Life Safety Dampers

Stember 2021

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Fire, Smoke & Combination Fire Smoke Dampers

Kent Maune
Product Manager

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amca INTERNATIONAL
COMMITTEE CHAIRPERSON

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Simplex

Notification

Grinnell

Suppression

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Passive Protection

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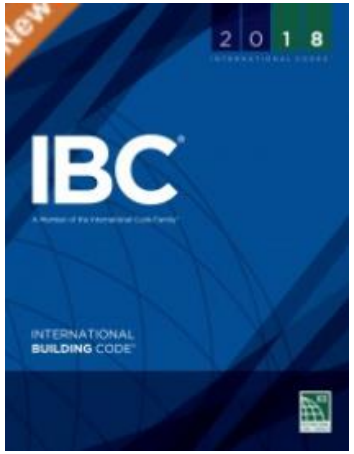
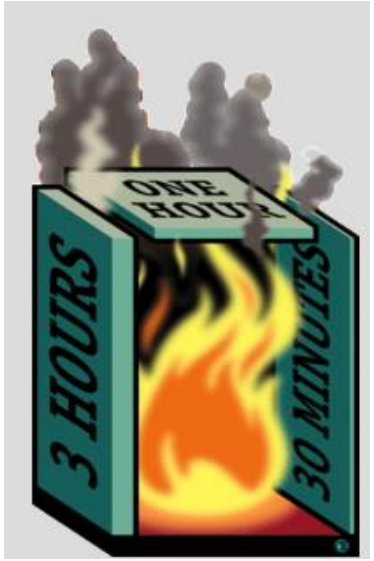
Building Code – UL Damper Requirements/ Fire & Smoke Protection Features (Ducts and Air Transfer openings)

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
717.6	**Horizontal Assemblies**		**CFD/Fire Damper**





IBC TABLE 717.3.2.1
FIRE DAMPER RATING (IMC TABLE 607.3.2.1)

TYPE OF PENETRATION	MINIMUM DAMPER RATING (hours)
Less than 3-hour fire-resistance-rated assemblies	1.5
3-hour or greater fire-resistance-rated assemblies	3

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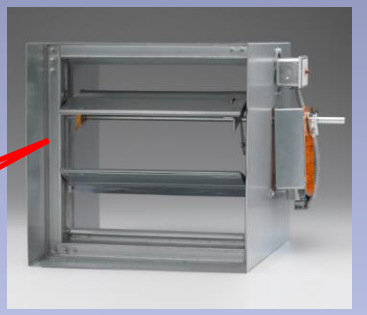

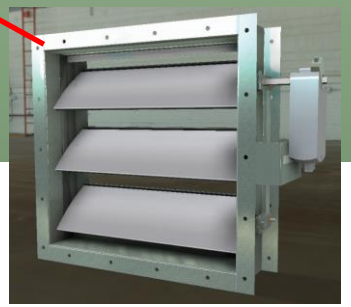

I-503

UL Damper Applications

Plans/Specification/Responsibilities

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Plans and Review

NFPA 90A 2015

Section 5.4.6 Damper Location and Information

5.4.6.1 The locations and mounting arrangement of all fire, smoke, ceiling and combination fire smoke dampers:

"Shall be shown on the drawings of the air duct systems."

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Plans and Review

NFPA 90A 2015

Section 5.4.6 Damper Location and Information

5.4.6.2 Dampers required to close in airflow “shall have the calculated airflow at their location shown on drawings of the air duct system”.

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Access to the Dampers

7.2.1 Access. Dampers equipped with fusible links, internal operators, or both shall be provided with an access door that is **not less than 12” square** or provided with a removable duct section.

7.2.2 Access shall not be obstructed.

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UL Damper Test Standards

- UL 555 - FIRE DAMPERS
- UL555S – SMOKE DAMPERS
- **UL555 & UL555S** – COMBINATION FIRE & SMOKE DAMPERS
- UL555C – CEILING DAMPERS
- **UL555 & UL555S** – CORRIDOR DAMPERS

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Underwriters Laboratories

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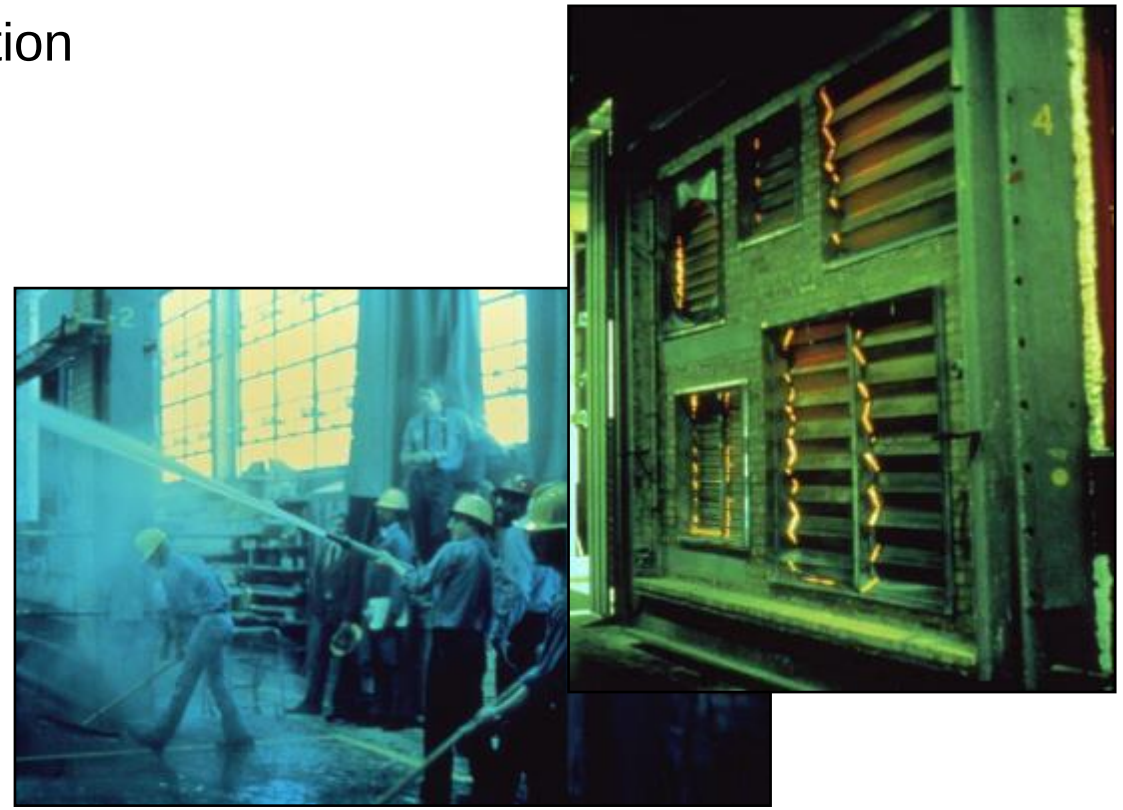
UL Damper Test Standards

