Fire, Smoke, and Combination Fire/Smoke Dampers

Presented by:

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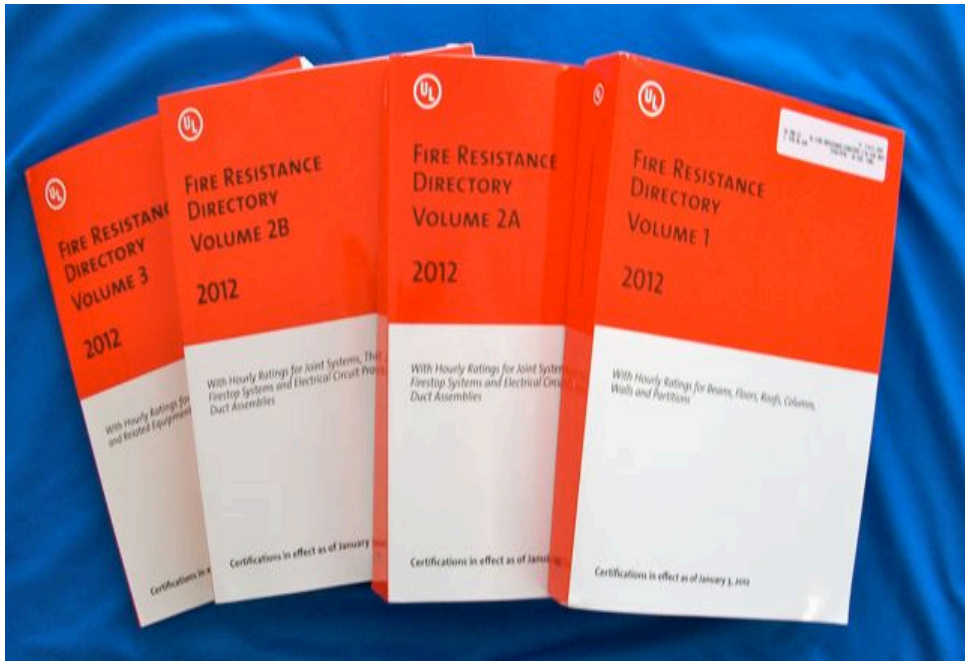
Former Member: AMCA Air Control Code Action & Review Committee

Agenda

- Life Safety Damper Overview
  - Damper Types
  - UL Rating Qualifications
- Damper Basics
  - Applications
  - Installations & FAQs
  - Penetration Requirements
- Code Required Testing
- Improper Installations

Underwriters Laboratories (UL) Directory



ONLINE CERTIFICATIONS DIRECTORY

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Search results

You may choose to Refine Your Search.

Company Name	Category Name	Link to File
LAU INDUSTRIES INC	Dampers for Fire Barrier and Smoke Applications	EMME.R25085
LEADER INDUSTRIES INC	Dampers for Fire Barrier and Smoke Applications	EMME.R5543
LLOYD ASIA CO LTD	Dampers for Fire Barrier and Smoke Applications	EMME.R26194
LLOYD INDUSTRIES INC	Dampers for Fire Barrier and Smoke Applications	EMME.R14128
LOUVERS & DAMPERS INC	Dampers for Fire Barrier and Smoke Applications	EMME.R16591
METAL INDUSTRIES INC	Dampers for Fire Barrier and Smoke Applications	EMME.R26783
METAL-FAB INC	Dampers for Fire Barrier and Smoke Applications	EMME.R16483
METROPOLITAN AIR TECHNOLOGY	Dampers for Fire Barrier and Smoke Applications	EMME.R27198
MIAMI TECH INC	Dampers for Fire Barrier and Smoke Applications	EMME.R10250
NAILOR INDUSTRIES INC	Dampers for Fire Barrier and Smoke Applications	EMME.R9492

All UL life safety products are listed in the UL Directories

www.UL.com

Life Safety Damper Types

- **Fire Dampers**
- **Smoke Dampers**
- **Combination Fire/Smoke Dampers**
  - Corridor Dampers
- **Ceiling Radiation Dampers**

Images courtesy of Nailor Industries, Inc.

Fire Dampers

“A device, installed in an air distribution system, designed to close automatically upon detection of heat, to interrupt migratory airflow, and to **restrict the passage of flame**.” (NFPA 80)

Images courtesy of Nailor Industries, Inc.

Why do we need Fire Dampers?

Principles of Protection:

- Containment & Compartmentation – *limit spread of fire*
- Provide effective fire resistive continuity to *allow for egress* in fire event
- "*Defend in Place*" strategy, especially in Healthcare and similar occupancies

Lessons Learned…

Major US fire incidents shaped modern day code requirements:

- MGM Grand Hotel Fire (1980)

MGM GRAND HOTEL FIRE

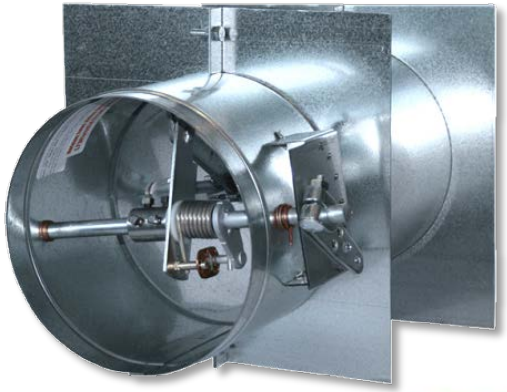
November 21, 1980
85 people died, over 700 injured
~$223 Million in legal settlements

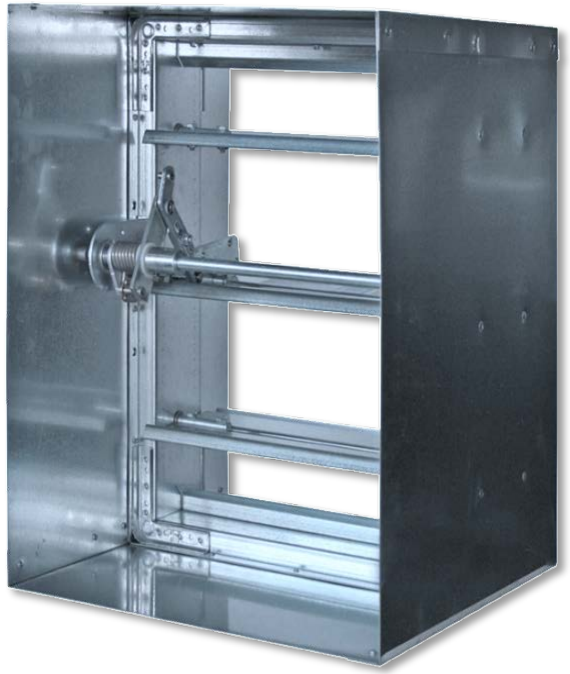
- Area of origin was “The Deli”; an area that was vacant and closed. Faulty wiring in a display case caused the initial fire.
- Fire spread rapidly due to the ignition of wallpaper, pvc piping, glue and plastic mirrors.
- Toxic fumes/smoke spread due to faulty smoke dampers within the ventilation ductwork and throughout the air circulation system.

  “Dampers in the main unit over the casino were…bolted in such a manner as to make them inoperable.”

Source: "MGM Fire Investigation Report“, Clark County Fire Department

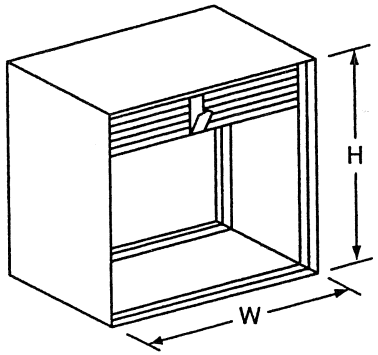
Fire Dampers: Types





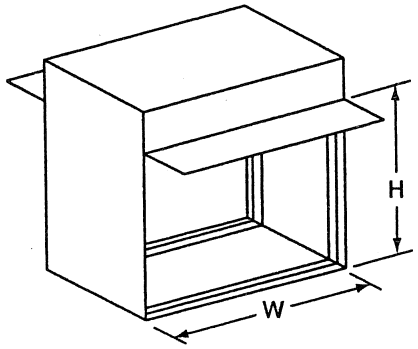
Images courtesy of Nailor Industries, Inc.

Curtain Fire Damper Enclosure Types



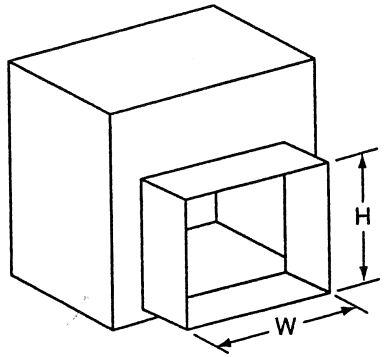
Type A (No Transition)

Frame and blades in the air stream



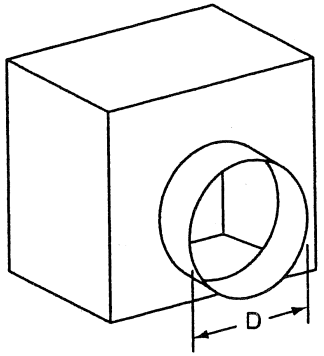
Type B

Blades out of the airstream



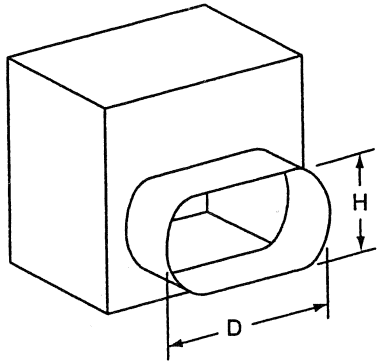
Type C

Square Transition collar



Type CR

Round transition collar



Type CO

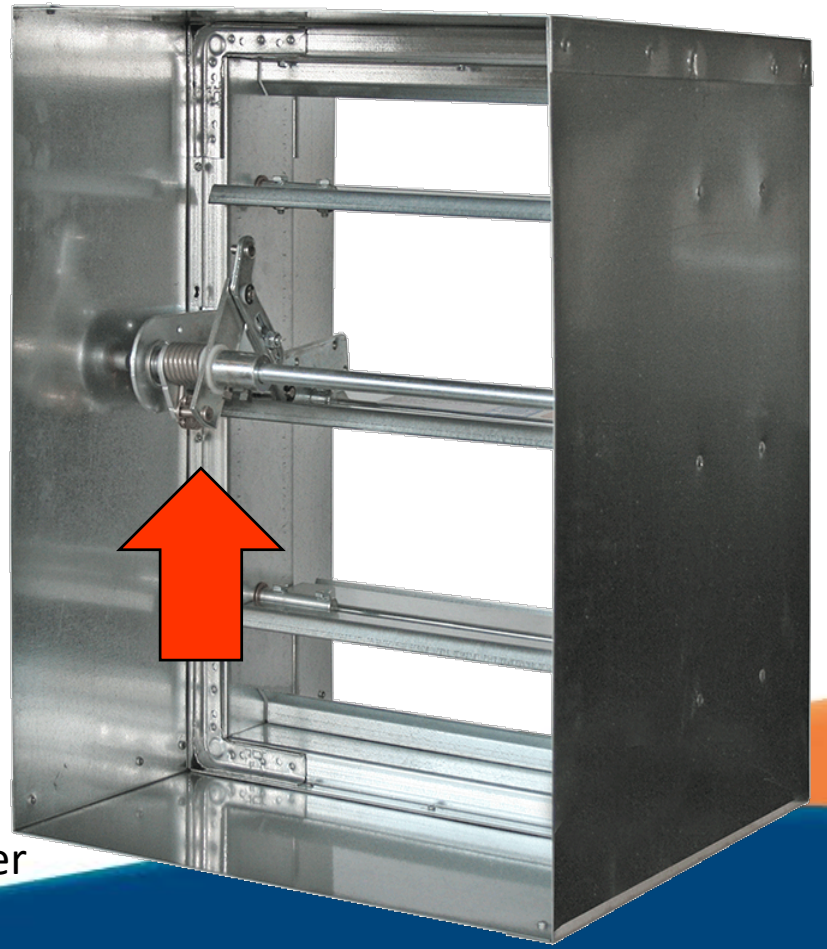
Flat oval transition collar

Type C damper have blades and frame out of the airstream for maximum free area. They are available in low pressure and high pressure (sealed) casings.

Fire Dampers: How do they work?

Curtain Fire Damper

Typical Fusible Link



Multi-Blade Fire Damper

Images courtesy of Nailor Industries, Inc.

Fire Dampers: UL Rating Qualifications

- Static or Dynamic
- Hourly Rating – 1-1/2 hr. or 3 hr.
- Mounting Position – Vertical (Walls/Partitions) or Horizontal (Ceilings/Floors)
- Installation – “In Wall” or “Out of Wall”

Fire Dampers: Static vs. Dynamic

"**Fans Off**" during fire emergency = **STATIC** System

"**Fans On**" during fire emergency = **DYNAMIC** System
(i.e. Smoke Control system)

Velocity/Pressure Rating – min. 2000 fpm @ 4 in. w.g.

