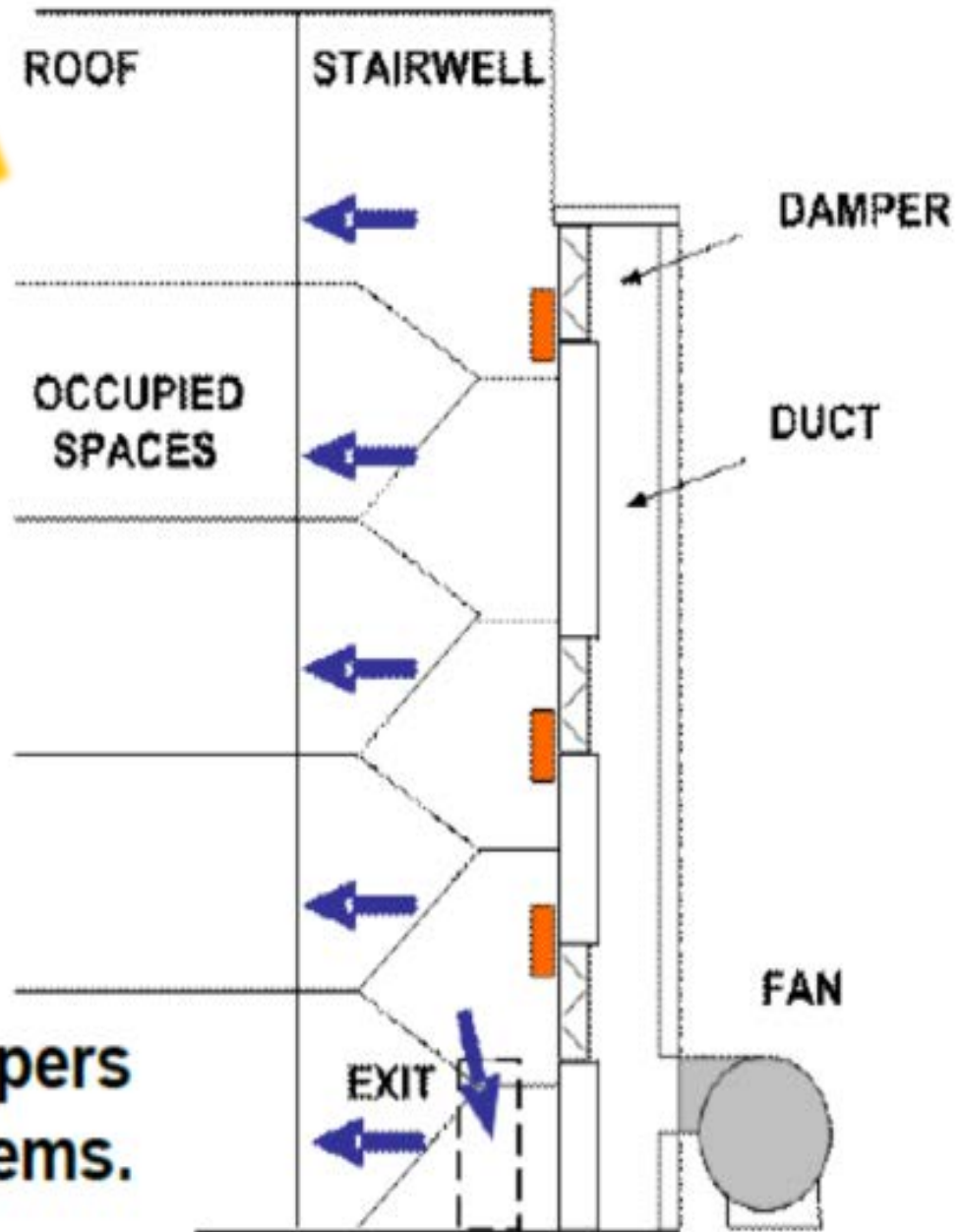


# Engineered Smoke Control System Dampers

*When It Works...*

Stairwells, underground buildings, exit corridors, stages and auditoriums, elevator shafts, atria, large spaces

15% of installed F&S dampers are in smoke control systems.