717.3.1 Damper Testing– Dampers shall be tested and labeled in accordance with the standards in this section

- FIRE ENDURANCE TEST (Video)
- HOSE STREAM TEST
- OPERATIONAL RELIABILTY TEST
- DYNAMIC CLOSURE TEST (Video)



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Underwriters Laboratories

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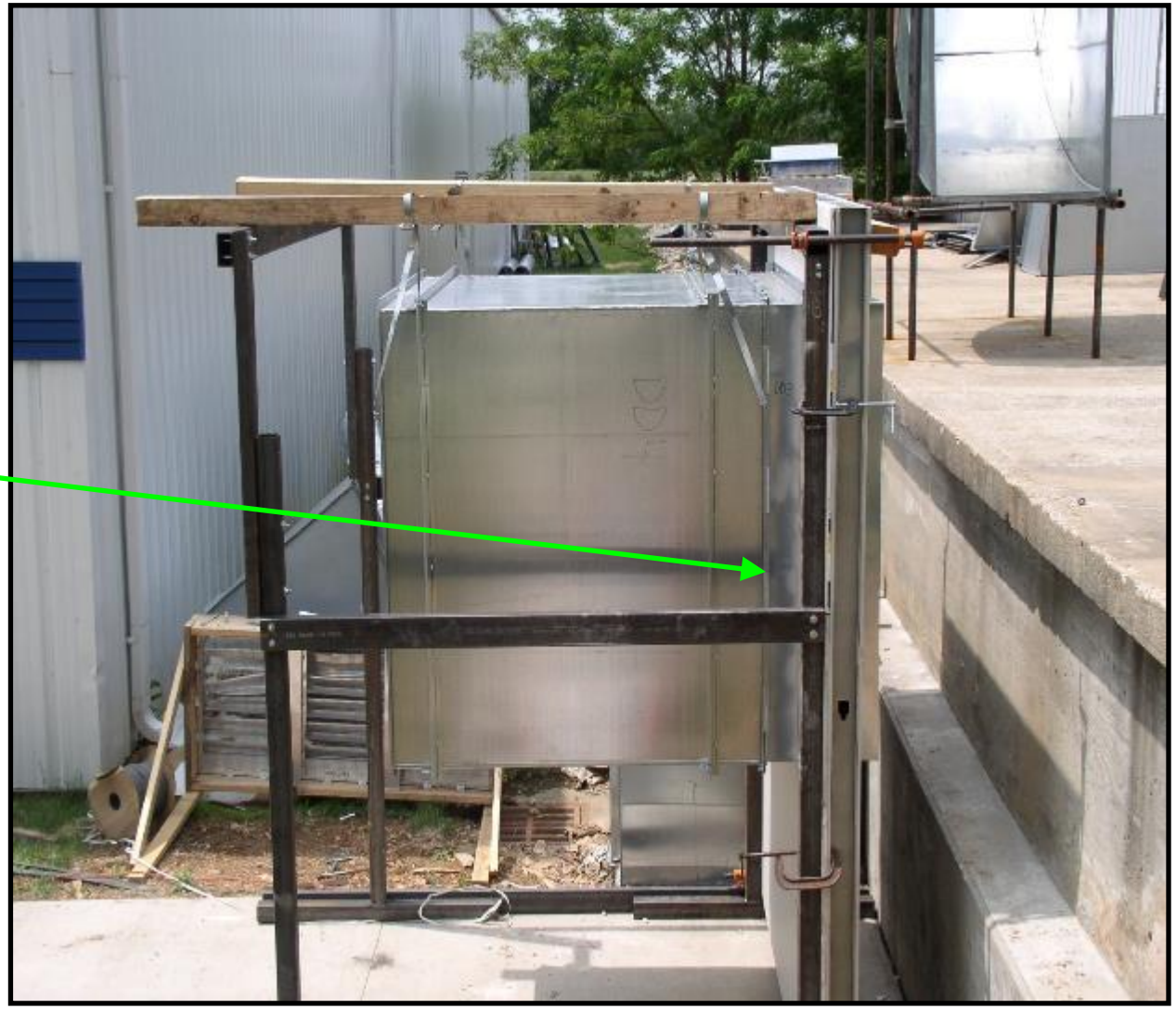
Duct Impact Test

DUCT CONNECTED TO DAMPER SLEEVE



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Duct Impact Test

Passed Test

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Fire, Smoke & Combination Fire Smoke Dampers Ratings

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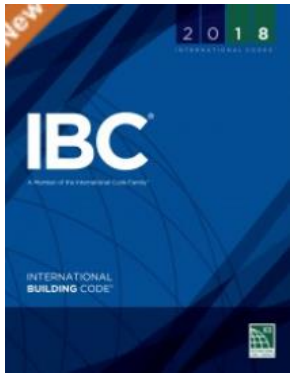
Fire Damper Ratings

1 ½ Hour & 3 Hour

- 95% of applications 1 ½ hour

Static & Dynamic

- Static: Not tested against airflow
- Dynamic: Tested against airflow (min. 2,000fpm @ 4" w.g.)



IBC TABLE 717.3.2.1
FIRE DAMPER RATING (IMC TABLE 607.3.2.1)

TYPE OF PENETRATION	MINIMUM DAMPER RATING (hours)
Less than 3-hour fire-resistance-rated assemblies	1.5
3-hour or greater fire-resistance-rated assemblies	3

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Fire Damper Ratings

Static

- Static - the HVAC system blower will be cycled off during an alarm

Dynamic

- Dynamic - the HVAC system blower may continue to run during an alarm rated to close against moving air measured in feet-per-minute (fpm) velocity

STATIC

Dynamic

Closure Springs

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Dynamic Fire Damper Ratings

Dynamic Closure Ratings	• Minimum 2000 FPM and 4” w.g.

Extended Velocity Ratings	• 1000 FPM Increments
	  • 3000 FPM
	  • 4000 FPM

Extended Static Pressure Ratings	• 2” w.g. Increments
	  • 6” w.g.
	  • 8” w.g

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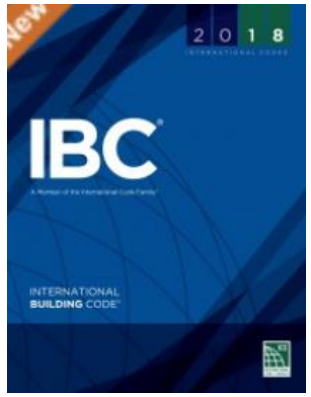
Smoke Damper Ratings

Leakage Class	• Class I – 8cfm @ 4”w.g. • Class II – 20cfm @ 4” w.g.
Assembly Rating	• 250°F or 350°F
Dynamic Rating	• Minimum 2,000fpm @ 4” w.g.

Two-position or modulating actuator



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Combination Fire Smoke Damper Ratings

1 ½ Hour or 3 Hour	• 95% of applications are 1 ½ hour
Leakage Class	• Class I – 8cfm @ 4”w.g. • Class II – 20cfm @ 4” w.g.
Assembly Rating	• 250°F or 350°F
Dynamic Rating	• Minimum 2,000fpm @ 4” w.g.