- 1000 fpm increments and 1 in. w.g. increments

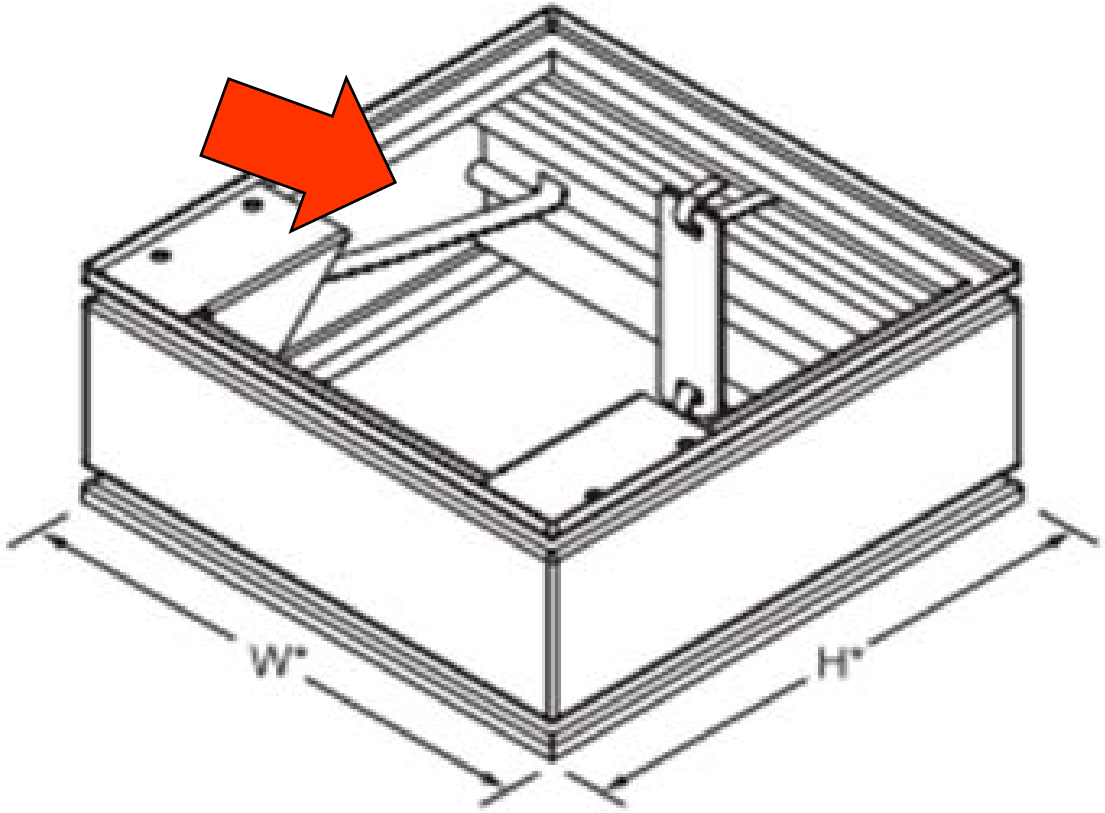
Fire Dampers: UL555 Dynamic Testing

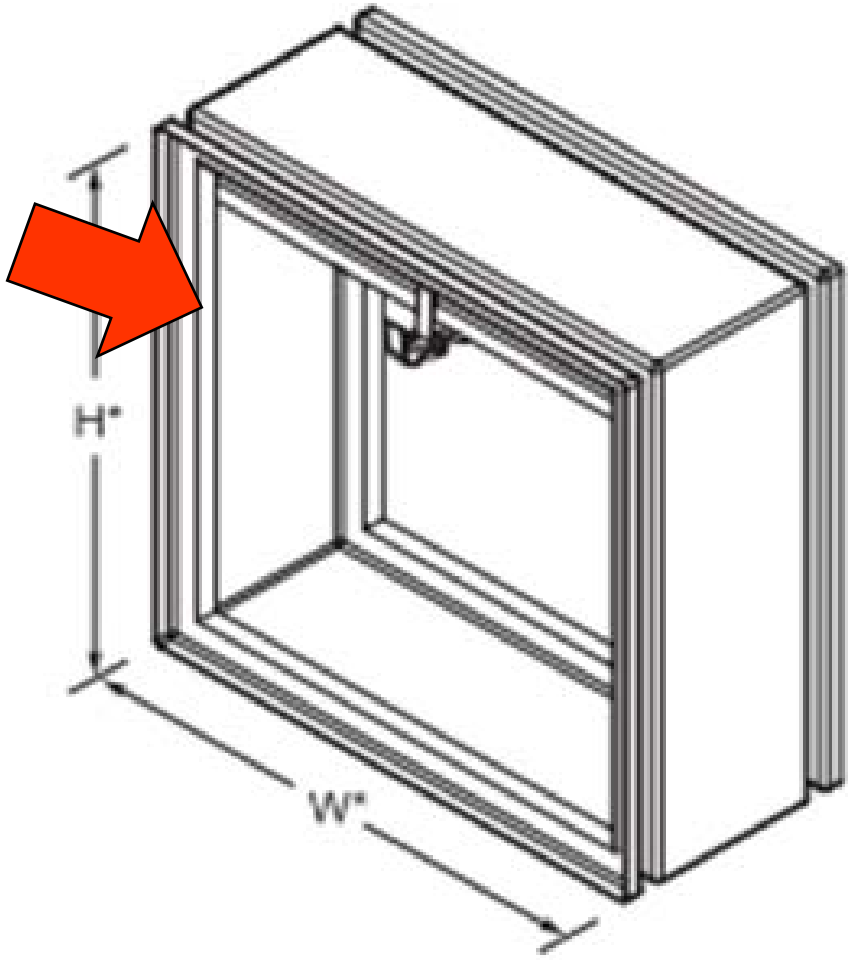
UL555 6th edition (July 2002) incorporated new test requirements for Fire Dampers including:

- Airflow ratings of 2000, 3000, and 4000 fpm with minimum test velocities of 2400, 3400, and 4400 fpm, respectively.
- Pressure ratings of 4, 6, and 8 in-w.g. with minimum test pressures of 4.5, 6.5, and 8.5 in-w.g., respectively.
- Bidirectional airflow testing.

Difference: Static vs. Dynamic

Why orientation (V or H) matters:





Fire Dampers: Curtain vs. Multi-Blade

When should I use one vs. the other?

- What is the opening size?
- Is the application pressure sensitive?
- Is this a high velocity application?
- Mitigating risk to occupants/owners:
  - Is risk of fire great?
  - Is value of economic loss due to fire great?

Images courtesy of Nailor Industries, Inc.

Video courtesy of Nailor Industries, Inc.

Fire Test UL 555

Fire Test UL 555

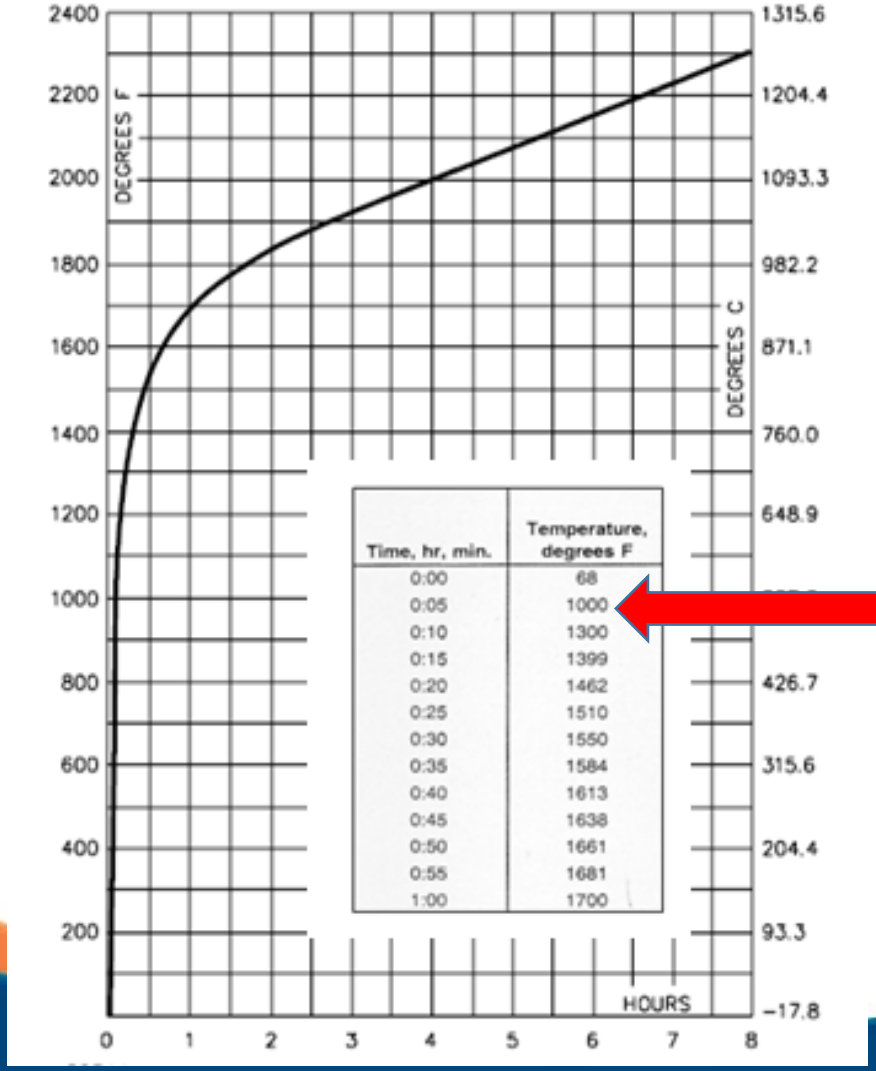
- 1-1/2 or 3 hour burn test per UL Time/Temp curve (next slide)
- Maximum size (single and/or multi-section) must be tested

<u>Fire Test allowances</u>

- Allows up to 6” of flame when the seals burn
- Allows visible gaps of 3/8” vertically and 1/32” horizontally
- Allows ¾” nonvisible gaps during test

TIME/TEMPERATURE CURVE UL 555

Figure 10.2
Time-temperature curve



Time, hr, min.	Temperature, degrees F
0:00	68
0:05	1000
0:10	1300
0:15	1399
0:20	1462
0:25	1510
0:30	1550
0:35	1584
0:40	1613
0:45	1638
0:50	1661
0:55	1681
1:00	1700

1000 ºF after 05 seconds…

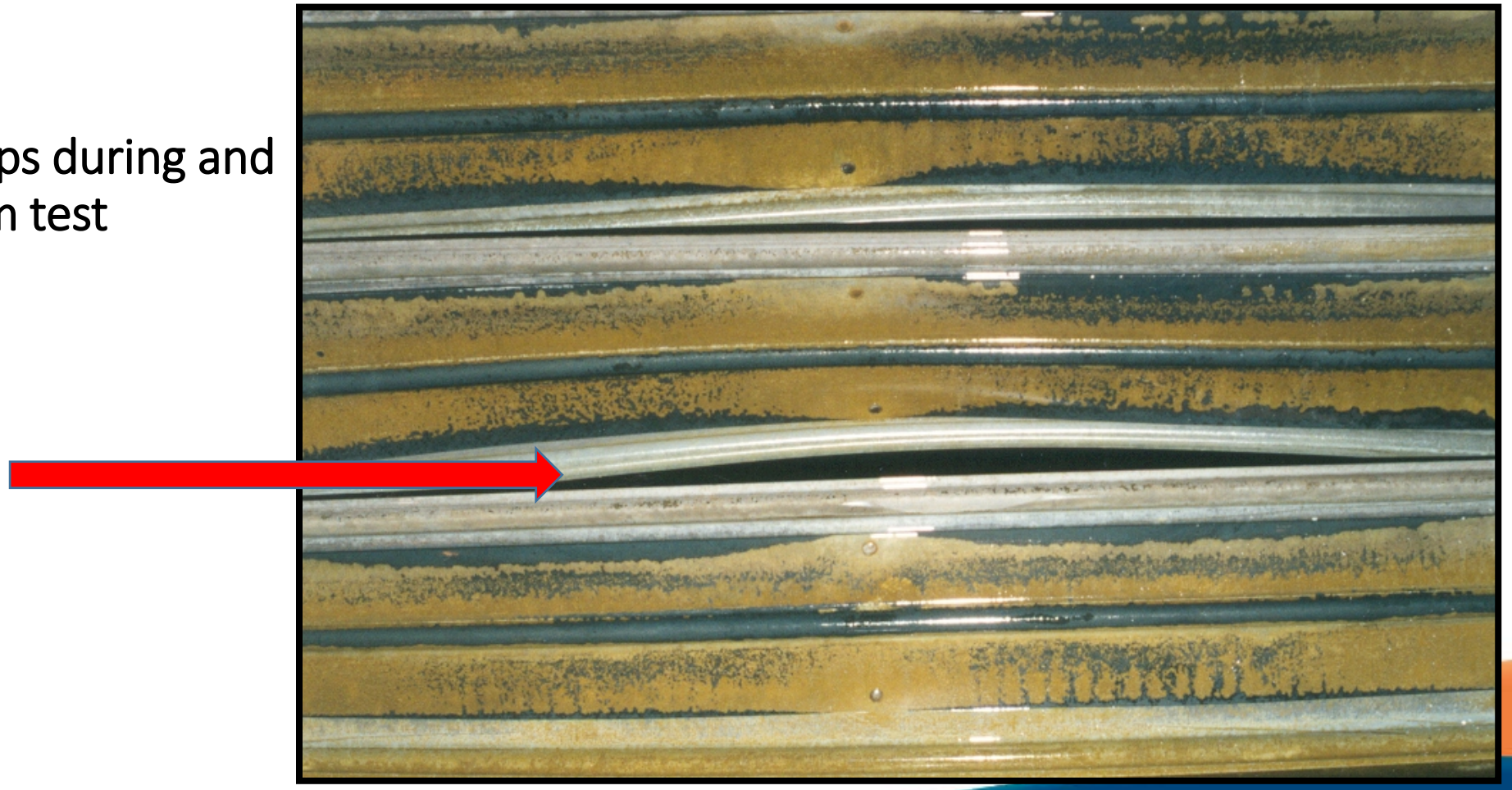
Hose Stream Test UL 555

- **2-1/2 ” diameter hose with 1-1/8 ” nozzle at 20 feet**
- **1-½ hour test: 30 psi water pressure for 1-½ second per square foot of damper**
- **3 hour test: 45 psi water pressure for 3 seconds per square foot of damper**

