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FIRE DAMPERS:
BEYOND THE DUCT

Inspection • Testing • Maintenance • Compliance

Gain a deeper understanding of fire damper inspection, testing, maintenance, and compliance requirements in HVAC systems.

Rick MacDonald • NADCA Fall Technical Conference

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This presentation is not intended to be a comprehensive program covering all aspects of this topic. All technicians are encouraged to read and follow all applicable standards, codes and regulations related to this topic.

- ✓ It is the responsibility of each individual contractor to follow local building codes and licensing requirements and to work safely in accordance with OSHA guidelines.
- ✓ It is the contractor's responsibility to take proper precautions on each project to prevent cross contamination. Always take the health and safety of the building occupants into consideration before you conduct any cleaning procedures.
- ✓ All of the following tips are only general tips. They do not cover every situation and it is your responsibility to adapt these tips to the individual system you are working on.
- ✓ The instructor is not responsible in any way for the work you perform after viewing this slide show. You are responsible for your own work.
- ✓ The views and opinions following are the instructors opinions and not necessarily the official position of the National Air Duct Cleaners Association.

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WHAT WE'LL LEARN

A 4.5-minute path from device recognition to inspection

☐

Recognize fire, smoke and combination dampers

☐

Understand static vs. dynamic fire dampers

☐

Follow the inspection and operational test sequence

☐

Know schedules, deficiencies and documentation

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WHY FIRE DAMPERS EXIST

The duct opening cannot defeat the rated assembly.

FIRE

HEAT / SIGNAL

DAMPER CLOSES

COMPARTMENTATION

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Rated walls, floors and shafts rely on compartmentation. Duct penetrations create openings through those protected assemblies.

The damper is listed opening protection inside the HVAC system—not ordinary duct hardware.

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FIRE DAMPER BASICS — COMMON TYPES

Learn the device before learning the test

CURTAIN-TYPE

Blades are stacked out of the airstream and release to close the opening. Traditional designs commonly use a heat responsive release.



MULTI-BLADE

Interconnected blades rotate closed. It can resemble a control damper, so the label and listing matter.



COMBINATION F/I/S

Provides both fire and smoke protection. Actuator, controls and system interfaces become part of the test.



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STATIC vs. DYNAMIC FIRE DAMPERS

The words describe airflow conditions during closure—not whether the damper moves

STATIC FIRE DAMPER

Designed for a system where airflow stops during the fire condition.

FAN OFF → NO AIRFLOW → DAMPER CLOSES

DYNAMIC FIRE DAMPER

Designed and listed to close while air is still moving through the duct.

FAN ON → AIRFLOW CONTINUES → DAMPER MUST CLOSE

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KEY POINT: Static and dynamic describe the airflow conditions under which the damper is listed to close—not whether the damper itself moves.

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THE LABEL MATTERS

Appearance alone does not establish type, rating or listed operating limits



Record manufacturer/model information when readable.
Confirm fire/smoke rating and static/dynamic information where shown.
For dynamic dampers, verify listed velocity/pressure limits for the actual device.
If identification is missing or unreadable, document the limitation—do not guess.

Field label example

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SMOKE & COMBINATION DAMPERS

Similar location—different operating logic



Smoke dampers restrict smoke movement and are commonly motor-operated.
Combination fire/smoke dampers provide both fire and smoke protection.
Actuators, linkages, controls, sensors and end positions can become part of the test.
Use the approved procedure for the actual device and system.

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WHERE YOU WILL FIND THEM

Follow the duct through protected boundaries

FIRE BARRIERS Duct penetrations through rated walls/partitions	SHAFTS Ducts entering or leaving protected shaft enclosures
FLOOR / CEILING Protected horizontal assemblies	SMOKE BARRIERS Locations requiring smoke controlling protection

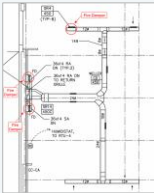
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READING MECHANICAL PLANS

Find the device before you arrive in the field



Use the project legend—symbols vary.