Two-position or modulating actuator

IBC TABLE 717.3.2.1
FIRE DAMPER RATING (IMC TABLE 607.3.2.1)

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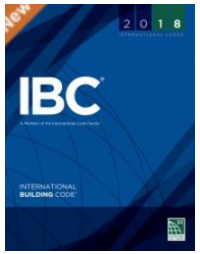

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717.3.2.3 Fire/Smoke Damper Ratings
717.3.2.4 Corridor Damper Ratings

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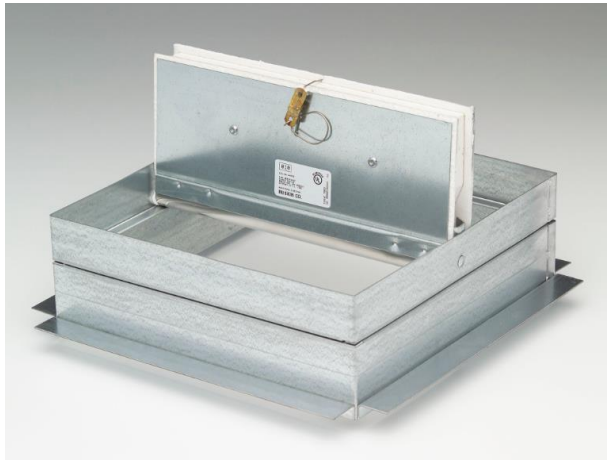
Ceiling Radiation/Fire Damper Ratings

Rating: 1 to 4 hours

- CFD assumes the rating of the ceiling assembly

Static rated only



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Fire, Smoke & Combination Fire Smoke Dampers Installation

717.2 Installation

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Installations

ICC INTERNATIONAL CODE COUNCIL

NFPA 90A
Standard for the Installation of Air-Conditioning and Ventilating Systems
2018

SECTION 717
DUCTS AND AIR TRANSFER OPENINGS

717.2 Installation

Fire dampers, smoke dampers, combination fire/smoke dampers and ceiling radiation dampers located within air distribution and smoke control system shall be installed in accordance with the requirements of this section, the manufacturer's instructions and the dampers' listing.

5.4.7 Installation.

Δ 5.4.7.1* Fire dampers, including their sleeves; smoke dampers;
and ceiling dampers shall be installed in accordance with the conditions of their listings and the manufacturer's installation
instructions and the requirements of NFPA 80.

Δ 5.4.7.2 Smoke dampers shall be installed in accordance with the conditions of their listings, the manufacturer's installation instructions, and the requirements of NFPA 105.

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Installations

Ruskin Authority in Air Control - YouTube

Ruskin Life Safety Damper Actuator Relocation for...

Ruskin Authority in Air Control
51 views • 6 days ago

Ruskin Life Safety Damper Actuator Relocation for...

Ruskin Authority in Air Control
649 views • 6 months ago

Ruskin Fast Angle - Wood Stud Damper Installation...

Ruskin Authority in Air Control
567 views • 9 months ago

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Fire and Combination Fire Smoke Damper Installation

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4. Mounting Angles

Mounting angles shall be a minimum of 1½" x 1½" x 20 gauge steel (38 x 38 x 1.0). For openings in metal stud, wood stud and concrete/masonry wall and concrete/masonry floors, mounting angles are only required on one side of the wall or top side of the floor and must be attached to both the damper/sleeve and the wall or floor. Mounting angles may be installed directly to the metal stud under the wallboard on metal stud wall installations only. Two angle installation the mounting angles must be attached only to the damper/sleeve. Mounting angles must overlap the partition a minimum of 1" (25). Do not weld or fasten angles together at cor-ners of dampers. Ruskin fire/smoke dampers may be installed using Ruskin FAST angle for one angle installation or Ruskin PFMA for two angle installations.

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Fire and Combination Fire Smoke Damper Installation

FD and FSD Opening Clearance

Installation Instruction Supplement
(D)IBD, (D)FD and FSD
UL555 and UL555S 1 1/2 Hour Rated

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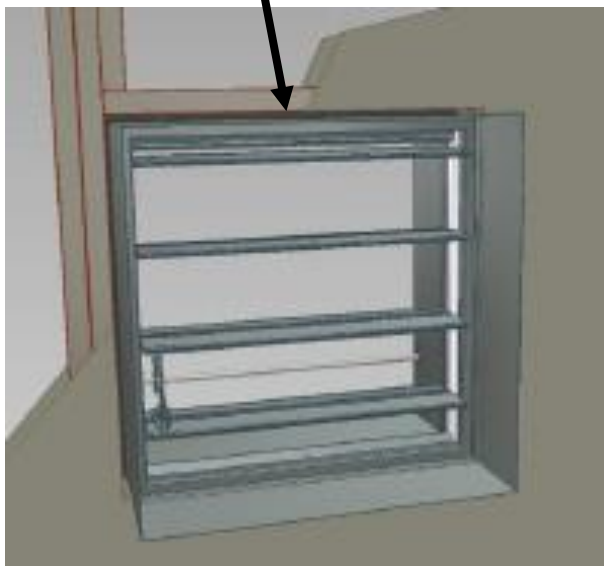
The opening clearance is calculated by width and height. The opening minimum width is ¼" larger than the damper width and the minimum height is ¼" larger than the height of the damper/sleeve assembly. The standard maximum opening size is 1" wider and 1" taller than the damper/sleeve assembly width and/or height. The maximum opening size can be expanded to 2" wider and 2" taller than the damper/sleeve assembly width and/or height as long as the Single-sided mounting angle is 16 gauge steel or heavier. See example below.

Example 1: Angle 1 Side
12" x 12" damper (Actual Size)
Minimum opening size 12 ¼" x 12 ¼"
Maximum opening size 13" x 13" (single-sided 20 gauge mounting angle)
Optional Maximum size 14" x 14" (single-sided 16 gauge mounting angle)

Opening Clearance is the space between the side and/or top of the damper and the wall framing