“Cold Gaps” after Hose Stream Test

UL 555 -

- Test allows 1” gaps during and after hose stream test



Typical Vee Blade Design

Smoke Dampers

"A device within the air distribution system to **control the movement of smoke**." (NFPA 80)

Images courtesy of Nailor Industries, Inc.

Why do we need Smoke Dampers?

- According to NFPA, Smoke is the major killer in fire related deaths (i.e. MGM Grand Casino).
  - Building occupants can be jeopardized by smoke traveling far from the fire's origin.
- Sprinklers certainly help to extinguish a fire, but they cannot contain the smoke generated by the fire.

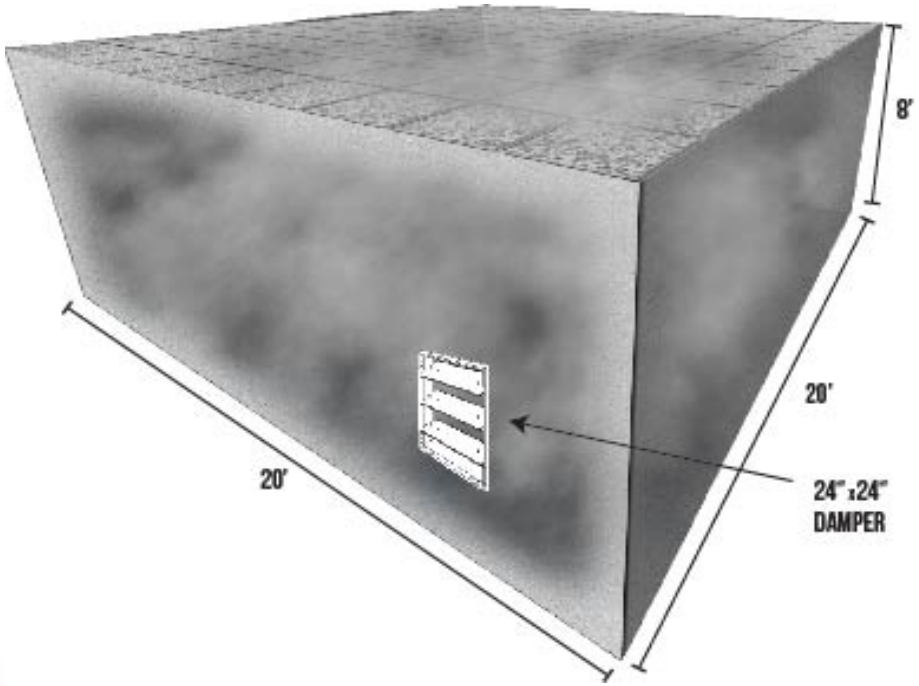
UL Rating Qualifications

- Leakage Class – I, II (or III*)
- Velocity – 2000, 3000, or 4000 fpm
- Pressure – 4, 6, or 8 in-w.g.
- Operational Temperature – 250 °F or 350 °F
- Fail Position – Open or Closed

Smoke Dampers: Leakage Class

- UL 555S Classifications
  - Class I (8 cfm/sq. ft. @ 4 in. w.g.)
  - Class II (20 cfm/sq. ft. @ 4 in. w.g.)
  - Class III (80 cfm/sq. ft. @ 4 in. w.g.)

“Amount of time” to fill a room with Smoke based on Leakage Class



- Class I = **100 minutes**
- Class II = **40 minutes**
- Class III = **10 minutes**

Combination Fire/Smoke Dampers

"A device that meets **both the fire damper and smoke damper requirements**." (NFPA80)

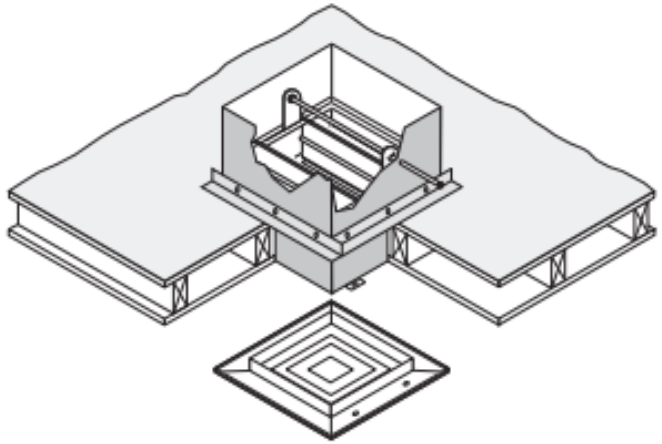
Images courtesy of Nailor Industries, Inc.

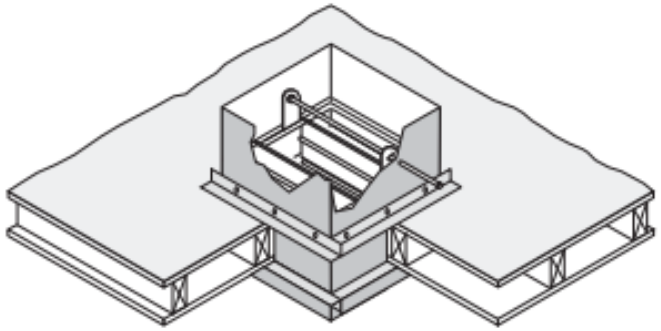

UL Rating Qualifications

- Hourly Rating – 1-1/2 hr. or 3 hr.
- Leakage Class – I, II, or III
- Velocity – 2000, 3000, or 4000 fpm
- Pressure – 4, 6, or 8 in-w.g.
- Temperature – 250 ^{o}F or 350 ^{o}F
- Mounting Position – Vertical or Horizontal
- Installation – “In Wall” or “Out of Wall”

Corridor Dampers

- Fire/smoke dampers that have been designed for use in corridors.
  - “Corridor” = means of egress travel to an exit, typically found in hospitals.
- There are additional test requirements for Corridor Dampers in UL555 and they carry a 1 hr. rating when certified.
- Most commonly used in California.

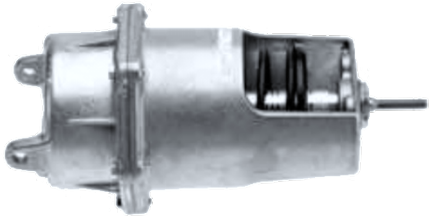




Images courtesy of Nailor Industries, Inc.

Smoke & Fire/Smoke Actuators

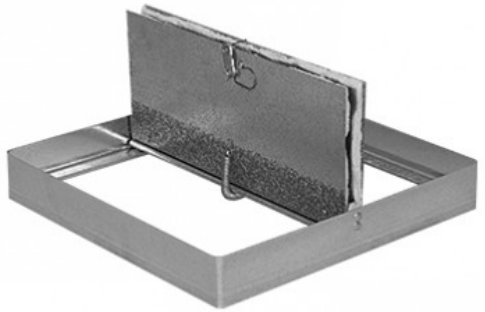
- Actuators must be **factory installed,** per UL.
- Electric (120V, 24V, 230V) or Pneumatic.
- Two position (open/closed) and Modulating (Balancing) types.
- Different torque ratings, selection based on tested size of assembly.*
- May be externally or internally mounted.Φ



Images courtesy of Nailor Industries, Inc.

Ceiling Radiation Dampers

"A device installed to **limit radiant heat transfer through an air outlet or air inlet opening in the ceiling of a floor-or roof-ceiling assembly** having not less than a 1 hour fire resistance rating." (NFPA 90A)



Images courtesy of Nailor Industries, Inc.

Why do we need Ceiling Dampers?

- Ceiling Radiation Dampers protect the structural integrity of floor/ceiling or roof/ceiling assemblies.
- Falling through roofs/floors is a common cause of injury and death among firefighters.

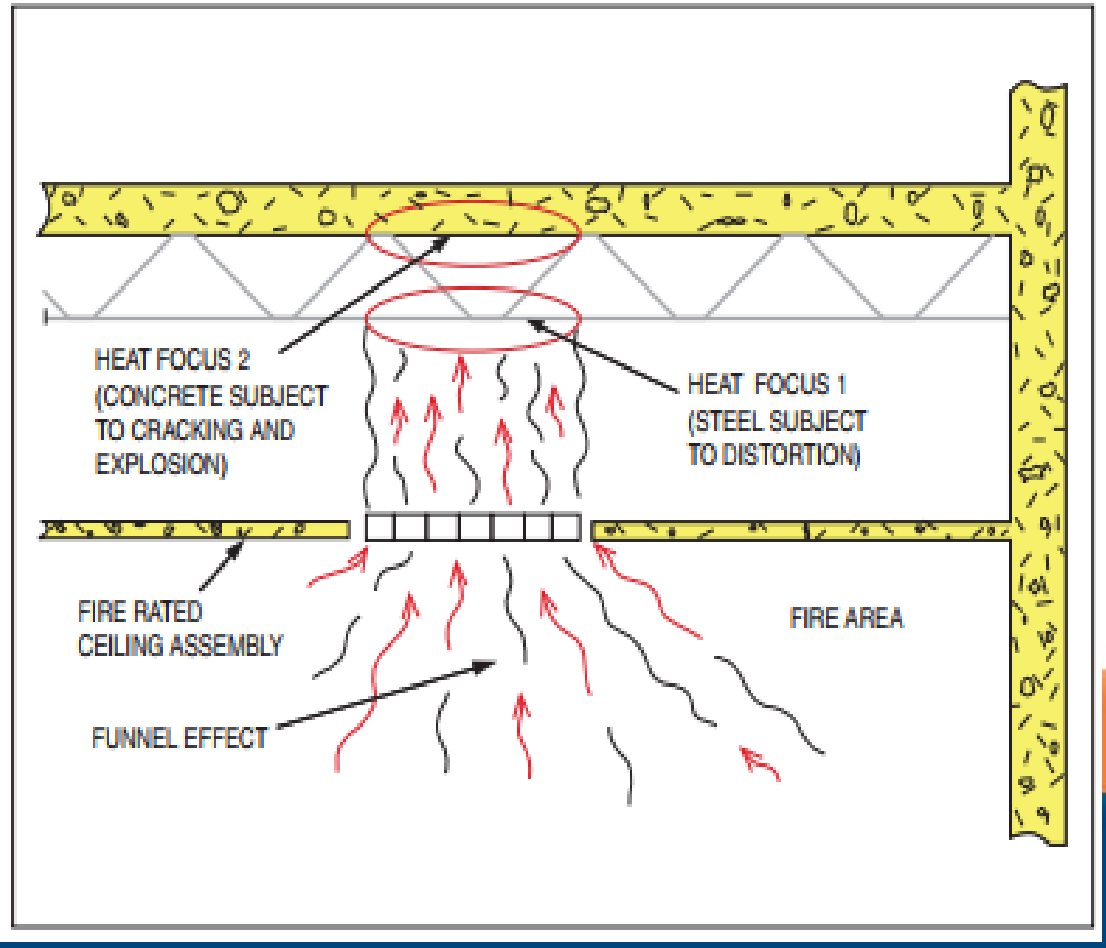
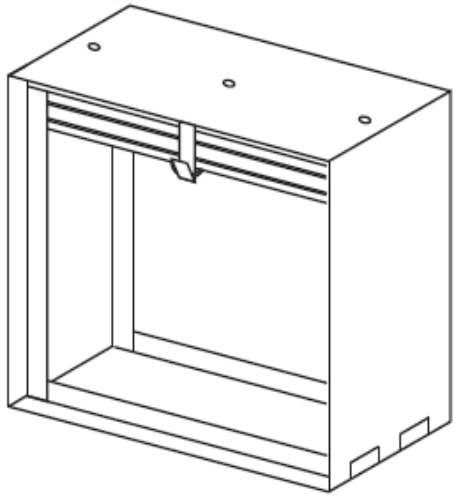


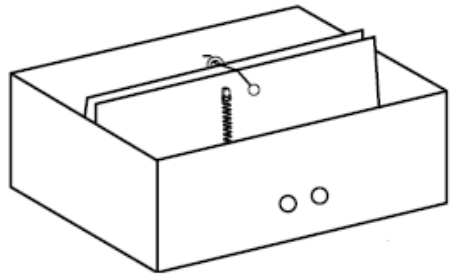
Illustration courtesy of Nailor Industries, Inc.