(Drawing courtesy of Belimos Americas)

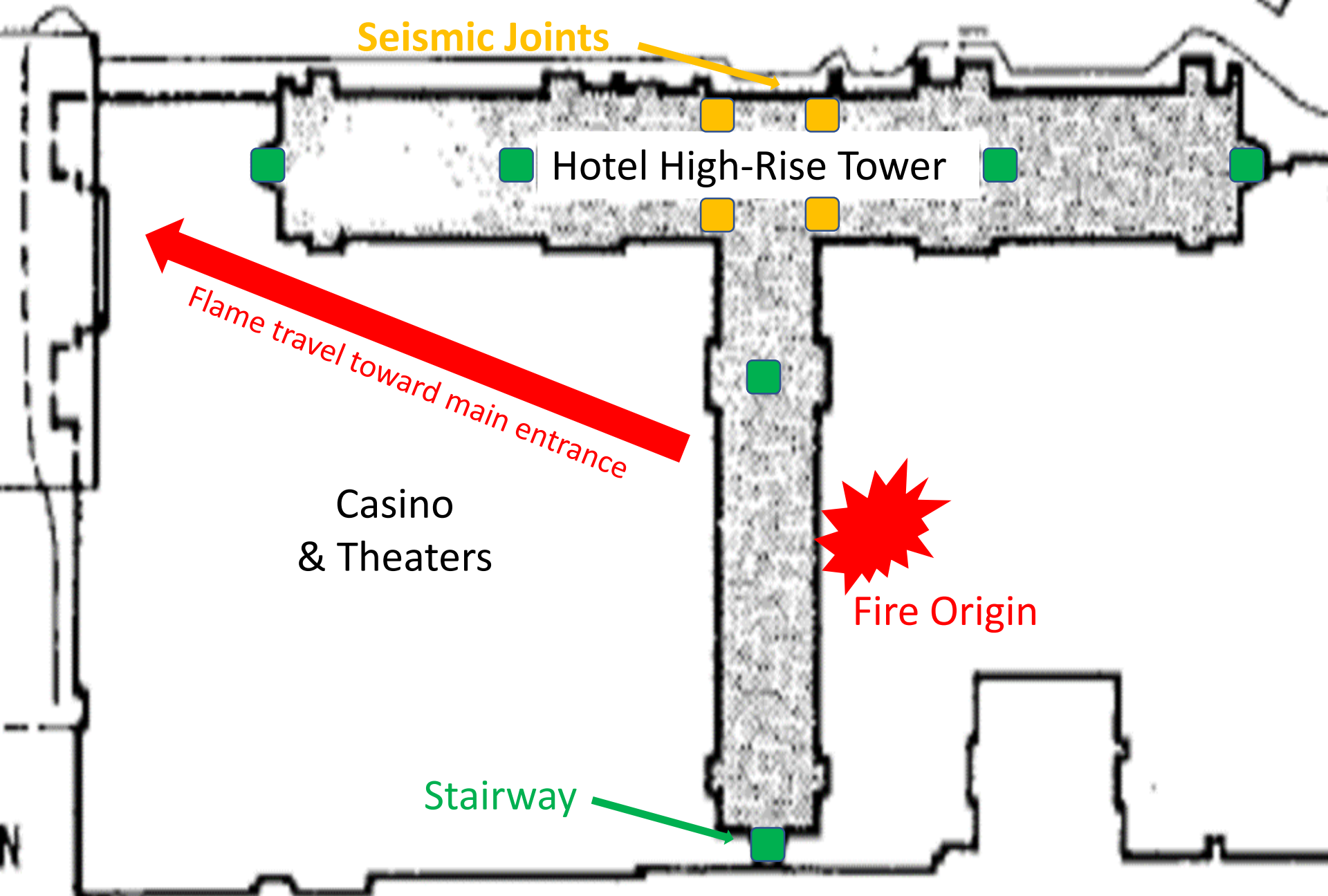
**When it doesn't work...**

- **November 21, 1980**
- **85 dead, over 600 injured**
- **Victims:**
  - **17 in casino**
  - **68 in high-rise**

**MGM GRAND**



Most fire disasters are the result of small deficiencies leading to an unintended chain reaction causing the loss of life and property.