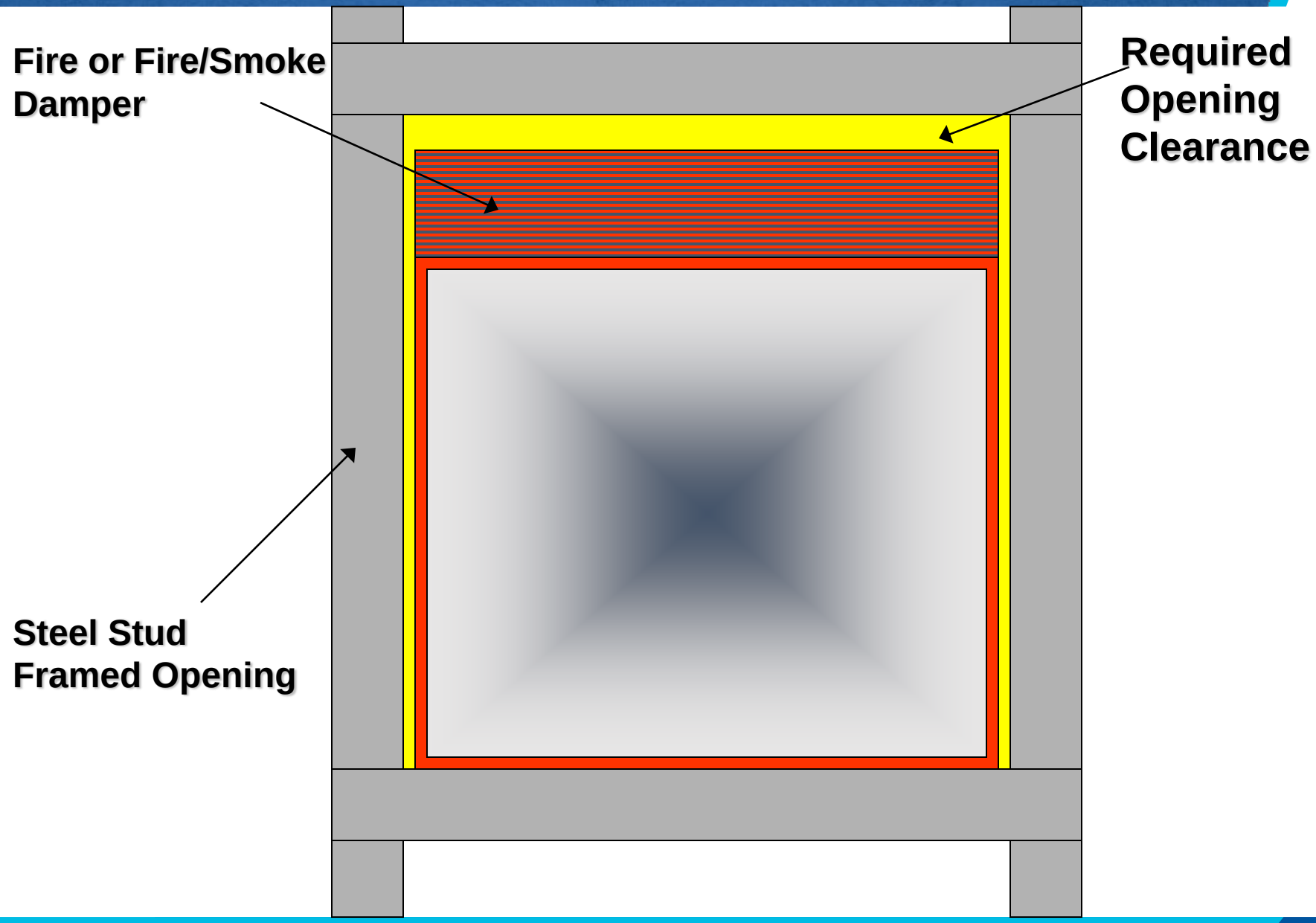


Fire and Combination Fire Smoke Damper Installation

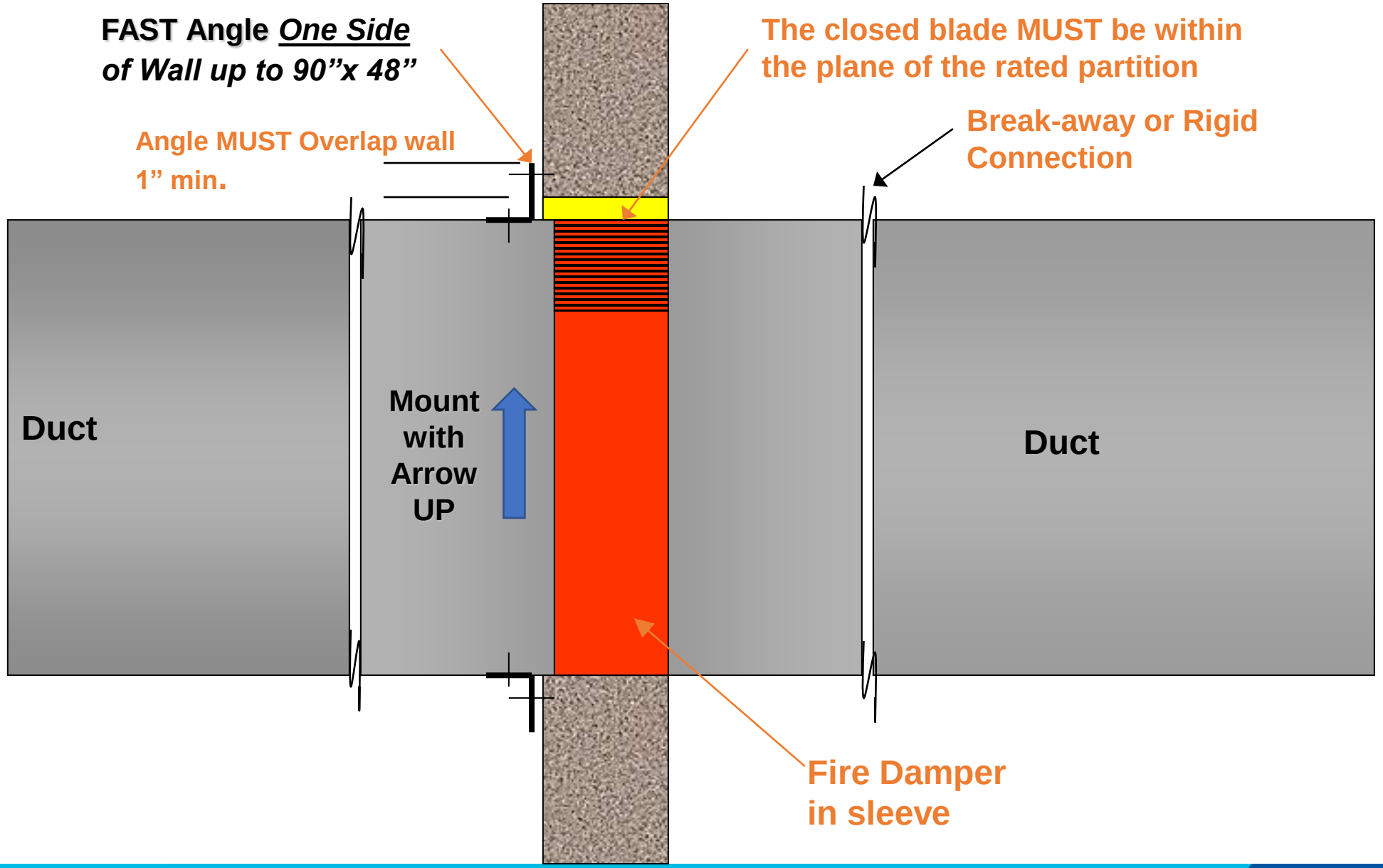
Metal Stud

Wood Stud

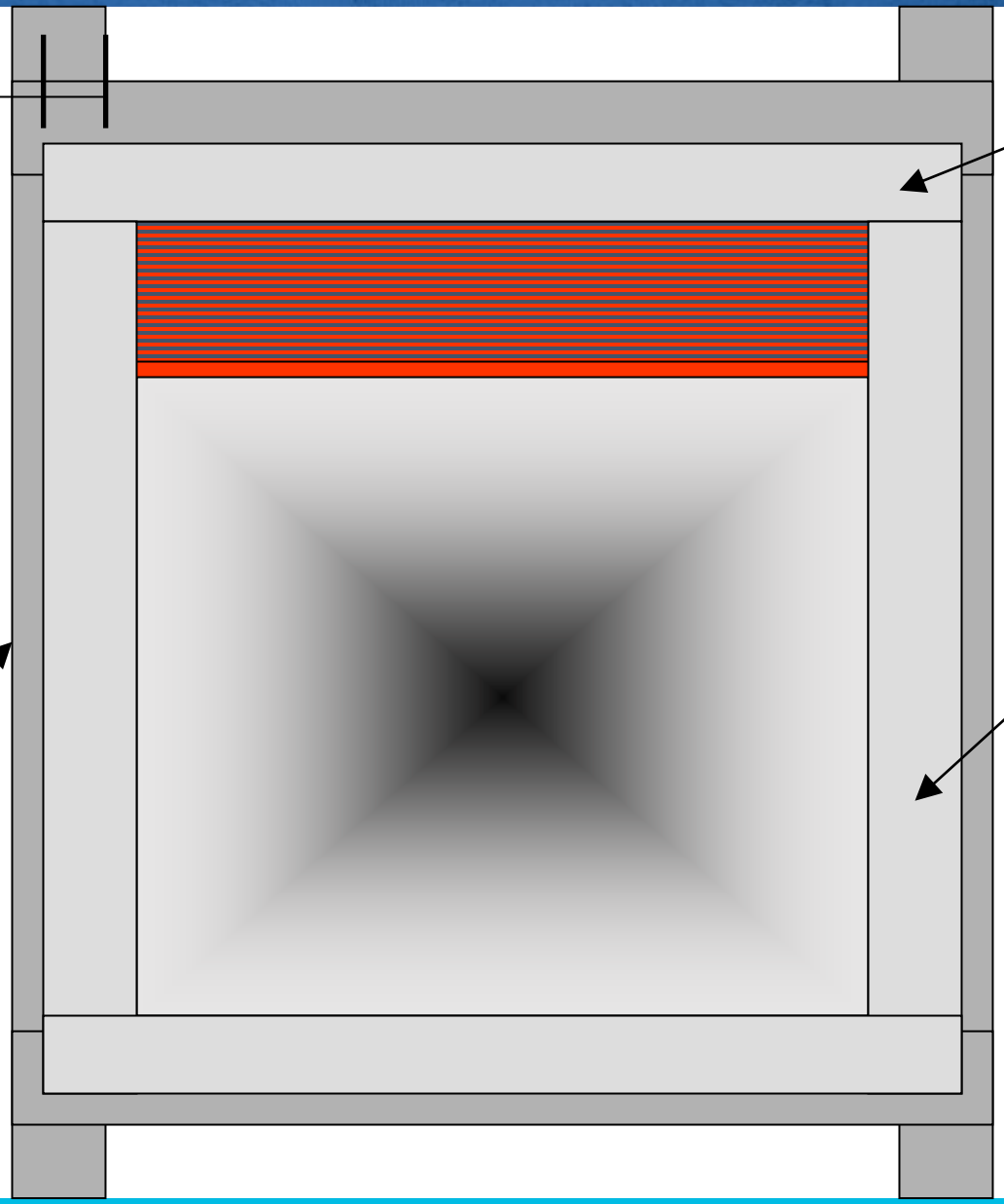