Fire Damper vs. Ceiling Damper?

- Limits spread of flame (UL555)
- Rated walls/floors/partitions

- Limits Heat
- Approved floor/ceiling or roof/ceiling assemblies only





Images courtesy of Nailor Industries, Inc.

Fire Damper vs. Ceiling Damper vs. Wood Truss Ceiling Radiation Damper

Images courtesy of Nailor Industries, Inc.

Ceiling Damper Test Standards

Tested and listed to either UL 555C or UL263.

UL 555C

CRDs listed to this standard can be used anywhere “hinged-door” type dampers are allowed.

Intended for use in sheet metal air duct outlets, typically in suspended ceilings.

UL 263

Part of a complete assembly which incudes all of the elements of the floor or roof/ceiling design and only the specified damper can be used in that specific design.

Intended for use in wood truss ceilings.

Listing that allows a UL 555C Damper

Design No. G526

July 28, 2017

Restrained Assembly Rating — 2 Hr.

Unrestrained Assembly Ratings — 1-1/2 and 2 Hr.

(See Item 14B)

Unrestrained Beam Rating — 2 Hr.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

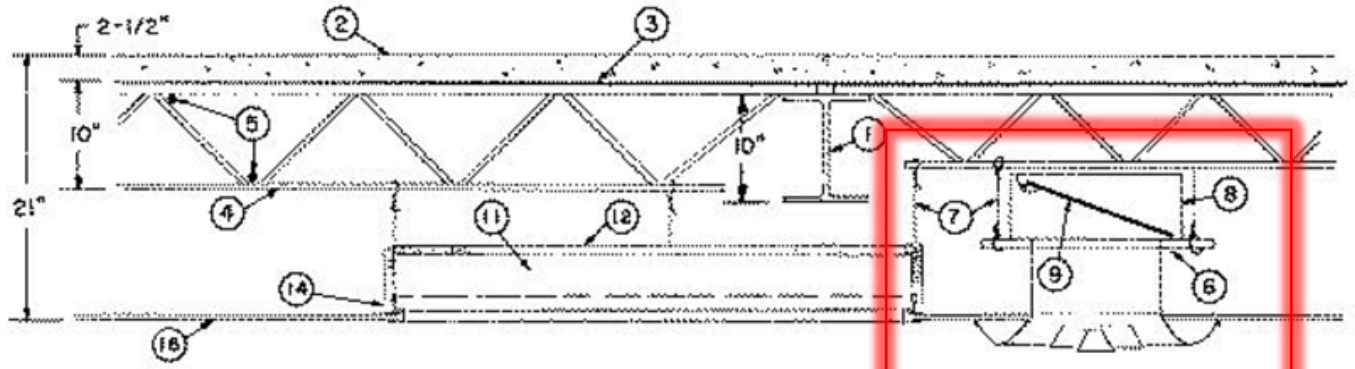


Image from UL Online Certification Directory

Typical UL 555C Application

- Air outlet, ceiling damper, and thermal blanket assembly installed in a suspended lay-in T-bar ceiling

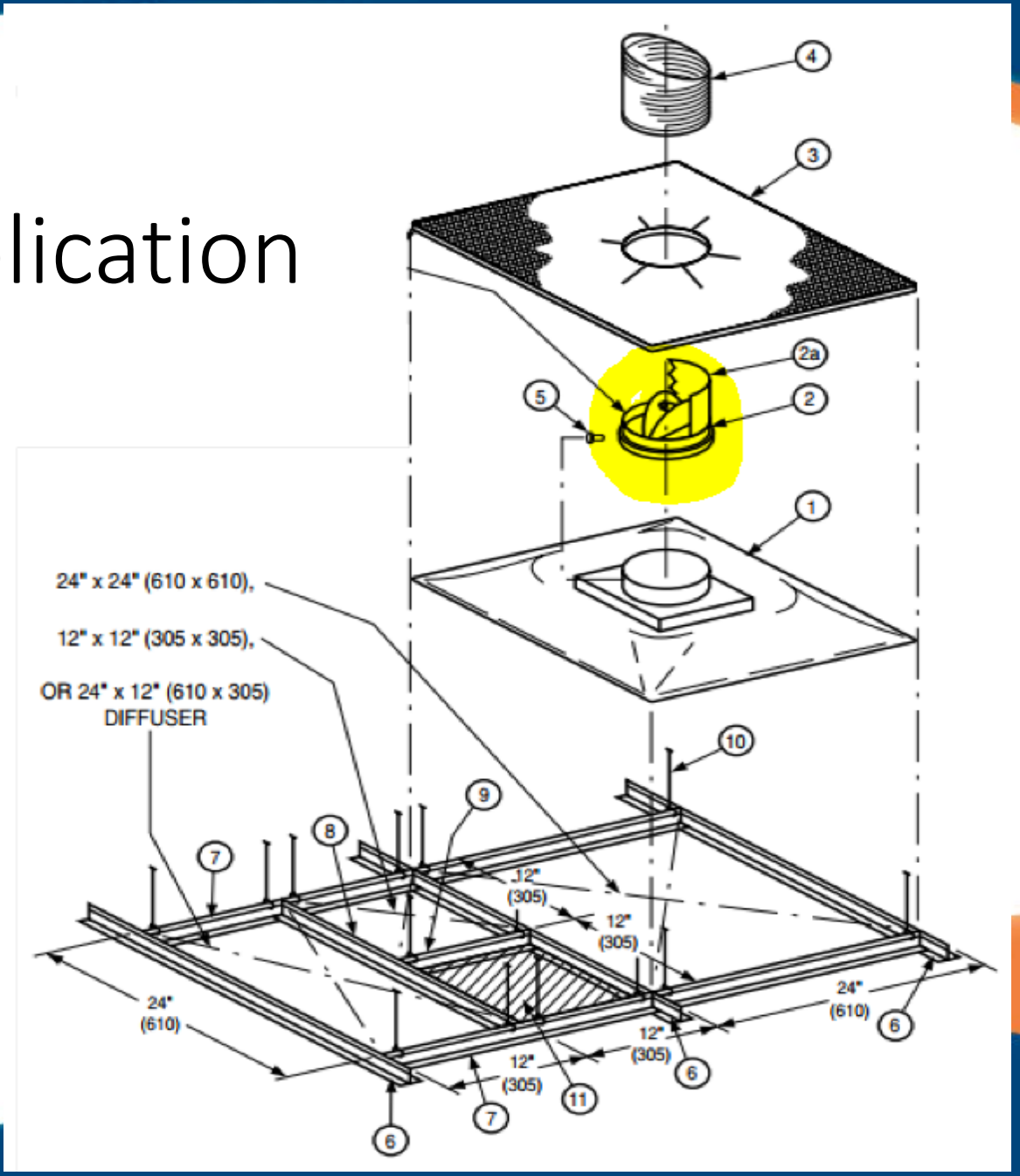


Illustration courtesy of Nailor Industries, Inc.

Typical UL 263 Listing – Wood Truss

Design No. L550

September 12, 2016

Unrestrained Assembly Rating — 1 Hr.

Finish Rating — 23 Min (See Items 5 or 5A)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

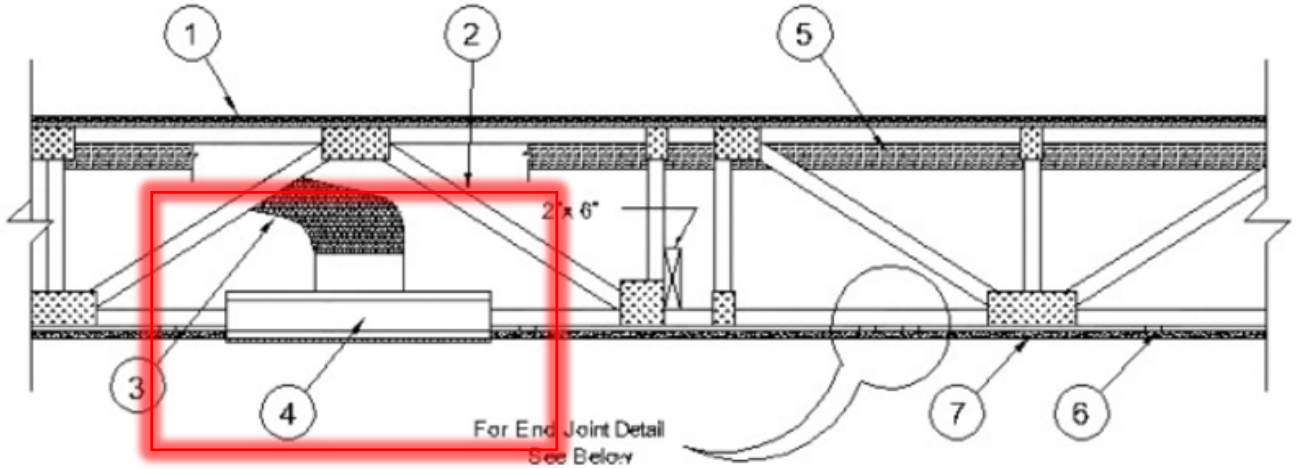
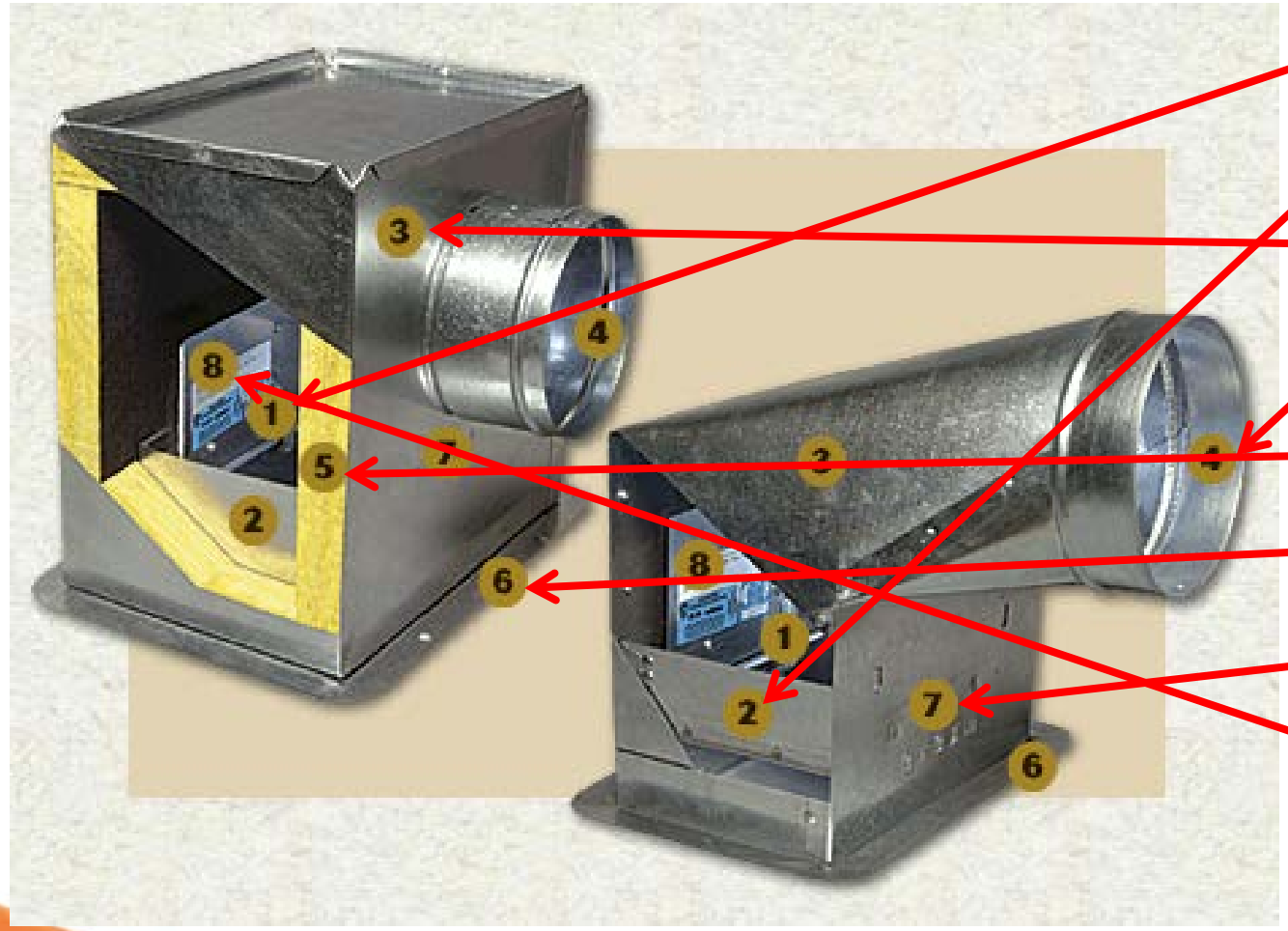


Image from UL Online Certification Directory

Ceiling Radiation Damper w/ Register Box (Boot)



1. Fusible Link
2. Damper Housing
3. Plenum Housing
4. Flexible Air Duct Connection
5. R-6.3 Duct Liner
6. Plaster Flange
7. Alignment Indicators
8. Damper Assembly

Image courtesy of Nailor Industries, Inc.