Seismic Joints

Hotel High-Rise Tower

Flame travel toward main entrance

Casino  
& Theaters

Fire Origin

Stairway



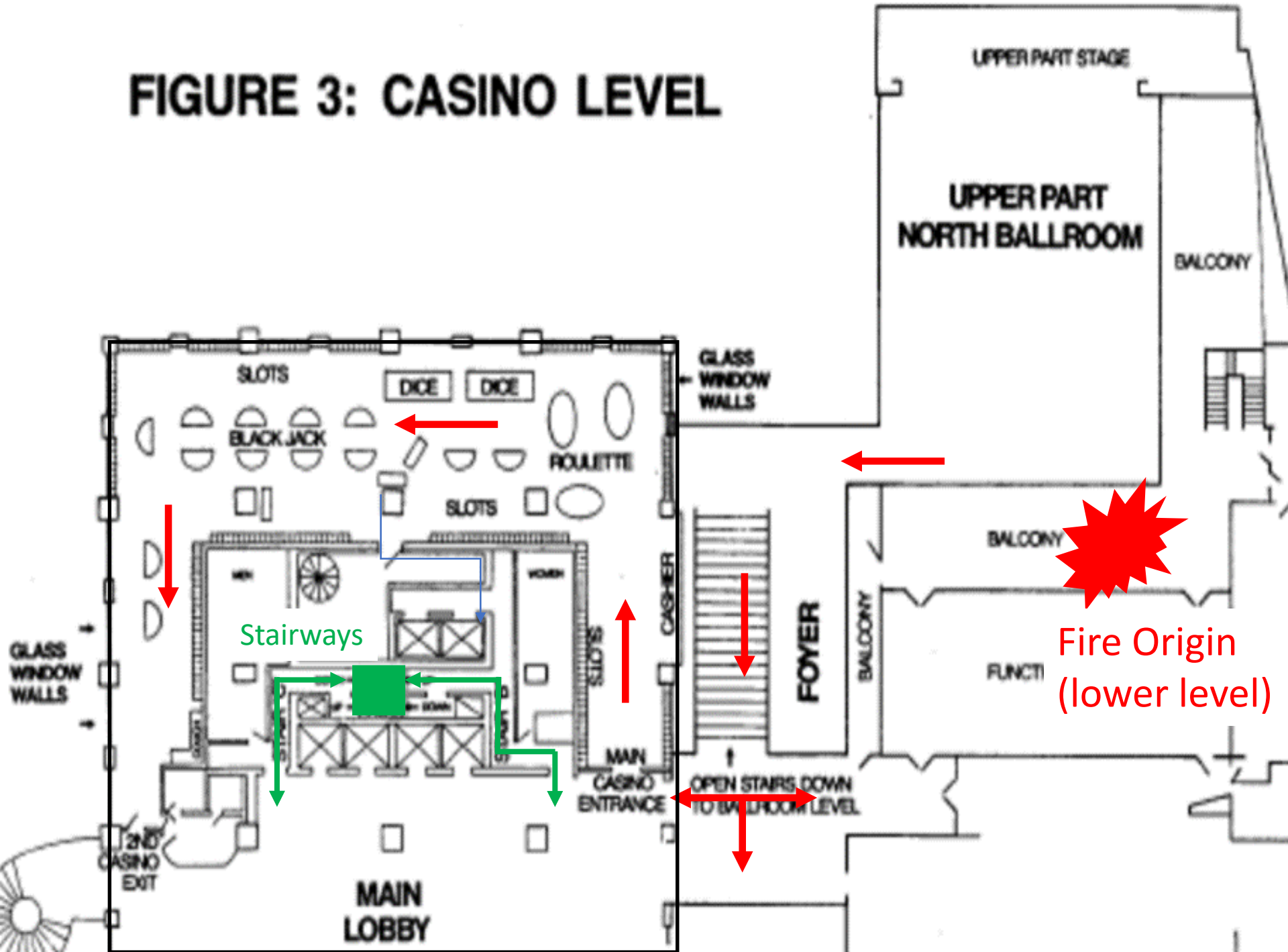
# Small Deficiencies:

- Electrical short circuit
- Lack of sprinklers in The Deli, casino, and high-rise
- Lack of fire-resistant barriers
- Lack of smoke detectors in ductwork
- Fire dampers disabled
- Seismic joints and stairways open to 2<sup>nd</sup> floor
- 4/6 stairways not enclosed with fire-rated construction
- Doors in stairways locked from inside
- Lack of smoke dampers for guest rooms
- Elevators did not automatically return to ground floor
- No evidence that building fire alarm sounded

