AMCA Industry Session / AHR Expo 2020

Remote Periodic Testing of Life-Safety Dampers

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Remote Periodic Testing of Life-Safety Dampers

Purpose and Learning Objectives

The purpose of this presentation is to inform HVAC-industry professionals about current codes, standards and technologies involving testing of fire/smoke dampers.

At the end of this presentation you will be able to:

1. Describe the different types of life-safety dampers.
2. Explain the damper-testing requirements outlined in NFPA 80 & 105.
3. Compare the visual and remote test methods for life-safety dampers and explain the benefits of remote testing.
4. Explain how the current allowance for remote testing can lead to reduced costs and increased safety.

Dane Carey

Member, AMCA Fire & Smoke Damper Subcommittee

Remote Testing of Fire/Smoke Dampers

- 33 years of experience in the damper industry
- Member of UL 555 Standards Technical Panel (STP)
- Member ASHRAE TC 5.6
- Member of many AMCA committees, including: Damper Engineering Committee, ACCARC, Fire Smoke Damper Task Force, AMCA 11 Committee, AMCA 511 Committee

Kent Maune

Chair, AMCA Air Control Code Action & Review Committee (ACCARC)

Remote Testing of Fire/Smoke Dampers

- Over 35 years experience in the damper industry
- Member of NFPA 80 & 105 Committee
- Member of many AMCA committees, including: Damper Engineering Committee, Fire & Smoke Damper Subcommittee, Advocacy Committee, Air Movement Code Action & Review Committee (AMCARC)

Life Safety Dampers

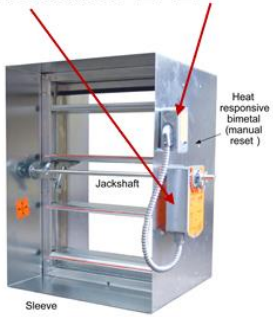
Fusible link/ springs

Curtain Fire Damper

Smoke detector activation/ actuator

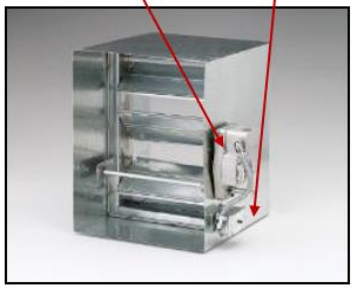
Smoke Damper

Smoke detector activation/ actuator/ EFL



Combination Fire/Smoke Damper

Smoke detector activation/ actuator/ EFL



Corridor Damper

Fusible link

Ceiling Damper

Reasons for Inspections

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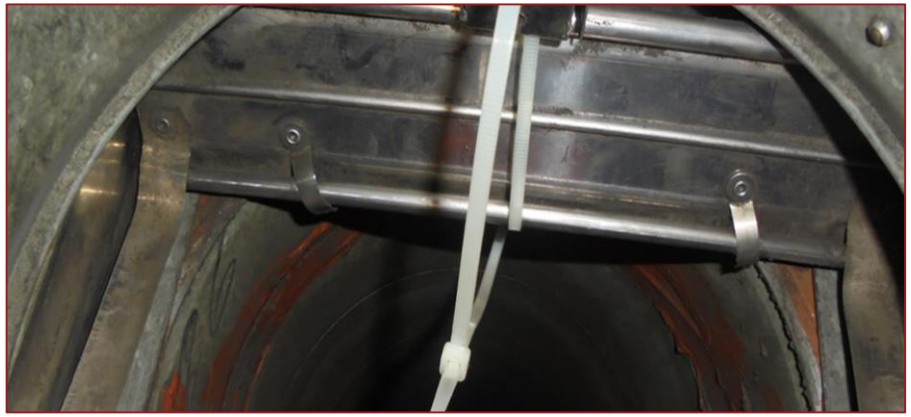
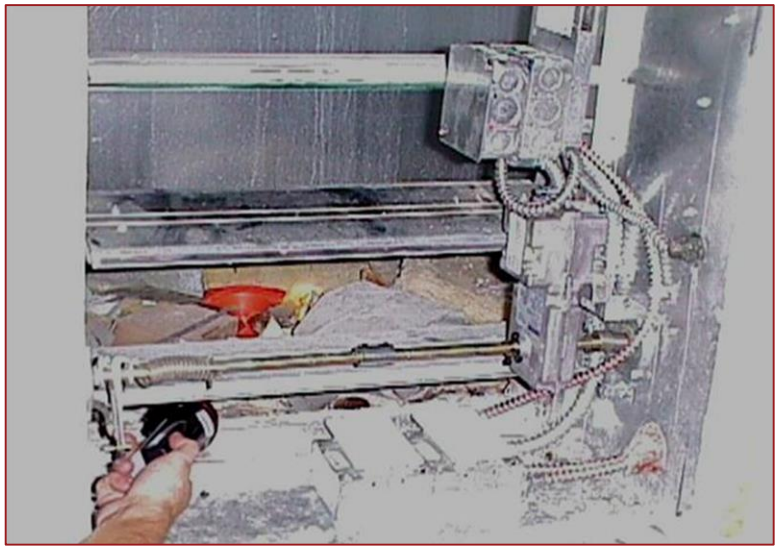