Review mechanical plans with life-safety/rated-wall plans.

Check damper schedules, details and reflected ceiling plans.

A symbol shows intended location; it does not prove usable field access.

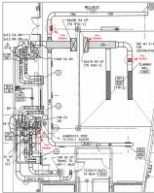
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HOW THE CODE & STANDARDS FIT TOGETHER

Each document answers a different question

IBC 717 WHERE? Rated assemblies, penetrations, access and identification	IMC 607 HOW IN HVAC? Mechanical-system fire/smoke damper provisions
NFPA 80 FIRE DAMPER ITM Inspection, testing, maintenance and records	NFPA 105 SMOKE ITM Smoke and combination damper testing/records

Also use NFPA 90A, the listing, manufacturer instructions, approved plans and the AHJ.

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INSPECTION & TESTING FREQUENCY

Put every damper on a documented inspection clock

ACCEPTANCE At installation / commissioning Establish the baseline operating record	1 YEAR First periodic inspection/test Verify operation and record deficiencies.	ONGOING Every 4 years Buildings containing a hospital: every 6 years.
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NFPA 80 (2022) 19.5.1 and NFPA 105 (2022) 7.5.2.2 — verify adopted editions.

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ACCESS COMES FIRST

You cannot perform a defensible inspection without usable access



Field example: access/blocking clearance problem

Large enough to inspect and maintain the operating parts.
Safe reach to release mechanism, blades/curtain, tracks, linkage and actuator when present.
Common failures: missing door, wrong side, too small, blocked or unsafe reach.
Seeing the sleeve is not the same as accessing the damper.

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WHAT AN ACTUAL INSPECTION INCLUDES

A defensible inspection proves operation and leaves a usable record

IDENTIFY

Location, type, label, access

EXAMINE

Damage, debris, interference

OPERATE

Authorized test method

VERIFY

Full closure / response

RESET

Return to normal service

DOCUMENT

Result, photos, deficiencies

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"Looks open" is an observation. A completed operating sequence is a test result.

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INSPECTION

ACTUATED vs. NON-ACTUATED DAMPERS

WHAT DOES THAT MEAN?

ACTUATED / ACTUATOR-OPERATED

Uses a powered device—typically an electric or pneumatic actuator—to control damper position.

Common with smoke and combination fire/smoke dampers, and some fire-damper designs.

Inspection/testing considers the actuator, linkage, blades, controls and complete travel.

**CONTROL SIGNAL → ACTUATOR
→ LINKAGE → BLADES**

NON-ACTUATED / MECHANICAL RELEASE

Does not use a powered actuator to drive the damper.

Traditional example: a curtain fire damper held open by a fusible link / mechanical release arrangement.

Inspection focuses on the release device, curtain/blades, tracks, obstructions, complete closure and proper reset.

**RELEASE DEVICE →
MECHANICAL CLOSURE**

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INSPECTION

INSPECTION FOCUS—ACTUATED vs. NON-ACTUATED

The inspection sequence changes with the operating mechanism

ACTUATED DAMPERS

Confirm unobstructed and safe access.

Verify the required normal position for the system design.

Operate the damper using the appropriate test method.

Verify complete travel to the required open and closed positions.

Observe actuator, linkage, controls and final position.

NON-ACTUATED FIRE DAMPERS

Inspect the fusible link and release mechanism.

Look for painted, damaged, missing or questionable components.

Test release and closure using the applicable procedure.

Verify full closure and latching where applicable.

Reset and verify return to the normal open position.

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INSPECTION

INSPECTION: TRADITIONAL FIRE DAMPER

Fusible-link / mechanical-release example

IDENTIFY & EXAMINE

- Confirm location, type, labelling and usable access.
- Inspect curtain/blades, tracks and surrounding duct for damage, corrosion or interference.
- Inspect the heat responsive release device and related mechanism.
- The temperature rating is determined by the listed damper/release device and application.