**When it doesn't work...**

- **December 31, 1986**
- **Arson**
- **97 dead, 146 injured**
- **Victims**
  - **Most in casino & main lobby**

# FIGURE 3: CASINO LEVEL



# Small Deficiencies:

- Lack of sprinklers
- Lack of fire-resistant barriers
- No smoke detectors in ductwork
- No fire or smoke dampers in duct shafts
- No fire detection systems
- No fire or smoke dampers for guest rooms
- Inadequate exit in casino
- Stairway B door propped open
- Smoke spread through ductwork, utility chase, and elevator shafts



# The Upshot:

- Fire experts provided extensive report to Governor
- 70+ recommendations for improvements
- All existing hotels retrofit with auto sprinklers
- Governor asked each hotel to comply voluntarily
- Governor made clear: if not voluntarily, it will be mandated through legislation
- Legislation was not necessary...

# Some good news...

According to the NFPA:

- The fire death rate per 1,000 fires is generally lower in high-rise buildings.
- Probably due to the much greater use of fire protection systems and features.
- High-rise buildings have lower % of fires with flame damage beyond room of origin.



**Screw in track holding  
damper open**



**Pipe running  
through damper**



A photograph showing a furnace damper in an open position. A wooden 2x4 is wedged against the damper's frame to hold it open. A red arrow points from a text box to the 2x4.

**2x4 holding  
damper open**

# Awareness

- Annual average deaths decreasing:
  - In 1977 there were 14,000 hotel fire-related deaths
  - In 1985, that number dropped to 7,500
  - In period of 2009-2013, 40 deaths (number includes *all* high-rise buildings)
- What can we do to ensure that Fire Life Safety works every time?
- John?

# Primary Fire Safety Objectives

- Occupant safety
- Emergency responder safety
- Protection of property
- Continuity of business operations
- Protection of adjacent property
- Protection of the environment