Reasons for Inspections



Applicable Codes and Standards

IBC
INTERNATIONAL BUILDING CODE

amca INTERNATIONAL

NFPA
NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

UL
Underwriters Laboratories

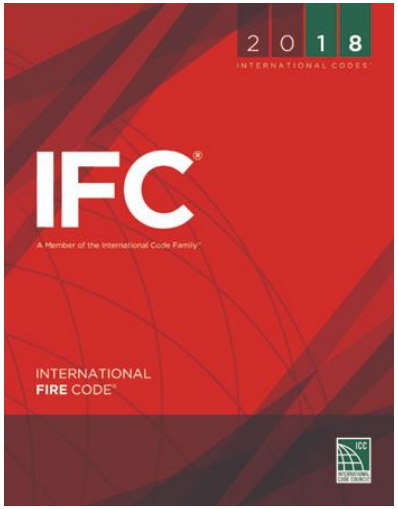
IFC
A Member of the International Code Family

2018 International Fire Code - IFC

Fire and Smoke Protective Features (Chapter 7)

Section 706 – Duct and Air Transfer Openings

- 706.1 – Maintaining Protection
  - Dampers protecting ducts and air transfer opening shall be inspected and maintained in accordance with **NFPA 80** and **NFPA105**.



National Fire Protection Association- NFPA

NFPA 80 - Standard for Fire Doors and Other Opening Protectives

- Chapter 19: Installation, Testing, and Maintenance of Fire Dampers

NFPA 105 – Standard for Smoke door Assemblies and Other Opening Protectives

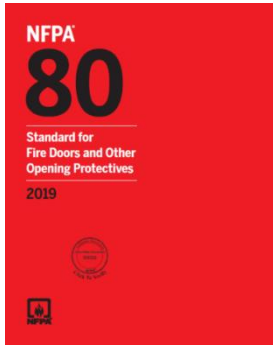
- Chapter 7: Installation, Testing, and Maintenance of Smoke Dampers

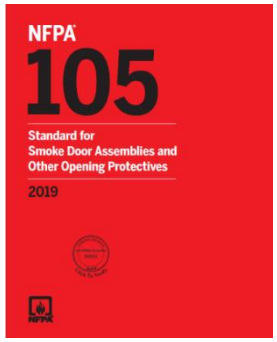
NFPA 80 & 105

Operational Testing – 2019 NFPA 80, Sect. 19.3

***19.3.1** – After the installation of a damper is completed, an operational test shall be conducted.*

- Conducted after installation
- Verifies that there is unobstructed access to the damper
- Verifies that the damper operates as designed





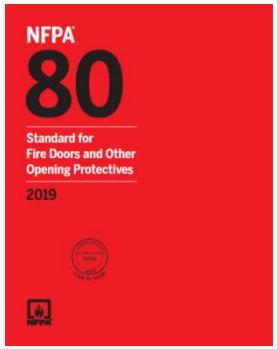
2019 NFPA 105, See section 7.4

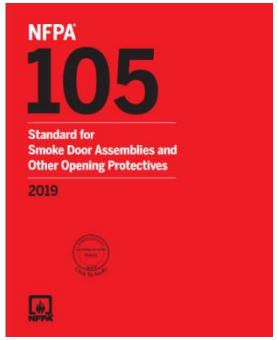
NFPA 80 & 105

Acceptance Test - 2019 NFPA 80, Sect. 19.4

***19.4.1** – Acceptance testing of fire dampers shall be performed by a qualified person with knowledge and understanding of the operating components of the type of assembly being subject to testing and the system in which it is installed.*

- Conducted after construction and balancing of the HVAC system is complete (just prior to turning the building over).
- Confirms proper operation of damper under maximum airflow conditions (for actuated dampers).