Opening Clearance “Expansion Gap”



Damper Orientation



Mounting Angles“Retaining Angles”



Angle MUST Overlap wall 1” min.

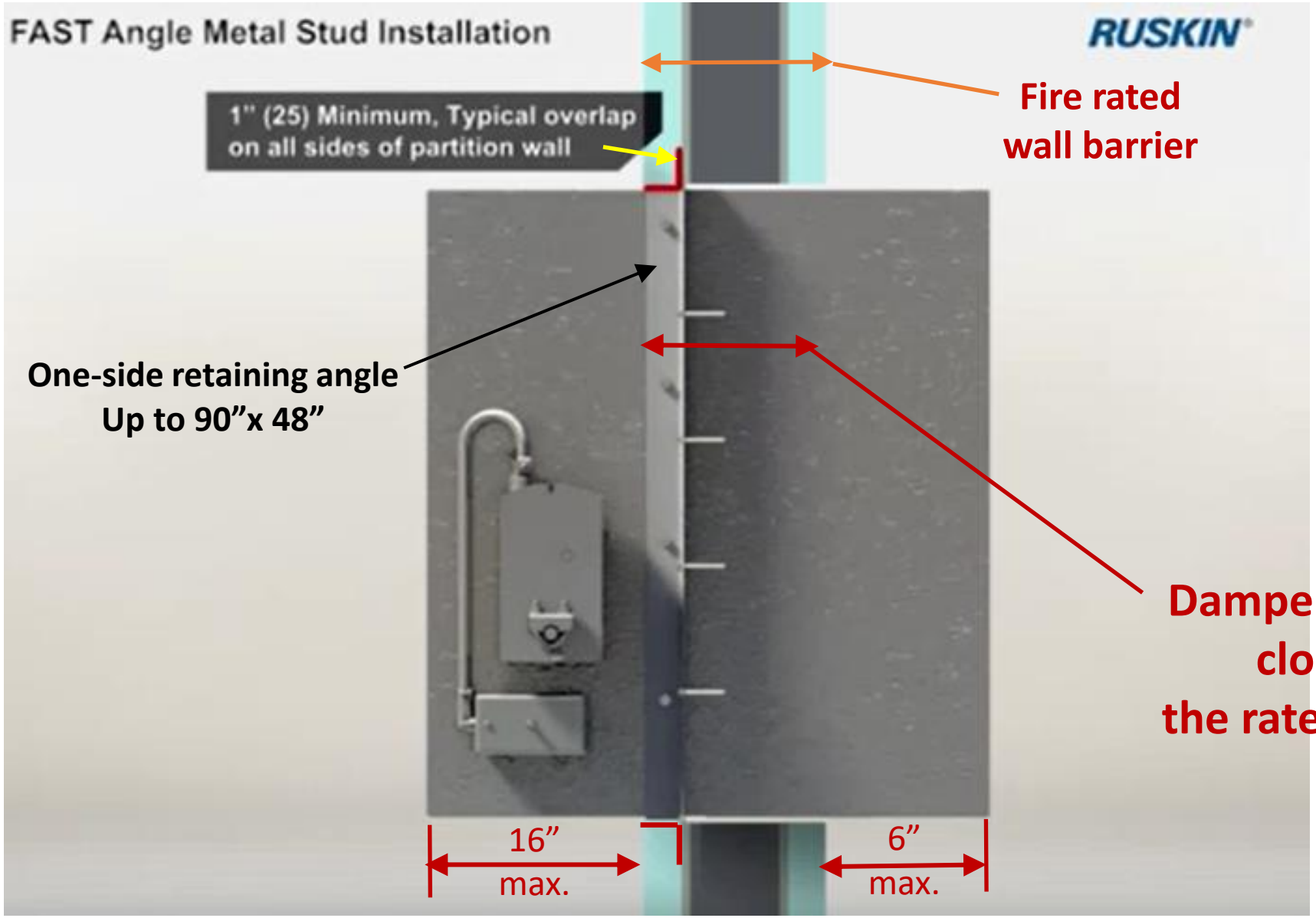
Framed Opening

Retaining angle/s serve 2 two main purposes:

1. **Cover the opening clearance**
2. **Retain damper in the opening**

Retaining Angle

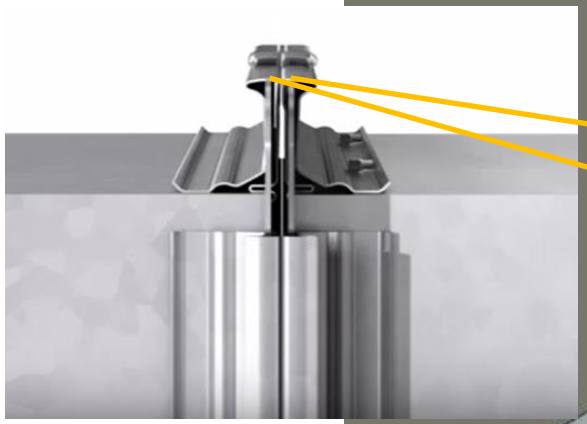
Section view of rated wall with FD damper installed

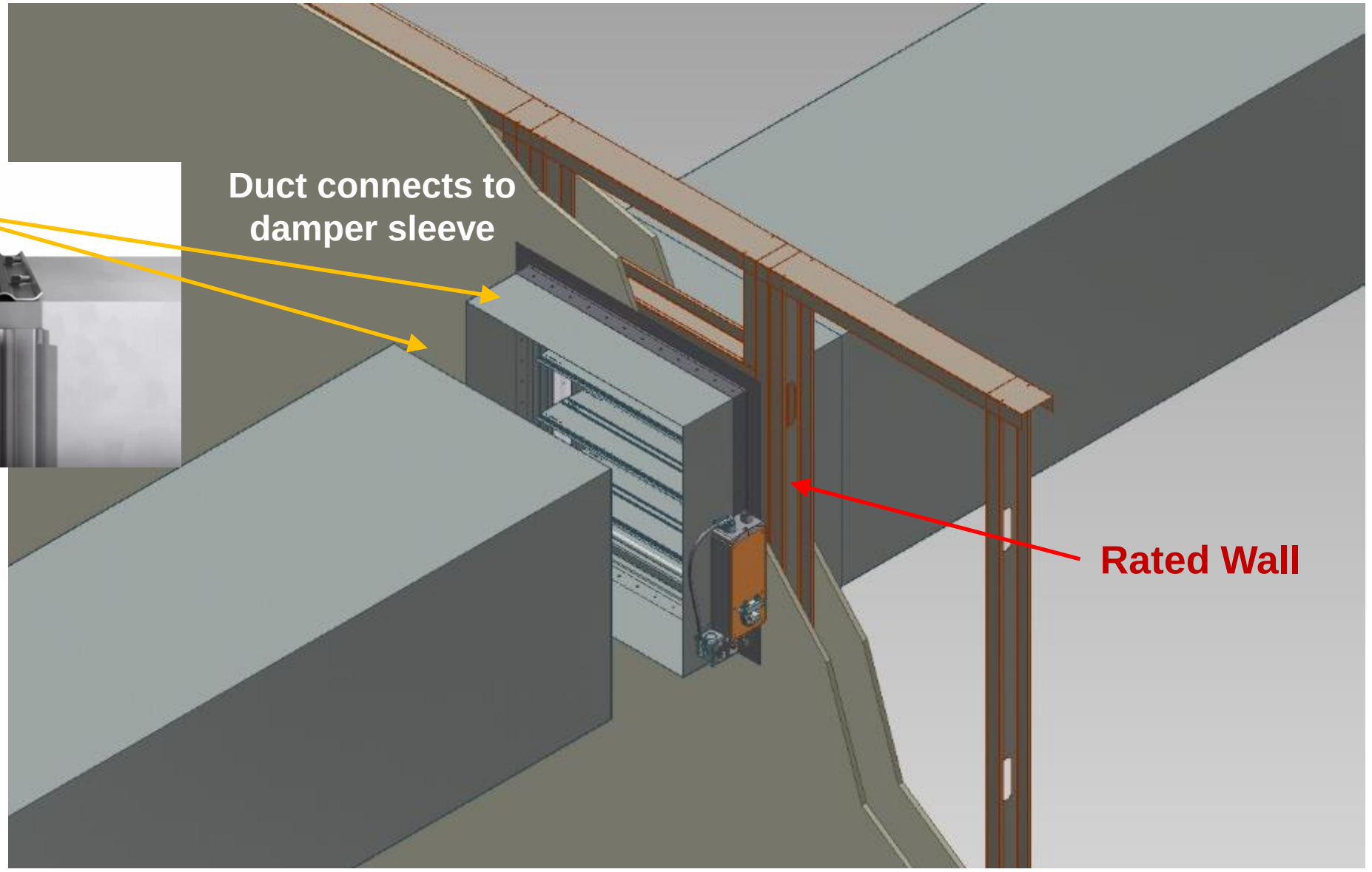


Opposite Side of Wall Shown

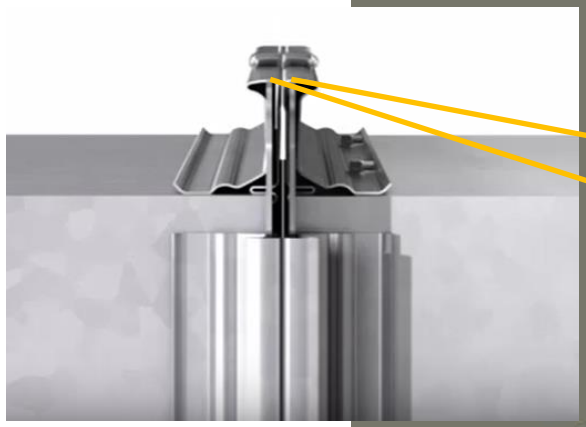
NO Retaining Angle required on opposite side