Typical Damper Installations

Fire Damper - Curtain Type
Typical Installation

① **UL CLASSIFIED FIRE DAMPER - DYNAMIC OR STATIC**

1 1/2 Hr. Label - For fire separations up to 2 Hrs.

3 Hr. label - For fire separations up to 4 hrs.

② **FIRE SEPARATION**

③ **RETAINING ANGLES**

④ **BREAKAWAY JOINT**

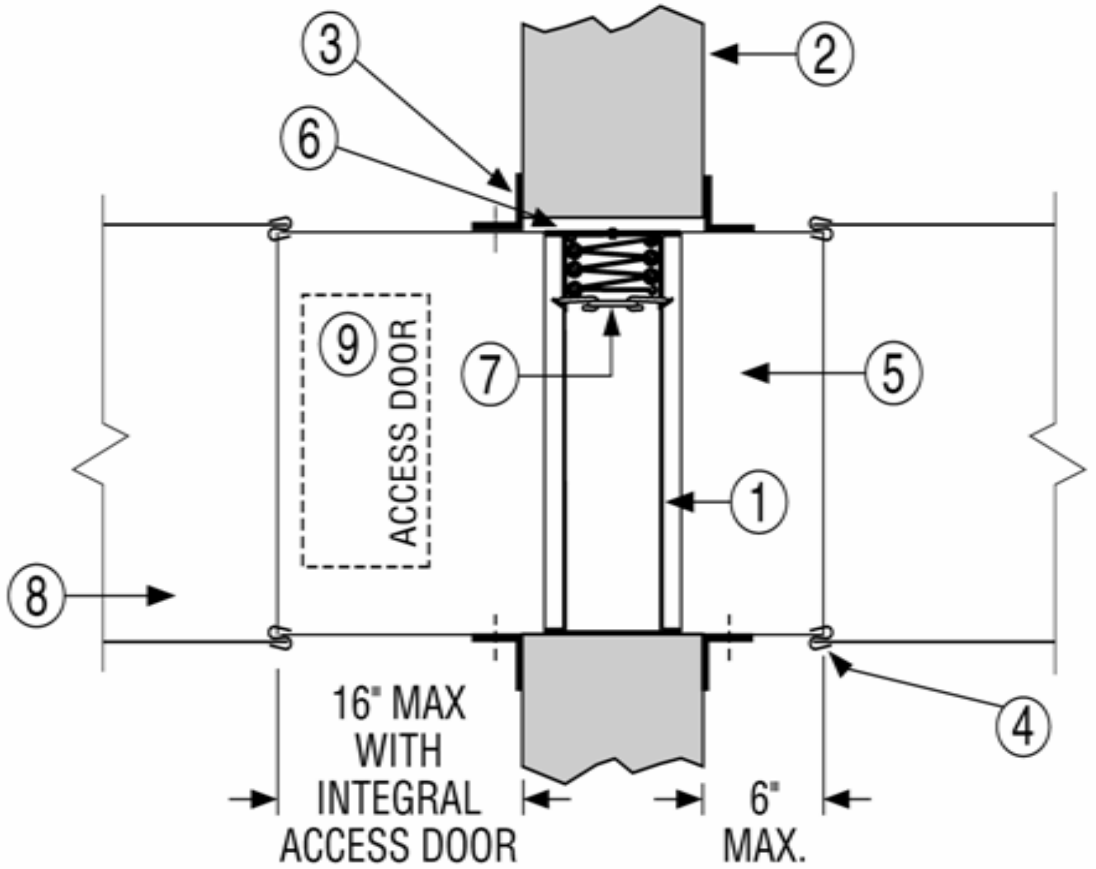
⑤ **SLEEVE** (DUCT GAUGE MIN. SMACNA/NFPA 90A SPEC.)

⑥ **EXPANSION CLEARANCE**

⑦ **UL LISTED HEAT RESPONSE DEVICE** (FUSIBLE LINK)

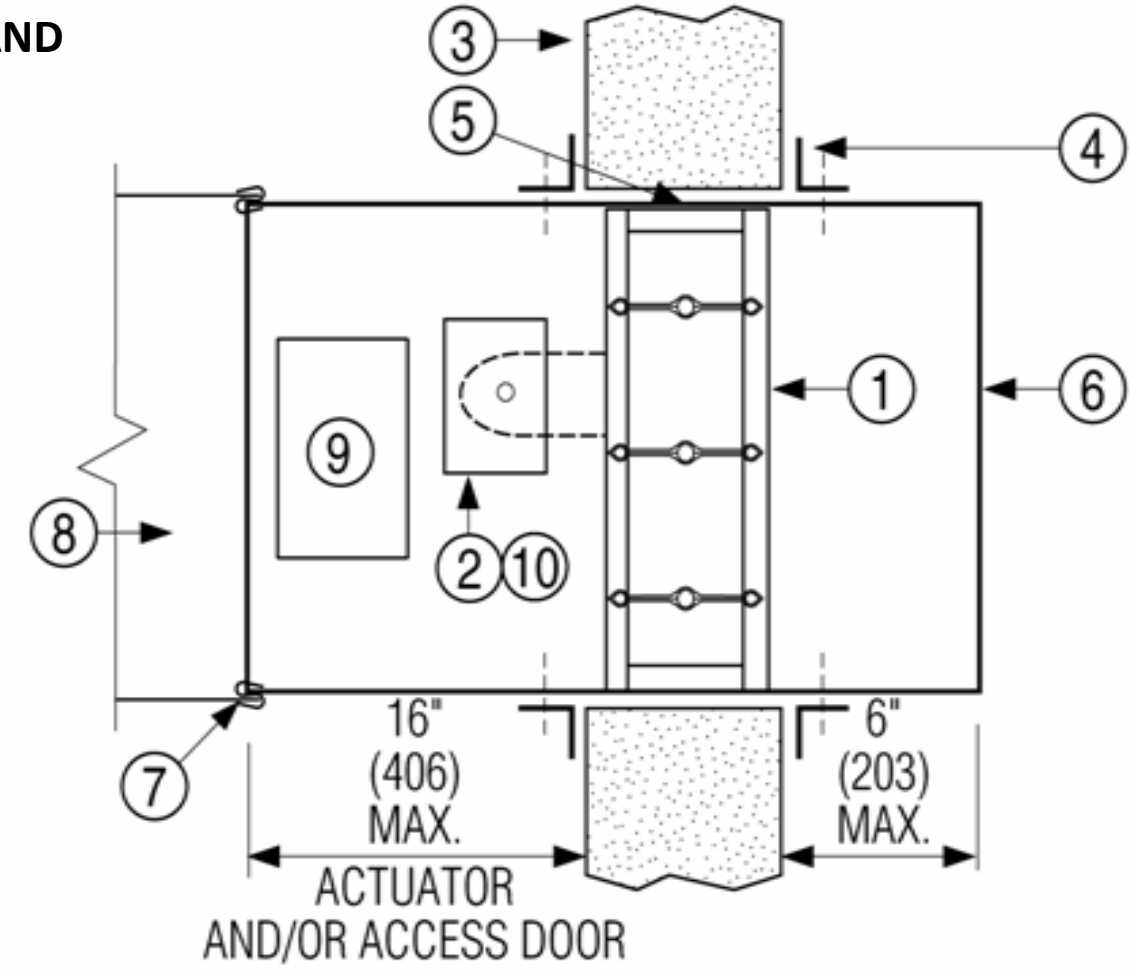
⑧ **DUCT**

⑨ **ACCESS DOOR**



Combination Fire/Smoke Damper
Typical Installation

1. **UL CLASSIFIED AS BOTH A DYNAMIC FIRE DAMPER AND A LEAKAGE RATED SMOKE DAMPER**
2. **UL QUALIFIED DAMPER/ACTUATOR ASSEMBLY**
   Pneumatic or Electric Actuators
3. **FIRE SEPARATION & SMOKE BARRIER**
4. **RETAINING ANGLES**
5. **EXPANSION CLEARANCE**
6. **SLEEVE**
7. **BREAKAWAY JOINT**
8. **STEEL DUCT**
9. **ACCESS DOOR**
10. **UL LISTED HEAT RESPONSIVE DEVICE**



Smoke Damper
Typical Installation

① **UL CLASSIFIED LEAKAGE RATED SMOKE DAMPER**

② **UL QUALIFIED ACTUATOR/DAMPER ASSEMBLY**

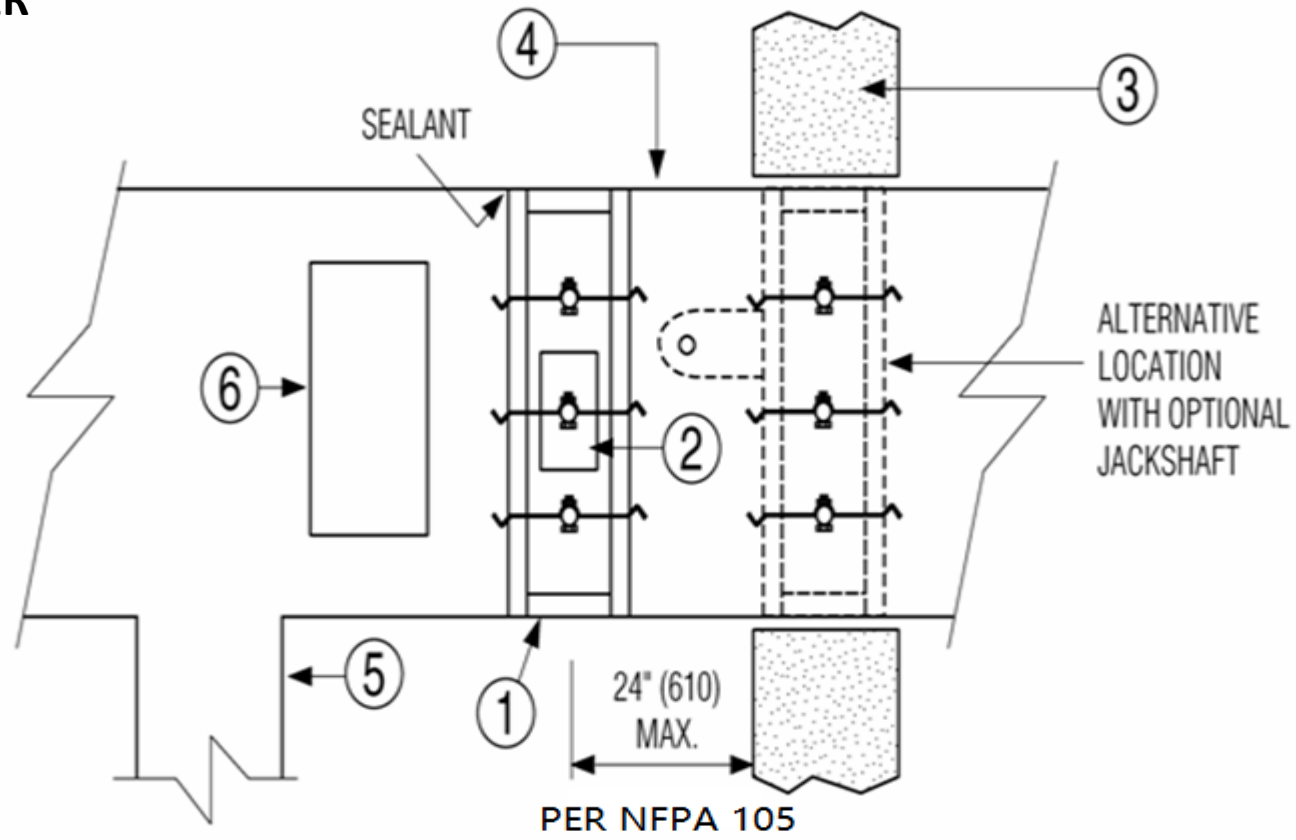
Pneumatic or Electric Actuators

③ **SMOKE BARRIER**

④ **DUCT**

⑤ **1st DUCT OUTLET**

⑥ **ACCESS DOOR**



Common question:
Do I HAVE TO seal around retaining angles?