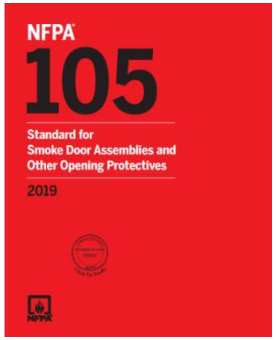
2019 NFPA 105, See section 7.5

NFPA 80 & 105

Periodic Testing of Life-Safety Dampers

Frequency – 2019 NFPA 80, Sect. 19.5

- Each damper shall be tested 1 year after acceptance testing.
- After that, the frequency shall be every 4 years, except in buildings containing a hospital, where the frequency shall be every 6 years.



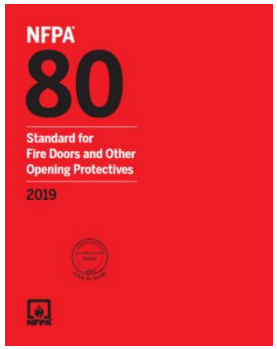
2019 NFPA 105, See section 7.6

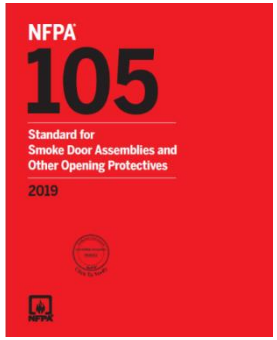
NFPA 80 & 105

Periodic Testing of Life-Safety Dampers

Visual Method – 2019 NFPA 80, 19.5.2.3.2

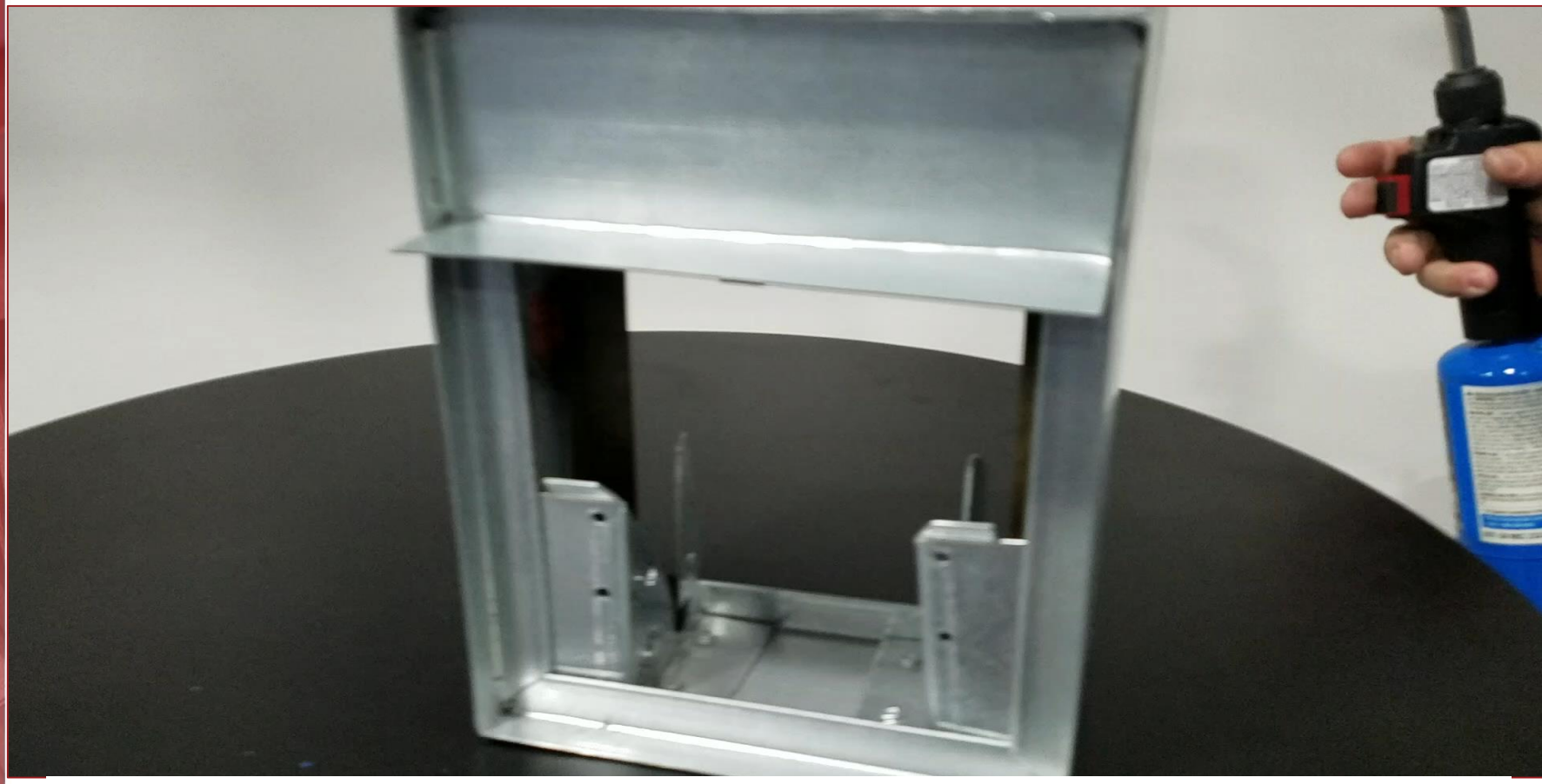
- May be used on all life-safety dampers.
- Is the only option for dampers with a fusible link.
- Requires visual confirmation that the damper closes, and latches (if applicable), as designed.
- For motorized dampers, this method requires visual confirmation that the damper reopens as designed.