FD or FSD Sleeve-Duct Connections

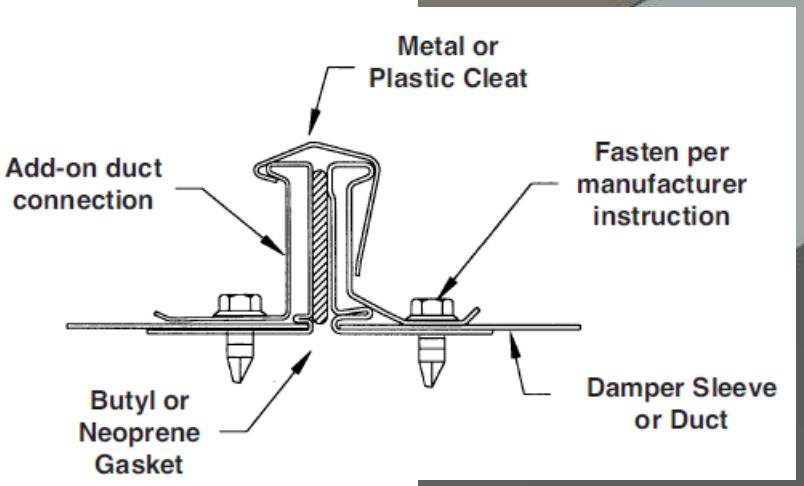




FD or FSD Sleeve-Duct Connections



Duct connects to damper sleeve



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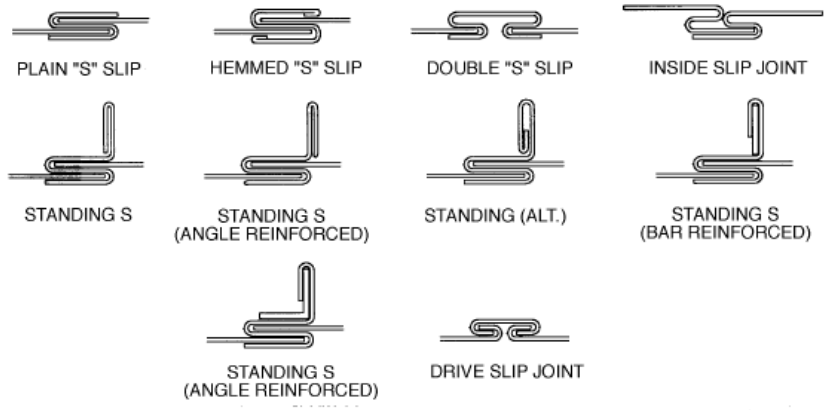
6. Duct/Sleeve Connections

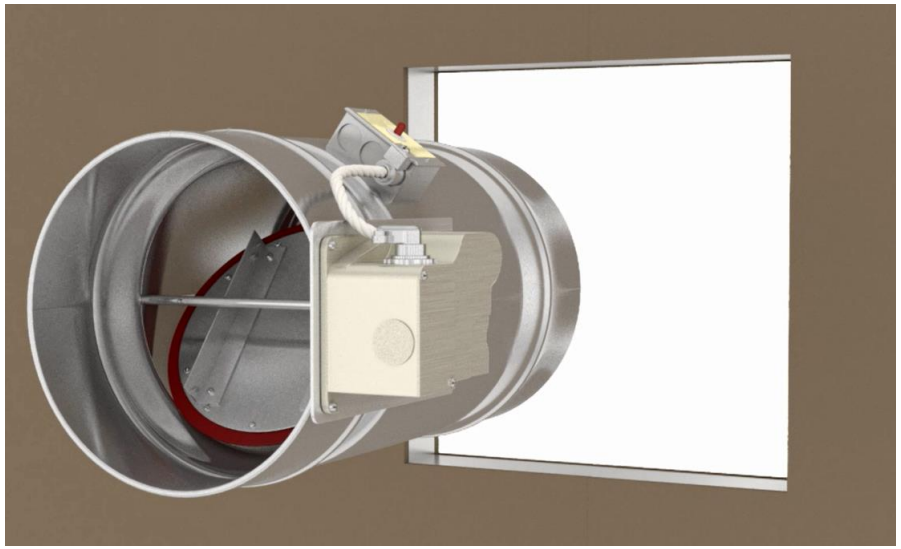
a. Break-away Duct/Sleeve Connections

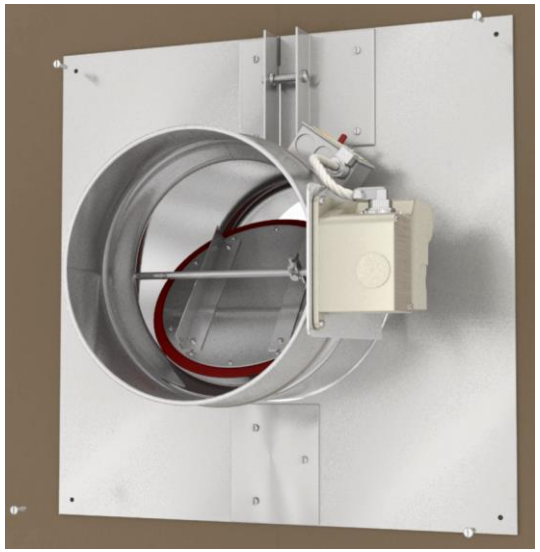
Rectangular ducts must use one or more of the connections depicted below

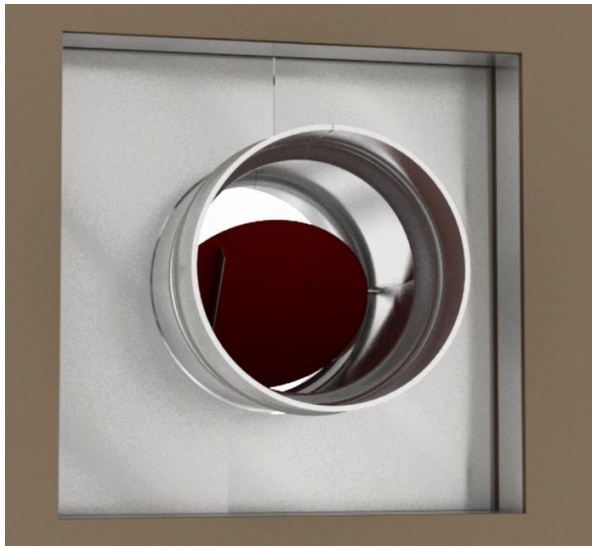


A maximum of two #10 (M5) sheet metal screws on each side and the bottom, located in the center of the slip pocket and penetrating both sides of the slip pocket may be used. Connections using these slip joints on the top and bottom with flat drive slips up to 20" (508) long on the sides may also be used.