TEST, RESET & DOCUMENT

- Use the procedure applicable to the listed damper.
- Release/operate and observe the full closure path.
- Verify complete closure and latching where applicable.
- Reset/restore to normal position and document the result.
- If deficient: document → correct/repair → retest → closeout.

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INSPECTION

INSPECTION: ACTUATOR-OPERATED DAMPER

Smoke, combination fire/smoke, and other actuator-operated designs

IDENTIFY & EXAMINE

- Confirm location, type, labelling and safe access.
- Verify the required normal position for the system design.
- Inspect actuator, linkage, blades and visible control components.
- Check the full path of movement for interference or binding.

OPERATE, RESTORE & DOCUMENT

- Operate using the appropriate listed/approved test method.
- Verify complete travel to the required open and closed positions.
- Observe actuator, linkage, control response and final position.
- Restore normal operating position and system controls.
- Record pass/fail/inaccessible/not tested and any corrective follow-up.

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INSPECTION

FIELD RECOGNITION — WHAT ARE YOU LOOKING AT?

Use the access opening, label and operating components together


View through an access opening


Close-up of release / fusible-link area


Permanent location identification

Do not identify a damper from appearance alone — confirm the label, listing, location and operating mechanism.

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FIELD RECOGNITION — WHAT ARE YOU LOOKING AT?



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STEPS 1-2: IDENTIFY & EXAMINE-What is this?

Know exactly what you are testing before you operate it.



Field view through duct access

Confirm exact location, damper type/service and access point.
Read and record labeling information when accessible.
Look for damage, corrosion, bent blades/curtain and damaged tracks.
Check for debris, liner, fasteners, piping or other interference.
Inspect release components, linkage and actuator when present.

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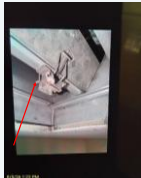
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STEPS 3-4: OPERATE & VERIFY

Use the authorized procedure—and watch the entire movement



Field release/link mechanism



Another field release mechanism

Verify full closure without binding or obstruction. Do not improvise a release or defeat controls.

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STEPS 5-6: RESET & DOCUMENT

A test is not complete until the system is restored and the result is recorded

RESET / RESTORE

- Reopen/reset using the approved procedure
- Restore release mechanism as applicable
- Restore actuator/control power
- Confirm normal system position

DOCUMENT

- Unique damper ID + exact location
- Type / label information
- Test method + result
- Deficiencies + photographs
- Corrective action + retest status

INSPECTION 25

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COMMON DEFICIENCIES

Most failures become obvious once adequate access exists

ACCESS

Missing + too small + blocked + unsafe reach

MECHANICAL

Bent blades + corrosion + damaged tracks + broken linkage

RELEASE / CONTROL

Missing/damaged link + actuator/control problem

INTERFERENCE

Debris + fasteners + liner + piping + unapproved changes

FAILURE 26

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INSPECTION

WHAT HAPPENS AFTER THE TEST?

A passing damper and a deficient damper follow different paths

IDENTIFY

INSPECT

TEST

RESET / RESTORE

DOCUMENT

DEFICIENCY FOUND?

NO — PASS

Return to normal service and document the passing result.

YES — CORRECTIVE PATH

Document deficiency → Correct / repair → Retest → Document closeout.

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WHAT'S WRONG WITH THIS PICTURE?

Audience challenge: observe first—then decide what must be verified



ASK THE ROOM

What do you see?
What would you document?
Would you operate the damper?
What information would you verify before calling this a deficiency?

Updated field photo

INSURERS

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WHAT'S WRONG WITH THESE PICTURES?

Real field conditions that can prevent proper operation



A — Damper cannot fully close
What prevents the damper from reaching the required closed position?



B — Wood is not a fusible link
What has been substituted or altered, and what should be documented?



C — Cable in path of travel
Would this condition allow a defensible operational test?