Visual Method with Fusible Link Removal

Visual Method with Melting Fusible Link

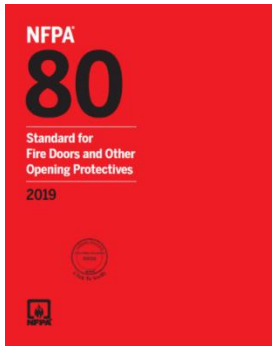


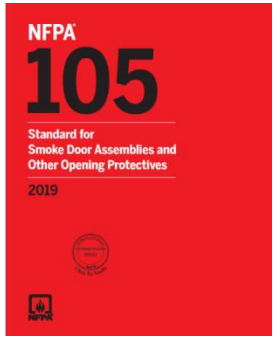
NFPA 80 & 105

Periodic Testing of Life-Safety Dampers

Remote Method – 2019 NFPA 19.5.2.3.3

- Can only be used on dampers without fusible links.
- Preconditions for using the remote method:
  - The damper shall have the ability to positively indicate when the damper is fully open and fully closed.
  - Prior to using the remote method a visual inspection must be conducted.
  - The visual inspection must confirm that the position indication method accurately reflects the full opened and closed position of the damper.

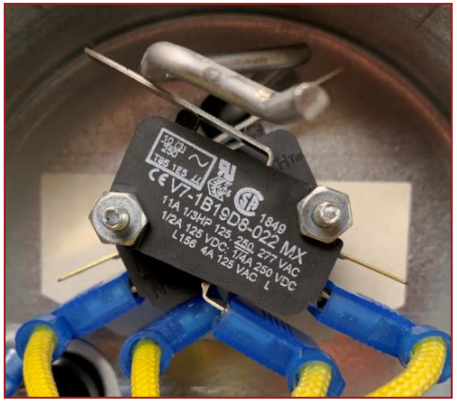




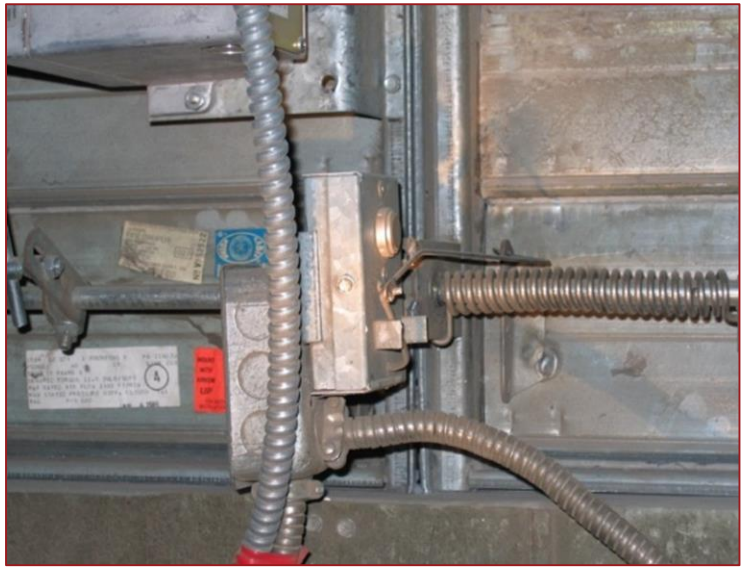
Remote Test Method

Position Indication Device

Most position indication devices use electro-mechanical switches (one to confirm the opened position and one to confirm the closed position).