- Sealing of retaining angles is **NOT REQUIRED**.
- Sealing of retaining angles **IS PERMITTED** when done in accordance with UL approved installation instructions.
- Specific requirements for location and type of sealant to be used.

Consult manufacturer's installation manual for specific requirements for each damper manufacturer and damper type.

[redacted]

SUPPLEMENTARY INSTALLATION INSTRUCTIONS
OPTIONAL SEALING OF FIRE DAMPERS AND COMBINATION FIRE/SMOKE DAMPERS IN WALL/PARTITION OR FLOOR OPENINGS

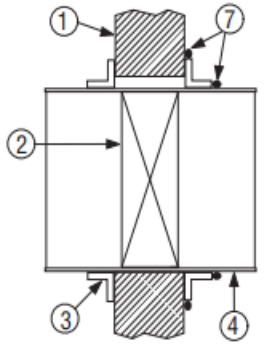


Figure 1. Damper ducted both sides.

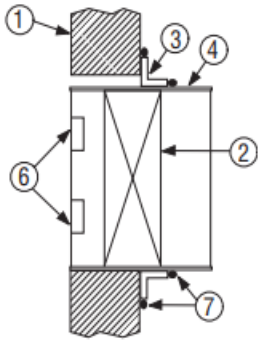


Figure 2. Damper sleeve with tabs for grille mounting

APPLICATION:
Application of sealant between the retaining angles, retaining plates, or sleeve retaining flange and the fire rated wall or floor as applicable to the damper installation is not required by UL as a standard procedure. However, if an airtight seal is required by specification or local building code, sealant shall be applied as shown.

METHOD
Follow the sealant manufacturers' directions; remove dirt, grease, and moisture from the surfaces to be sealed. Apply a continuous bead of Dow Corning RTV732, Dow Corning 999, Hilti Corporation FS-One, Johns Manville Firetemp C1 or GE RTV108 sealant. Location of sealant should be as shown in Figures 1 through 4 and may be applied on one or both sides of the fire separation, as applicable to the model specific installation.

IMPORTANT:
Do not apply sealant within the required expansion gap between the damper and the fire rated wall or floor.

Press the surface of the sealant in place to dispel any air. Allow sealant to set and become tack-free before operating the damper.

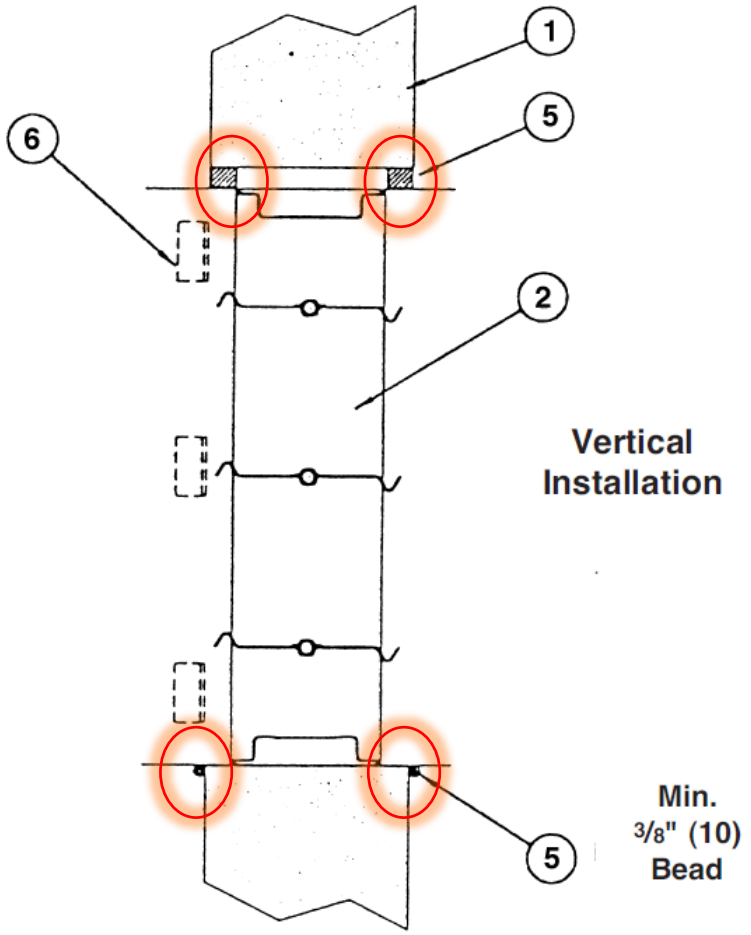
Refer to the appropriate damper installation instructions for details on damper installation.

ITEMS
1. Fire Rated Wall or Floor
2. Damper
3. Retaining Angles
4. Sleeve
5. Retaining Plate
6. Mounting Tabs
7. Sealant (refer to text for specific sealant)

Common question:
Do I HAVE TO fill the gap around fire dampers?

- The space around a fire damper or fire/smoke damper is commonly referred to as the annual space or expansion gap.
- **Almost every manufacturer and damper on the market states "DO NOT" to fill the gap!!**
- There is only 1 manufacturer (*that I am aware of) that has an optional installation method using firestopping caulk around the damper in the . THIS INSTALLATION IS VERY SPECIFIC.

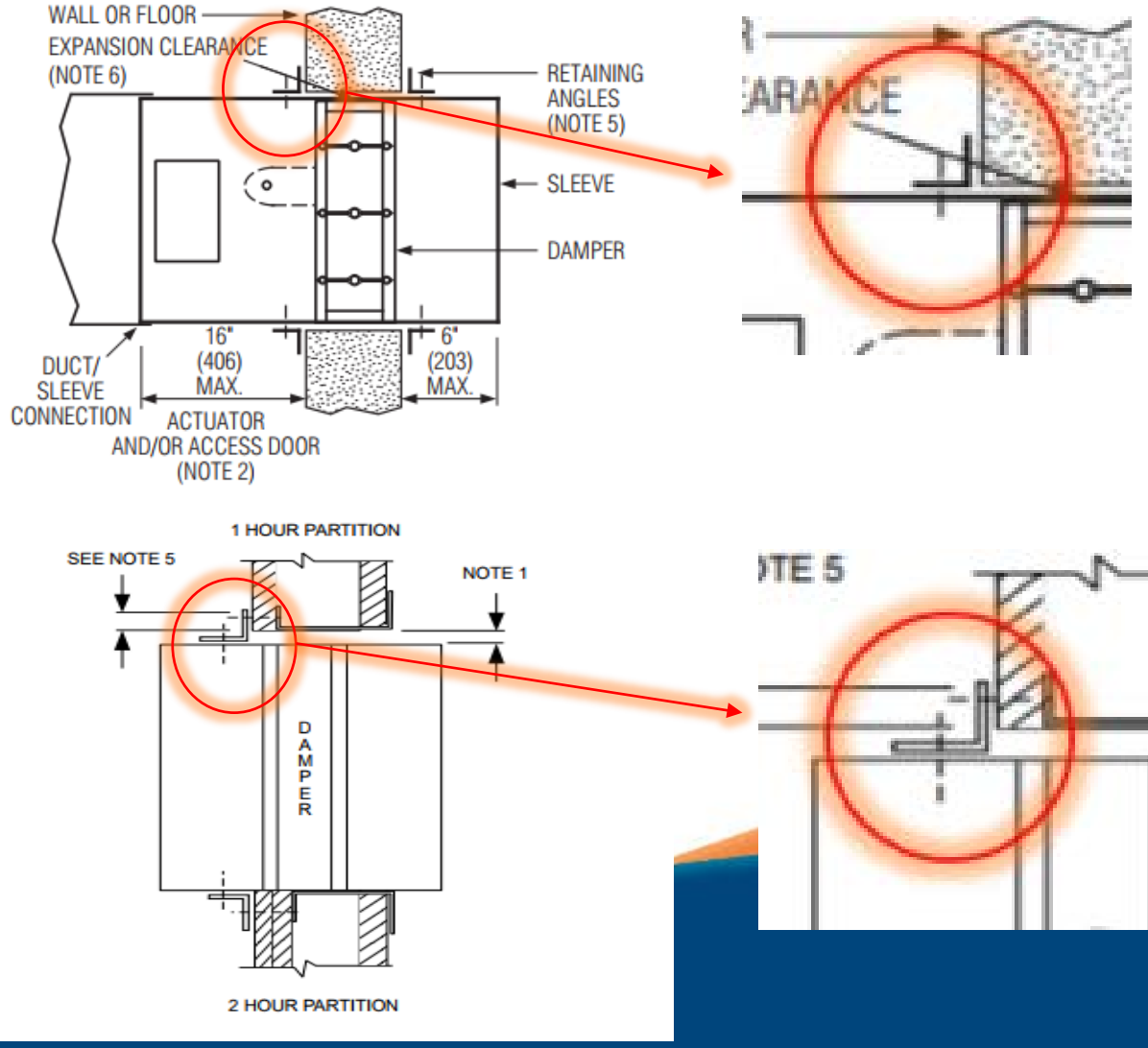
  Consult manufacturer's installation manual for specific requirements for each damper manufacturer and damper type.



Common question:
Do I HAVE TO anchor the retaining angle into the wall?

- Anchoring the retaining angle into the wall is usually **NOT REQUIRED** on a standard 2 sided angle installation (partition wall).
- Anchoring the retaining angle into the wall is usually **REQUIRED** on a standard 1 sided angle installation (shaft wall).

Consult manufacturer's installation manual for specific requirements for each damper manufacturer and damper type.



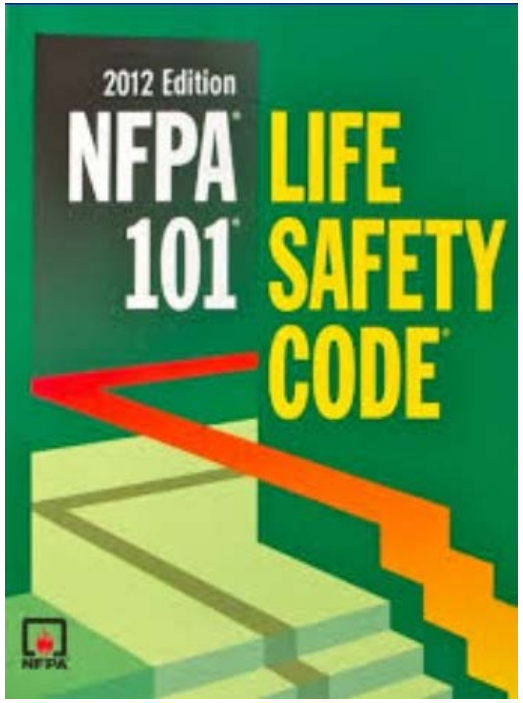
Penetration Types:
Where are Dampers Required?