Observe first. Then decide: PASS, FAIL, INACCESSIBLE, or NOT TESTED — and what evidence supports that result.

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FIELD CONDITIONS WORTH DOCUMENTING

Photos should show the condition and why it matters





Document what the photo proves. Verify the listing and surrounding assembly before assigning a cause or code violation.

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MAINTENANCE, REPAIR & RETESTING

Finding a deficiency is only the beginning

Routine attention may include cleaning accessible components and checking for corrosion or rust.

Inspect actuators, linkage and closure springs where applicable.

If a deficiency is found, document it and arrange corrective work using the applicable listing / manufacturer requirements.

After repair, perform the required retest and document the closeout.

If no deficiency is found, reset/restore the damper and document the passing result.

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WHAT A PROFESSIONAL REPORT SHOULD SHOW

Make the record useful to the owner and the next inspector

IDENTIFY

- Inspection date and Inspector identification
- Unique damper ID and exact location / access point
- Damper type and identifying information when available
- Test method and pass / fail / inaccessible / not-tested status
- Deficiencies and supporting photographs
- Corrective action, retest date and closeout status when applicable

PROVE THE RESULT

- Pass / fail / inaccessible / not tested
- Test method
- Condition photos
- Deficiencies
- Corrective action + retest trail

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COULD THIS BE A NADCA SERVICE?

Adjacent to HVAC work—but capability must come first

WHY IT FITS

- HVAC system familiarity
- Access planning
- Commercial coordination
- Documentation discipline
- Owner need for damper inventories

WHAT MUST BE BUILT

- Qualified personnel + training
- Current standards / OEM procedures
- Test equipment + reporting process
- Insurance / contract scope
- Repair capability or partner network

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KEY TAKEAWAYS

Inspection is a process—not a glance through an access door

KNOW

Identify the device, labelling and applicable standard.

ACCESS

Usable access must support a real inspection and operational test.

TEST

Operate, verify closure, reset and return the device to service.

DOCUMENT

Record limitations, deficiencies, corrective action and retest.

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Recap

Acceptance Testing

An acceptance test is test of the damper that is completed by a qualified person after the damper is installed, an operational test is completed, and the entire heating, ventilation, and air conditioning (HVAC) system is complete. The acceptance test is performed to confirm the following prior to placing the entire system in service:

- The damper is not damaged or missing any parts.
- If actuated, dampers close fully upon disconnection of electrical power or air pressure.
- If actuated, dampers fully reopen when electrical power or air pressure is reapplied.
- If non-actuated, the damper closes upon removal of the fusible link and is manually reset to the full-open position.

Testing must be done under maximum airflow after HVAC system balancing, unless acceptance testing is being performed for dampers with fusible links. In that case, it is permitted to turn the fan in the system off.

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Recap

Periodic Testing

Fire dampers need to be inspected and tested 1 year after the initial acceptance test and then every 4 years, unless the dampers are installed in a hospital, in which case they can be inspected and tested every 6 years. During the periodic inspection of an actuated fire damper, the following needs to be completed:

- Confirm that the damper is in the full-open or full-closed position as required by the system design.
- Visually confirm the damper moved to the full-closed or full-open position when commanded.
- Visually confirm that the damper returns to the original operating position as required by the system design.

During the periodic inspection of a non-actuated fire damper, the following needs to be completed:

- Confirm the fusible link is not painted.
- Confirm the damper fully closes when the fusible link is removed or activated with the damper in the full-open position.
- Where equipped, confirm that the damper latches in the full-closed position.
- Confirm that the damper is returned to the full-open and operational position with fusible link installed.

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Recap

- **Documentation**
- All inspections and tests of fire, smoke, and combination fire/smoke dampers need to be documented and maintained for at least three test cycles. These documents need to include the following:
 - Location of the damper
 - Date(s) of inspection
 - Name of the inspector
 - Deficiencies discovered, if any
 - Indication of when and how deficiencies were corrected, if applicable

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QUESTIONS?

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