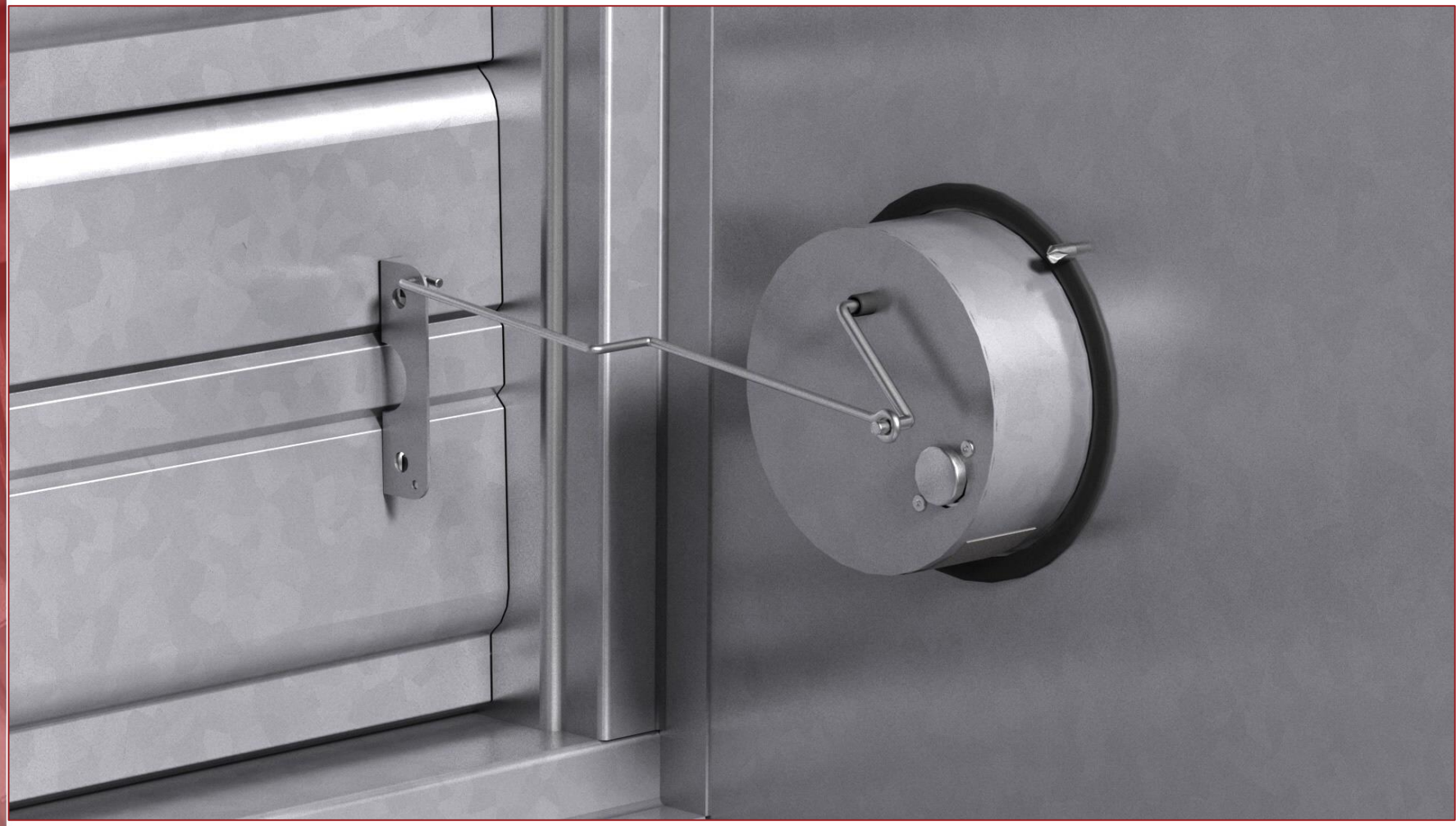


Remote Test Method
Position Indication Device



30+ year old switch package still in operation today

Typical Position Indication Device

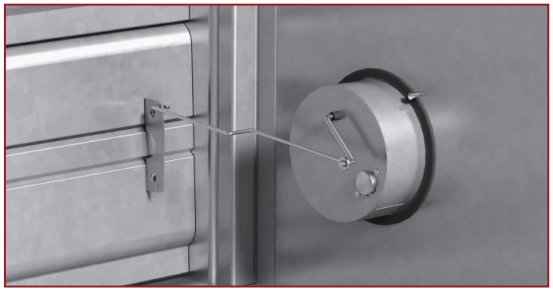


NFPA 80 & 105

Periodic Testing of Life-Safety Dampers

Remote Method

- Use the position indication device to confirm that the damper is fully open.
- Command the damper to the close position and use the position indication device to confirm that the damper reaches the fully closed position.