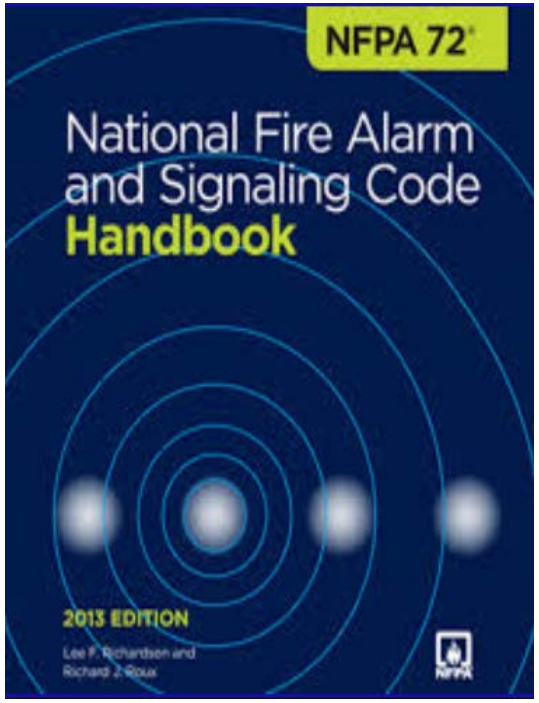
“I” Codes

- First published in 2000, combo of 3 legacy codes: BOCA National Building Code (BOCA/NBC), Uniform Building Code (UBC) & Standard Building Code (SBC)
- IBC – design of building; IMC – design of mechanical systems; IFC – regulate fire hazards, testing, maintenance in existing buildings

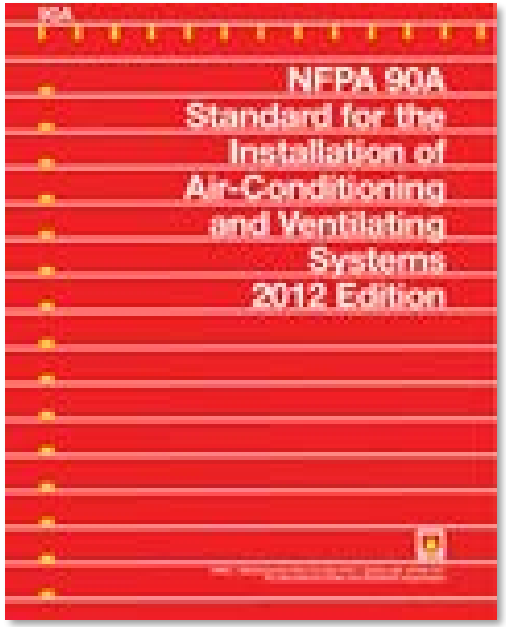
NFPA Codes


NFPA 1
Fire Code
2018
1


2012 Edition
NFPA 101 LIFE SAFETY CODE


NFPA 72
National Fire Alarm and Signaling Code Handbook
2013 EDITION

NFPA Standards



- NFPA standards contain **recommended practices and technical data for determining fire-resistive requirements**

IBC: Types of Penetrations

- **Fire Wall**: Extends from foundation through roof, allows collapse of structure either side w/o collapse of wall. Can be walls between buildings on lot lines, or to divide one building into separate buildings.
- **Fire Barrier**: Fire resistance-rated vertical assembly (generally), continuity maintained.
  - Exit passageway & enclosures, atrium boundaries, stairwell enclosures, separations btw. occupancies in a mixed-use building.
- **Fire Partition**: Fire resistance-rated vertical assembly, in which openings are protected.
  - Corridor walls or elevator lobbies (w/ exceptions); Separate dwelling units, sleeping rooms, and tenant spaces in malls.

IBC: Types of Penetrations

- **Smoke Barrier**: Continuous membrane to restrict movement of smoke, vertical or horizontal. IBC 709.3 requires smoke barriers be 1 hour rated.

- **Smoke Partition**: Unrated membrane to restrict smoke movement. Limited use in Code. SD only required in air transfer openings.

- **Smoke Wall**: No such thing!

IBC: Types of Penetrations

- **Shaft**: Enclosed space extending through one or more stories of a building, connecting vertical openings in successive floors.
  - *2 hr rated ≥ 4 stories, 1 hr fire-rated < 4 stories.*

- **Horizontal (Fire Resistant) Assembly**: Continuity maintained. Floors & Roofs.

- **Membrane Penetration**: an opening in a floor or roof/ceiling assembly that only passes through one side.

IBC
Chapter 7
Section 717.5
Ducts & Air Transfer Openings

The provisions of this section shall govern the protection of duct penetrations and air transfer openings in assemblies required to be protected and duct penetrations in nonfire-resistance-rated floor assemblies.

The following table indicates what walls are regulated by Section 717.5 and where these requirements are referenced from.

SECTION	WALL TYPE	REFERENCED FROM	TYPE OF DAMPER
717.5.1 (IMC 607.5.1)	Fire walls	706.11	Fire damper
717.5.1.1 (IMC 607.5.1.1)	Fire wall – Horizontal exits	706.11	Fire damper, Smoke damper
717.5.2 (IMC 607.5.2)	Fire barriers	707.10	Fire damper
717.5.2.1 (IMC 607.5.2.1)	Fire barriers – Horizontal exits	707.10	Fire damper, Smoke damper
717.5.3 (IMC 607.5.5)	Shaft enclosures	713.10	Fire damper, Smoke damper
717.5.4 (IMC 607.5.3)	Fire partitions	708.9	Fire damper
717.5.4.1 (IMC 607.5.3 and 607.5.4)	Fire partitions – Corridors	708.9	Fire damper, Smoke damper
717.5.5 (IMC 607.5.4)	Smoke barriers	709.8	Smoke damper
717.5.6 (IMC 607.5.6)	Exterior walls	705.10	Fire damper
717.5.7 (IMC 607.5.7)	Smoke partitions	710.8	Smoke damper

Where are dampers NOT required?*

- Clothes dryer exhaust
- Kitchen (grease) duct penetrations
- Hazardous exhaust ducts
- Dust collection penetrations

* check IBC or local code, or consult AHJ

Life Safety Damper Code Required Testing

Code Required testing of Dampers

The various model building codes do not detail all of the periodic testing requirements. They do refer to the NFPA standard that applies to the damper type.

The testing requirements generally are as follows:

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

  (**NFPA: 105, 6.5.2, NFPA 80: 19.4.1**)
- Each damper shall be tested and inspected every 4 years thereafter, except in hospitals where the frequency shall be every 6 years.

  (**NFPA 105: 6.5.2.1, 6.5.2.2., NFPA 80: 19.4.1.1**)

Code Required testing of Dampers

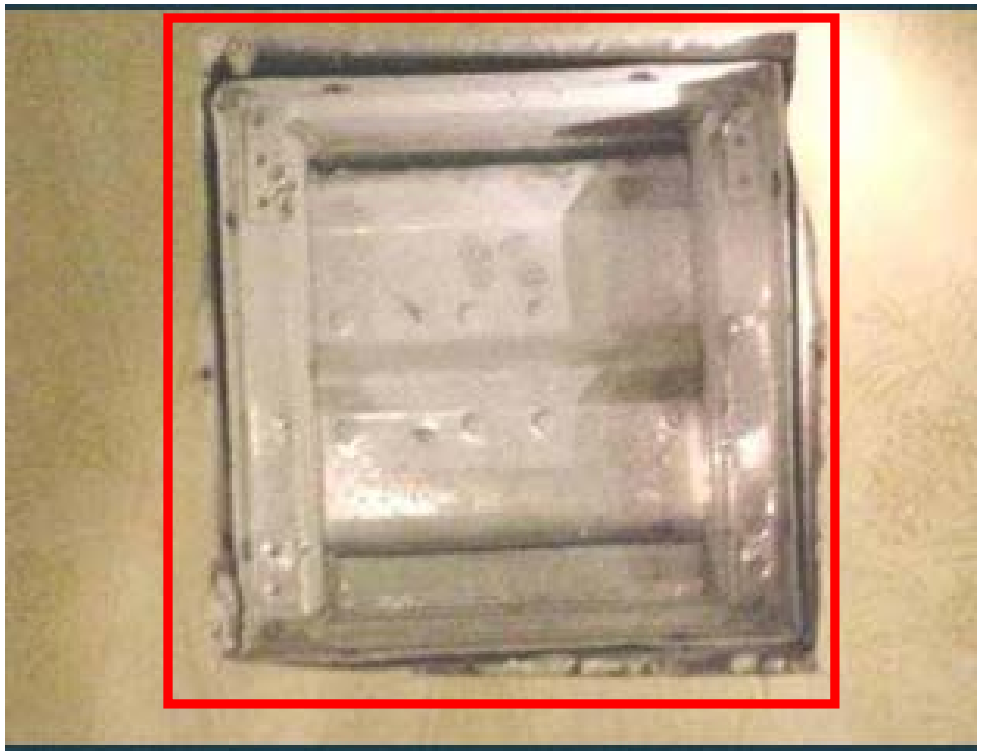
- **Smoke Control System damper testing:** After initial commissioning and testing:
  - Dedicated smoke control systems must be tested **2x/year**
  - Non-dedicated systems must be tested **1x/year**.

Responsibility Workflow Simplified…

- Manufacturer – Designs & build products to meet requirements of test standards and code
- Engineer – Interprets code to specify & design systems
- Contractor – Installs components according to code/IOM
- AHJ – Inspects/Approves installed components based on code interpretation

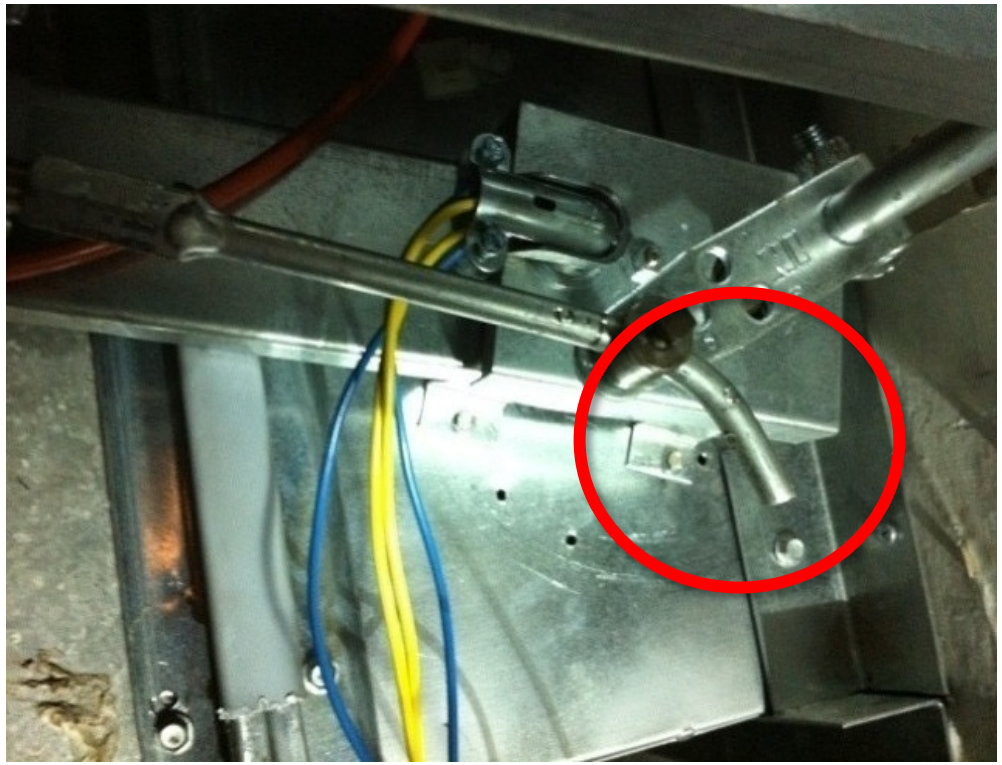
- Manufacturer's Rep – Advisor/Communication liaison between all parties