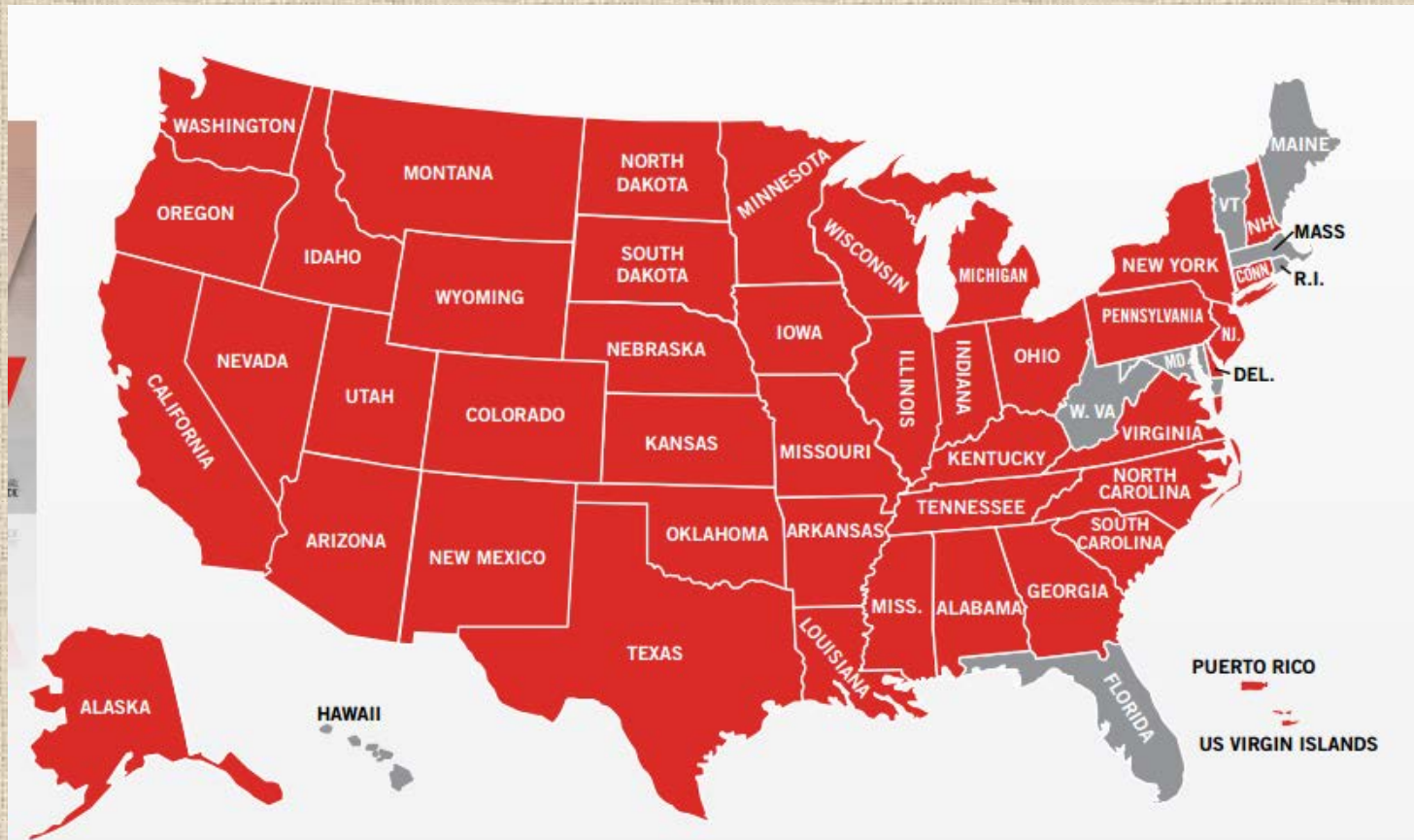


# History of FLS Legislation

- International Fire Code (IFC)
- Adopts NFPA standards as part of that code
- NFPA 80
- NFPA 105
- So the Adopted law says follow the IFC
  - IFC sends one to NFPA standards
    - NFPA standards spell out how to inspect fire dampers, find that standard
      - Find NFPA 80 and 105 to see what to do



# Why it is a concern for you?



# HVAC Fire Life Safety

## International Fire Code

### 703.1.2 Smoke barriers and smoke partitions.

**Required** *smoke barriers and smoke partitions shall be maintained to prevent the passage of smoke. All openings protected with approved smoke barrier doors or smoke dampers shall be*

maintained in accordance with **NFPA 105.**

# HVAC Fire Life Safety

## International Fire Code

### 703.1.3 Fire walls, fire barriers and fire partitions.

Required *fire walls, fire barriers and fire partitions shall be* maintained to prevent the passage of fire. All openings protected with *approved doors or fire dampers shall be maintained* in accordance with **NFPA 80**.



# HVAC Fire Life Safety

- NFPA 80 Scope.
  - This standard regulates the installation and maintenance of assemblies and devices used to protect openings in walls, floors, and ceilings against the spread of fire and smoke within, into, or out of buildings.

# HVAC Fire Life Safety

- NFPA 105 Scope

- This standard shall prescribe minimum requirements for smoke door assemblies for use in providing safety to life and protection of property from smoke



# HVAC Fire Life Safety

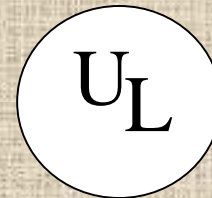
- Both NFPA 80 and 105 mandate:

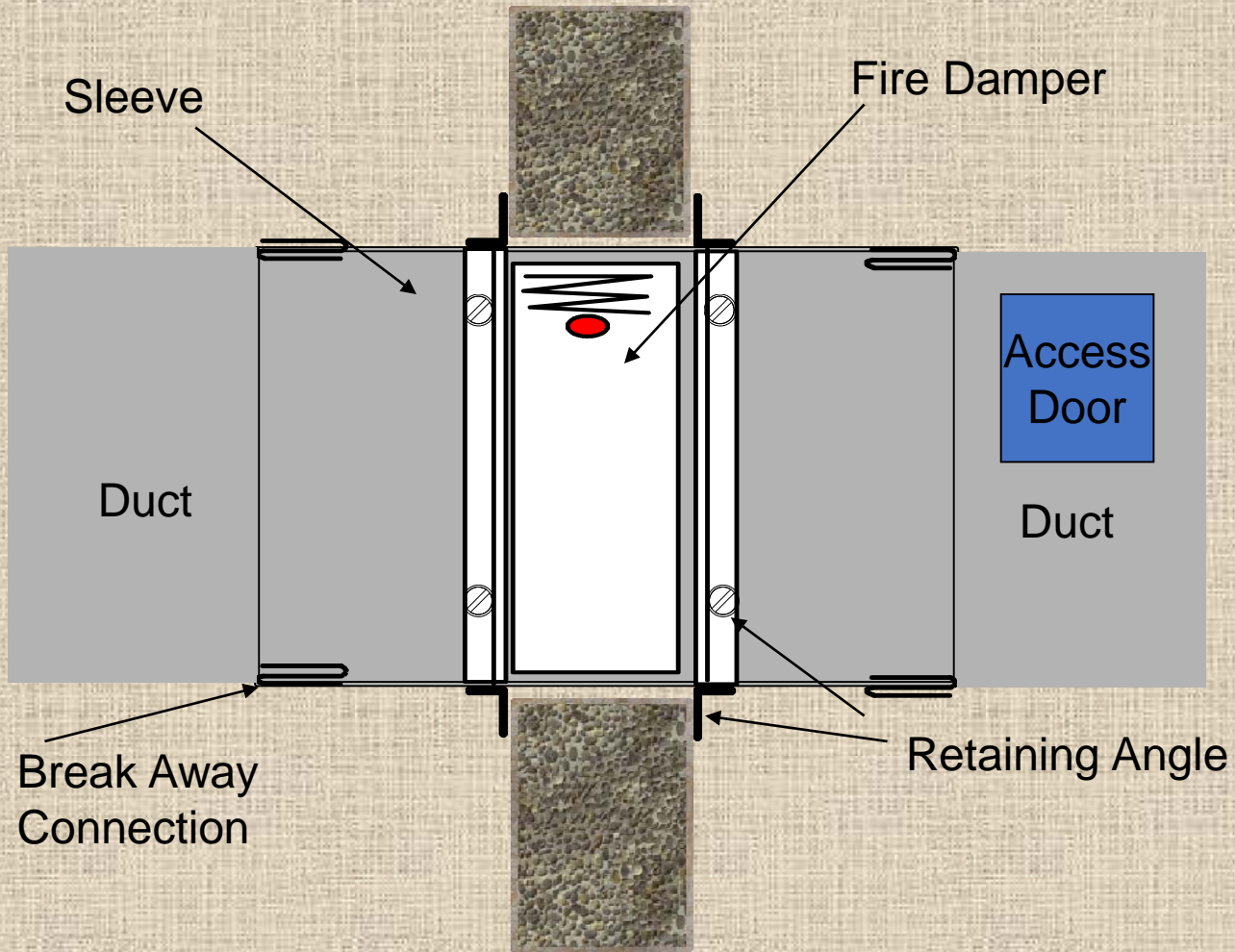
**19.4.1** Each damper shall be tested and inspected 1 year after installation.

**19.4.1.1** The test and inspection frequency shall then be every 4 years, except in hospitals, where the frequency shall be every 6 years.

# Product Listing

- The UL mark (and the ULC mark) indicates that products have been evaluated and the manufacturer has demonstrated the ability of the product to comply with UL's requirements.
- Typical listed products are:
  - Actuators
  - Fusible links
  - Fans
  - Motors









This is the most important part of this ad. It makes all the FLS stuff real to me.

# 83%

of Victims Who Perished in Fires Nationwide Died from **Smoke Inhalation**.

[www.GreenHVACsolutions.org](http://www.GreenHVACsolutions.org)

Heroes save lives. **Dampers save heroes.**

Fire and smoke dampers help save more lives during fire emergencies and rescues. We can inspect your building's smoke and fire dampers and ensure they meet today's fire and safety codes.



Sheet Metal Contractors Association  
1100 E. Hector Street  
Suite 185  
Conshohocken, PA 19388  
Phone: (610) 828-4055

SMWIA Local 19  
1301 S. Columbus Blvd.  
Philadelphia, PA 19147  
(215) 952-1999



# Qualification for Inspections

- Can anyone check out a damper?
- Qualified?
- Importance
- ANSI 17024



# Remember:

Most fire disasters are the result of small deficiencies leading to an unintended chain reaction causing the loss of life and property.

Inspecting & maintaining  
fire and smoke dampers  
*can*  
eliminate small deficiencies!

Thank you!

Questions?