- Command the damper back to the fully open position and use the position indication device to confirm that the damper returns to the fully open position.
- If any of those steps can not be successfully completed a visual inspection shall be conducted.



Remote Test Method

Position Indication

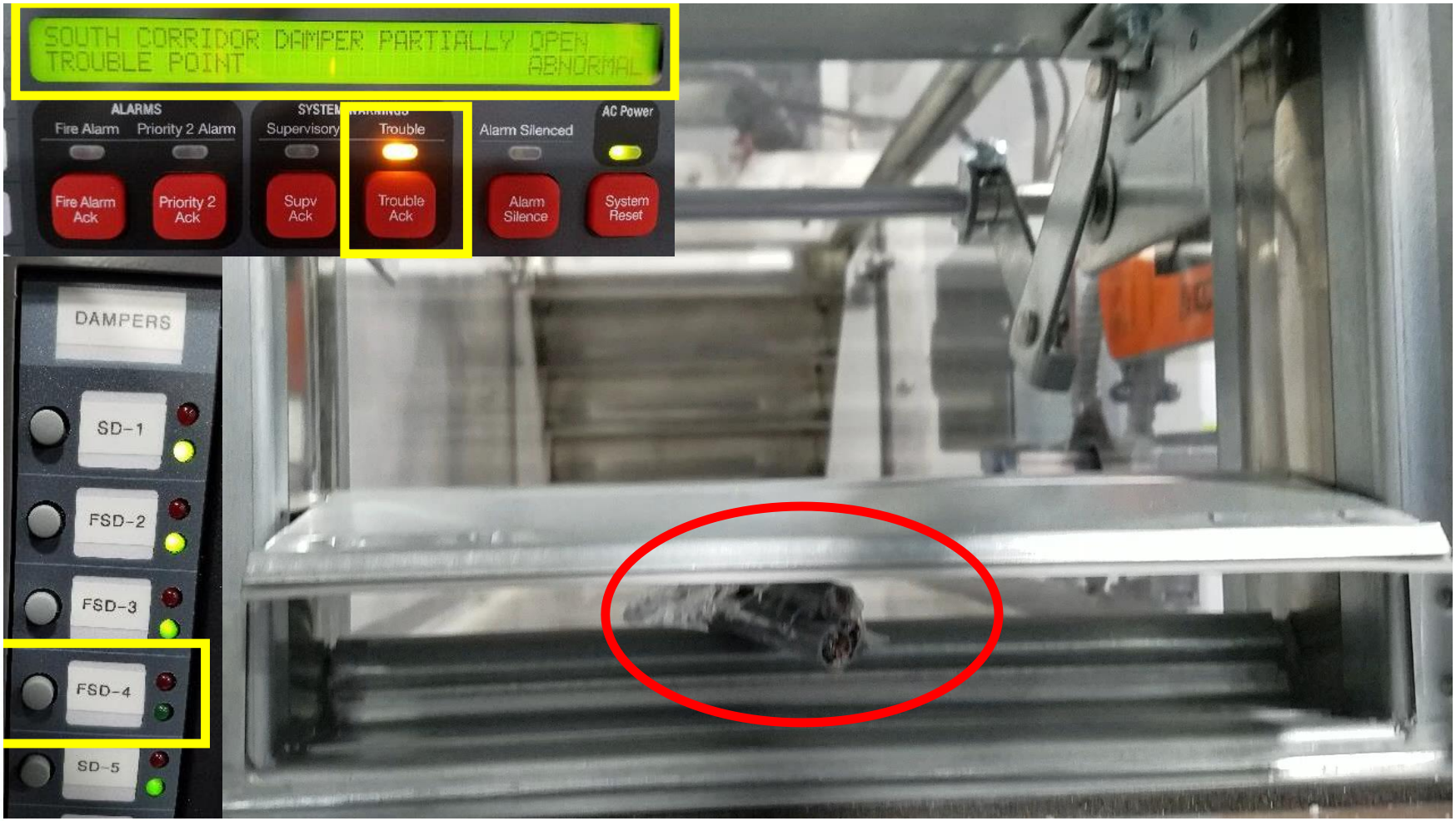
Remote Communication

The damper's position indication device can communicate the damper's position to any one of several devices or systems:

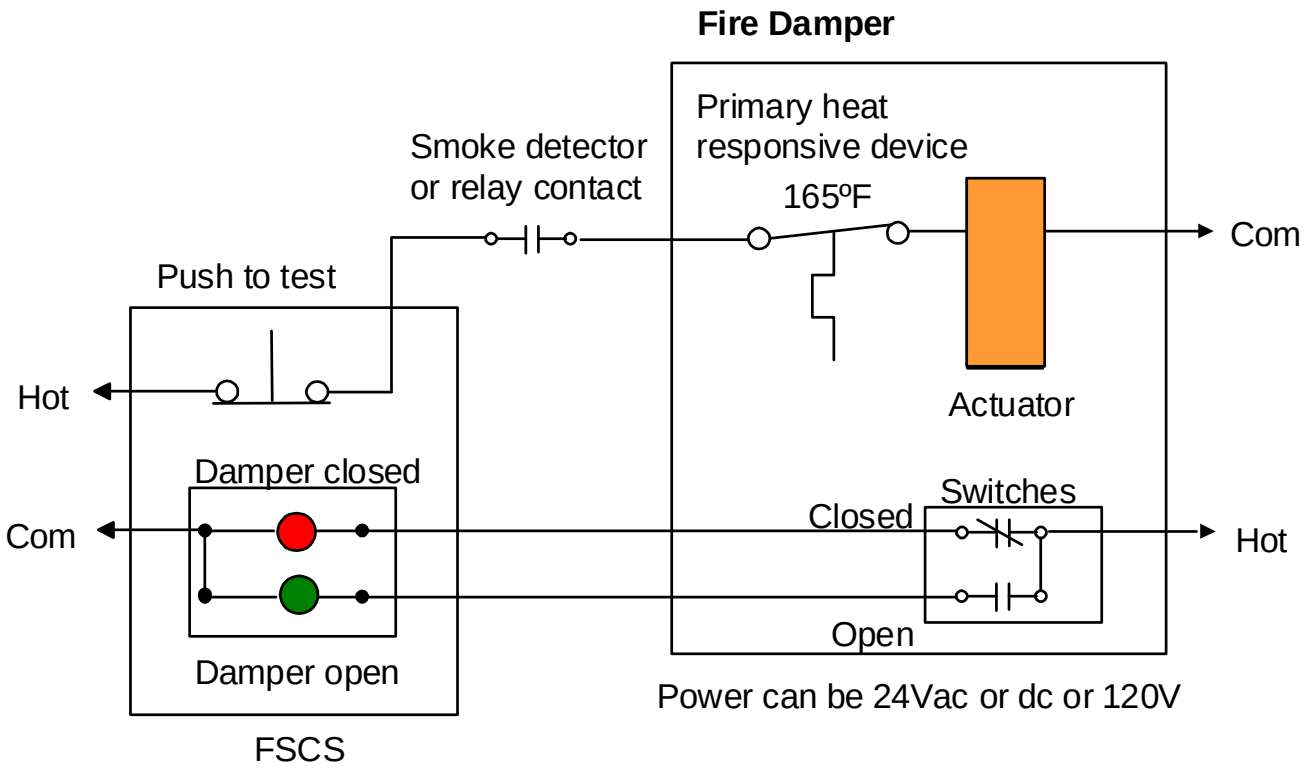
Local Indicator Lights

Smoke Control Systems

Building Automation Systems


SOUTH CORRIDOR DAMPER PARTIALLY OPEN
TROUBLE POINT
ABNORMAL
ALARMS
Fire Alarm
Priority 2 Alarm
Supervisory
Trouble
Alarm Silenced
AC Power
Fire Alarm Ack
Priority 2 Ack
Supv Ack
Trouble Ack
Alarm Silence
System Reset
DAMPERS
SD-1
FSD-2
FSD-3
FSD-4
SD-5

Remote Testing Basic Wiring



Remote Test Method

Benefits of the Remote Test Method

Difficult Accessibility

Many life-safety dampers are installed in locations that are difficult to physically get to and can be very difficult to visually see once you do get to them.