Improper Installations

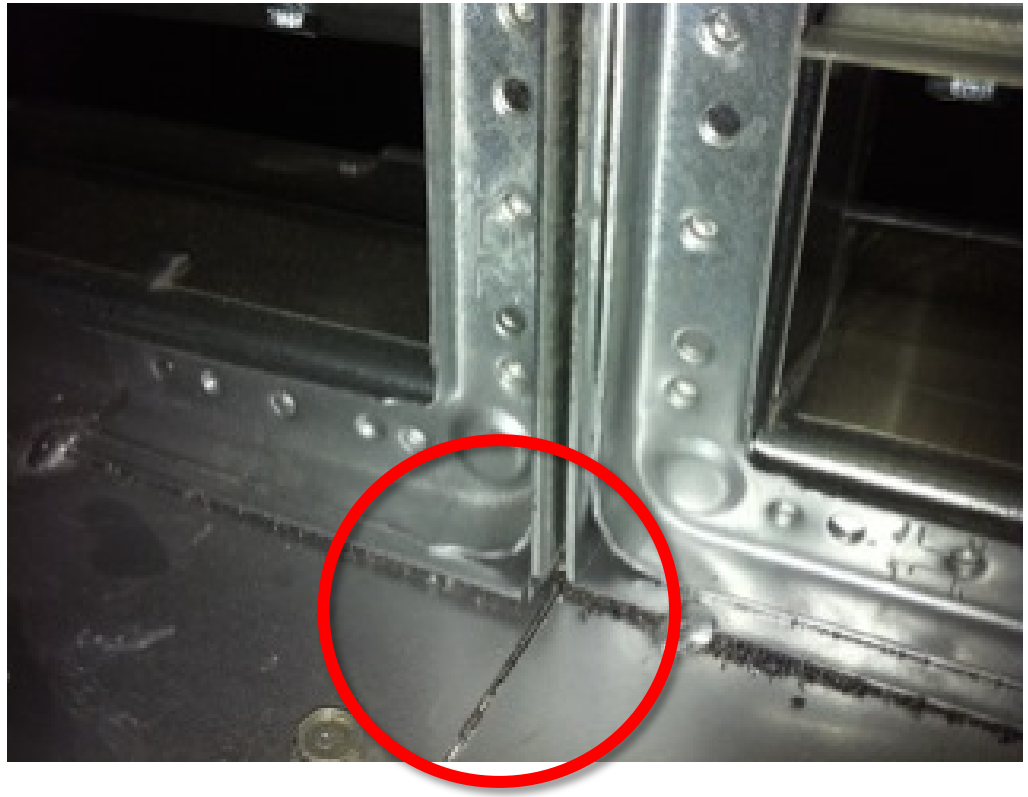


The damper is installed racked

The installation screw is in the track of the damper

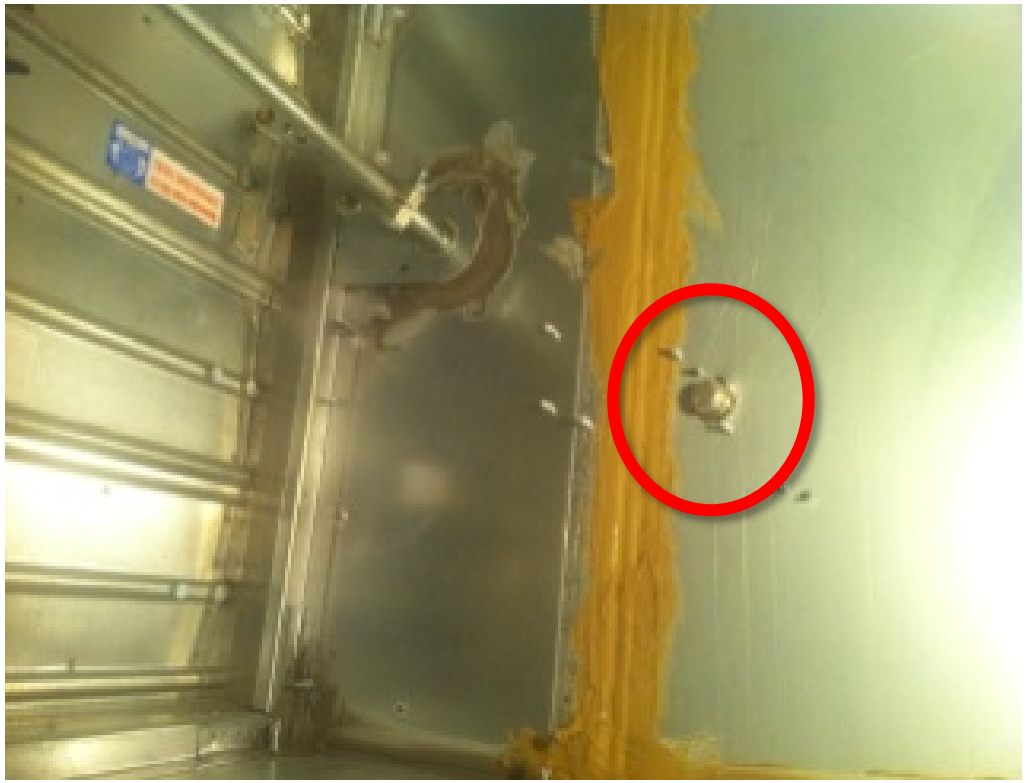


Bending of Components



Resizing Damper in the Field

Images courtesy of Nailor Industries, Inc.



Modifying the damper in the field without approval from the AHJ

Images courtesy of Nailor Industries, Inc.


And the
winner
is....

Not following
Damper Manufacturer's IOM
for approved installations!

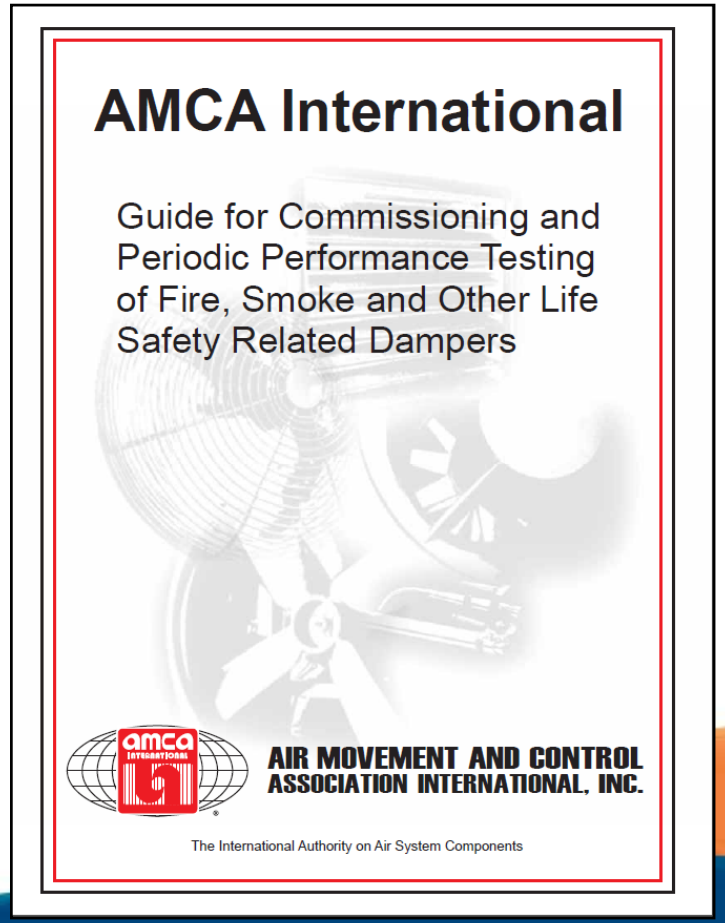
Images courtesy of Nailor Industries, Inc.

Resources

Air Movement and Control Association International, Inc. (AMCA)

"Guide for Commissioning and Periodic Performance Testing of Fire, Smoke and Other Life Safety Related Dampers"

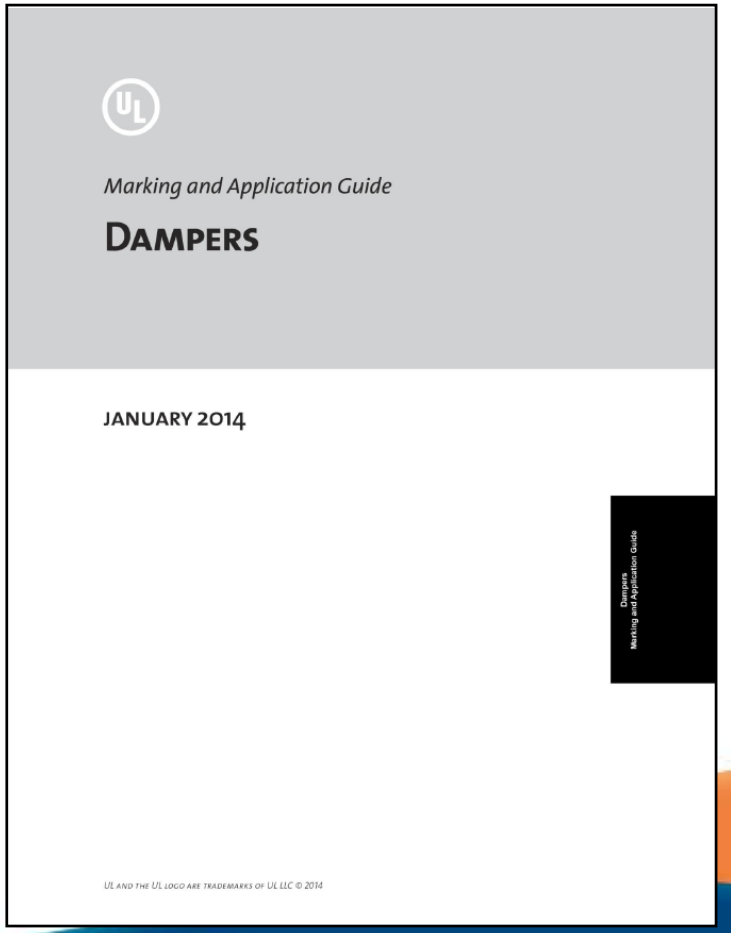
- **Free**!!
- "…provide recommendations for the proper commissioning of Fire and Life Safety Related Dampers and to describe the appropriate intervals and methods for performing periodic performance testing of these dampers."



Underwriters Laboratories (UL)

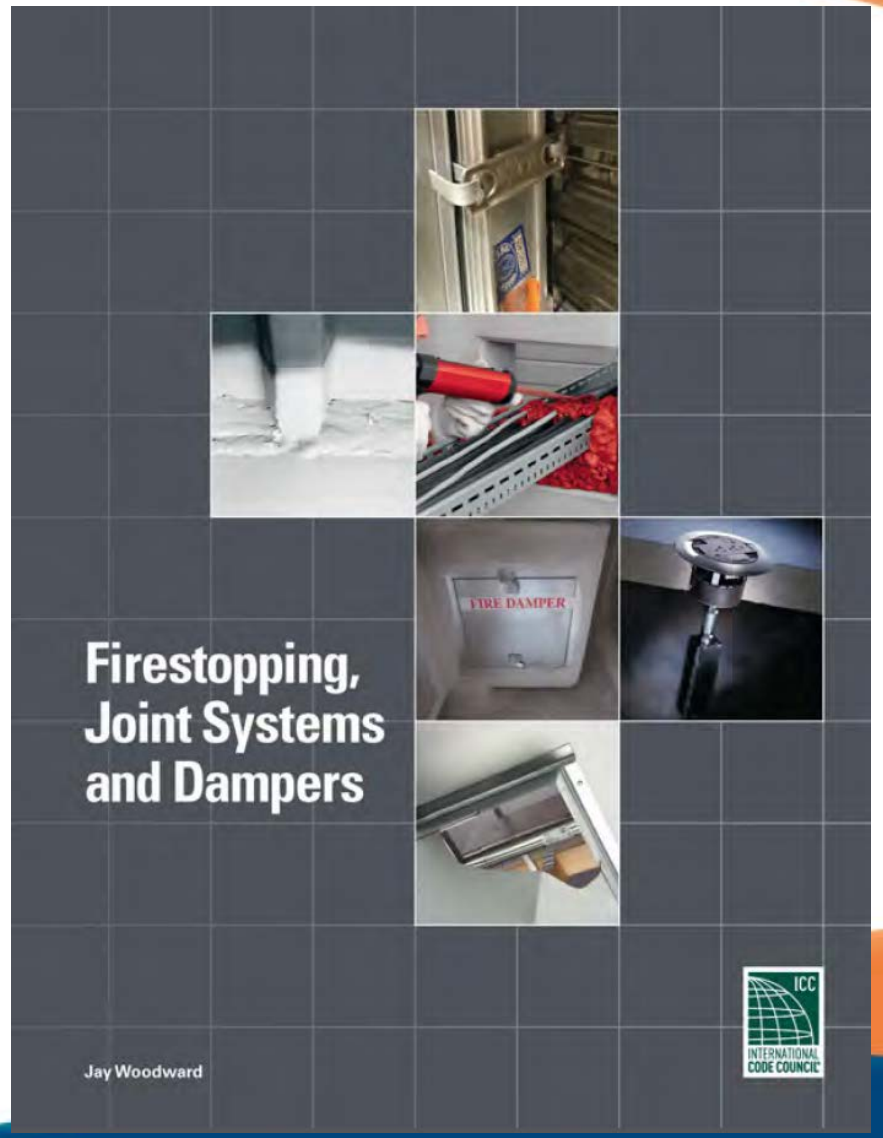
"Marking and Application Guide: Dampers"

- **Free**!!
- "…intended to assist code authorities, architects, contractors, installers and other interested parties in determining the suitability of fire, smoke, combination fire-smoke, ceiling radiation and corridor dampers in a particular installation and use, and to address concerns related to fire and smoke related performance."



“Firestopping, Joint Systems and Dampers”

- By Jay Woodward with support from ICC International Code Council and IFC International Firestop Council
- Great resource for ALL things dampers



1. Fire Dampers are intended to stop the spread of:

A. Smoke

B. Water

C. Flame/Fire

D. Heat

2. Fire/Smoke Dampers are intended to stop the spread of:

A. Heat

B. Noise

C. Flame/Fire & Smoke

D. Heat & Smoke

3. Fire and Fire/Smoke Dampers have hourly ratings of:

A. 1-1/2 & 4 hours

B. 1 & 3 Hours

C. 1 & 1-1/2 Hours

D. 1-1/2 & 3 Hours

4. For Smoke & Fire/Smoke Dampers, actuators can be shipped loose for field installation:

A. True

B. False

5. The minimum airflow rating for a Dynamic Damper is:

A. 1000 fpm

B. 1500 fpm

C. 2000 fpm

D. 4000 fpm

6. The minimum temperature of a fusible link for a curtain fire damper is:

A. 50 F

B. 212 F

C. 165 F

7. Which of the following partitions usually require a Fire Damper:

A. Fire Barrier

B. Window Frame

C. Smoke partition

D. Doorway

8. Smoke, Fire, and Fire/Smoke Dampers must be installed per the manufacturers UL approved installation instructions

A. True

B. False

Questions?

Email: Michael J. Bulzomi - MBulzomi@RFPeck.com