Remote Test Method

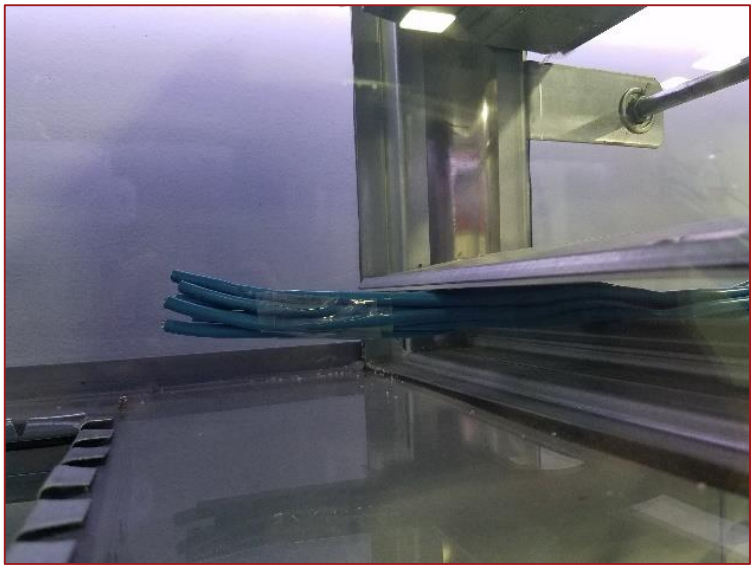
Benefits of the Remote Test Method

Reduced Cost

Accessing life-safety dampers for visual inspections can be very time consuming and can require areas of a building to be unusable during the inspection.

Remote Test Method
Position Indication

The argument has been made that dampers can have wires (like Cat-5 wires) through them and can close enough to send a signal stating closed.



Remote Test Method
Position Indication

As you can see here, yes it is closed with just a very slight increase in leakage. Current actuators provide much more torque than they used to (pre-2002). If the size of the wire prevents closing, indication will show it sooner than the 4-year inspection cycle.

Remote Test Method

Benefits of the Remote Test Method

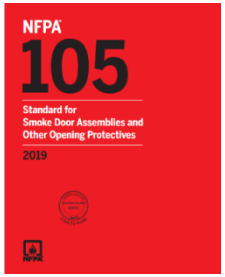
Increased Compliance

Due to difficult accessibility, high cost and lack of enforcement today, code-mandated periodic testing is not conducted on many life-safety dampers. The simplicity of the remote test method will result in increased compliance and thus safer buildings.

Periodic Testing of Life-Safety Dampers

Presentation Recap

- Periodic testing of life-safety dampers is mandated by codes.
- NFPA 80 and 105 required periodic testing must be conducted 1 year after acceptance testing, then every 4 years, except in hospitals where the frequency is every 6 years.
- The visual test method in NFPA 80 and 105 may be used on any life-safety damper.
- As of the 2019 edition of NFPA 80 and 105, dampers without fusible links that have a position indication device may utilize the remote test method.
- Dampers with fusible links have to be visually inspected.
- The remote test method is especially attractive for dampers in difficult to access locations.



Resources

- **AMCA International:** *www.amca.org*
  > Advocacy initiatives– Fire & Life Safety: *https://www.amca.org/advocate/#fire-and-life-safety*

- **2019 *AMCA inmotion*:** *http://bit.ly/AMCAinmotion2019*
  > Remote Periodic Testing of Life-Safety Dampers

- **AMCA Publication:** *www.amca.org/store*
  > **503-08:** Fire, Ceiling (Radiation), Smoke and Fire/Smoke Dampers Application Manual (Free PDF download)

- **AMCA White Papers:** *https://www.amca.org/educate/ #articles-and-technical-papers*
  > Fire and Smoke Dampers: Best Practice Design Tips
  > Impact of Fire-Sprinkler Trade-offs on Occupant and Building Safety

- **AMCA Presentations:** *https://www.amca.org/educate/#videos*
  > ASET-US 2018: *Design Tips for Fire and Smoke Dampers*– by Bill Koffel
  > ASET-EU 2018: *Fire & Smoke Control Design*– by Patrick Janssens