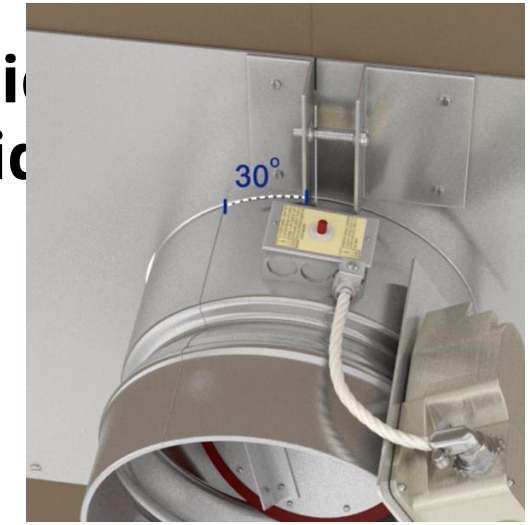
True Round Damper Installation

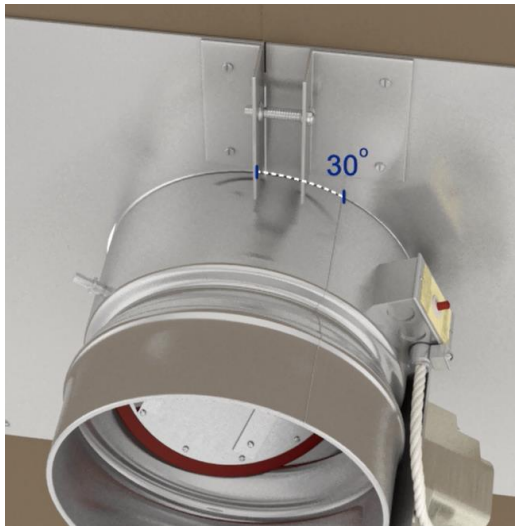




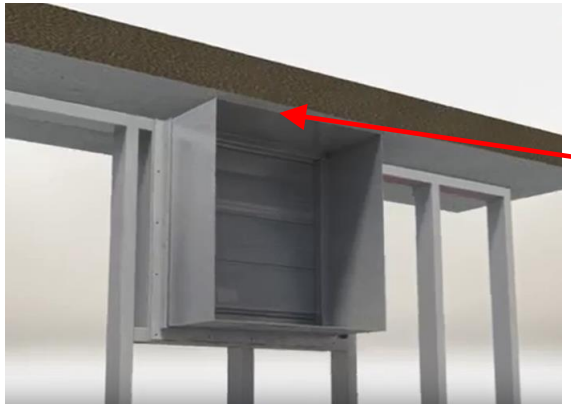


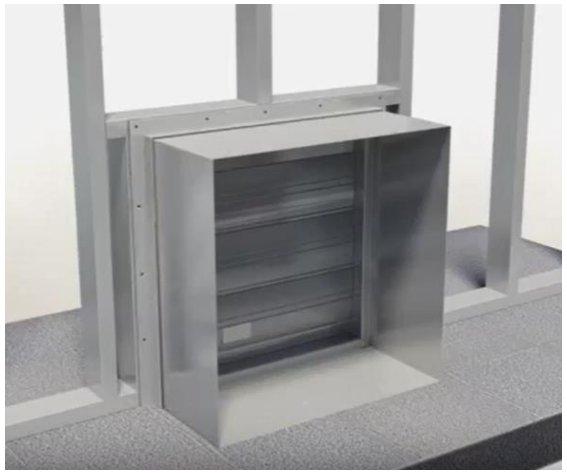
Standard Plate One Si
Optional Plate Two Sid



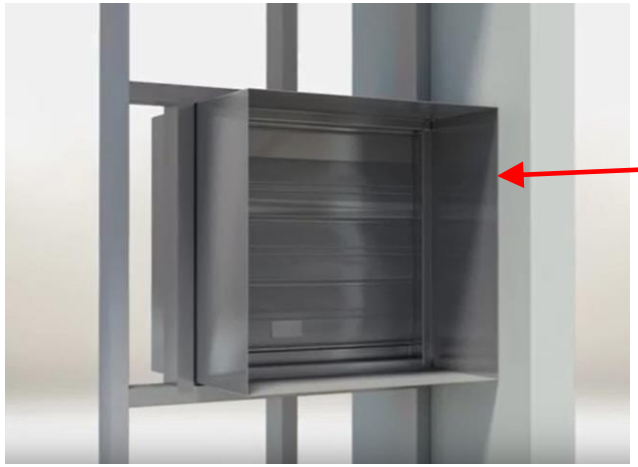


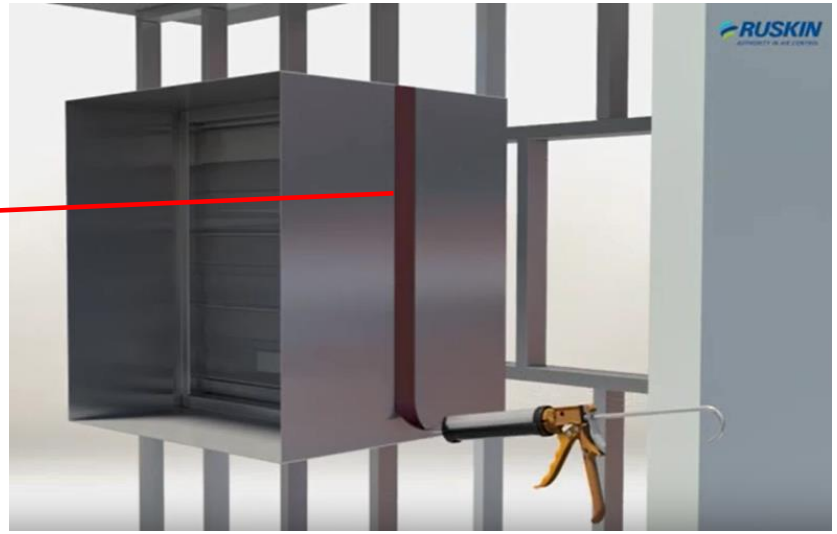
3 – Side Angles Installation



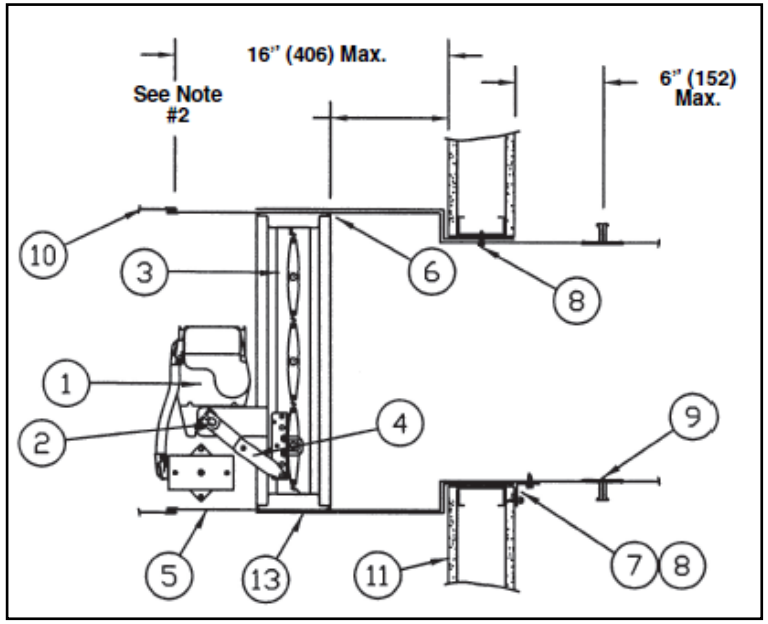


Firestop material can be applied on side where angle won't fit





“OW” Out of Wall or Floor



Shaft Dampers

Grill Access

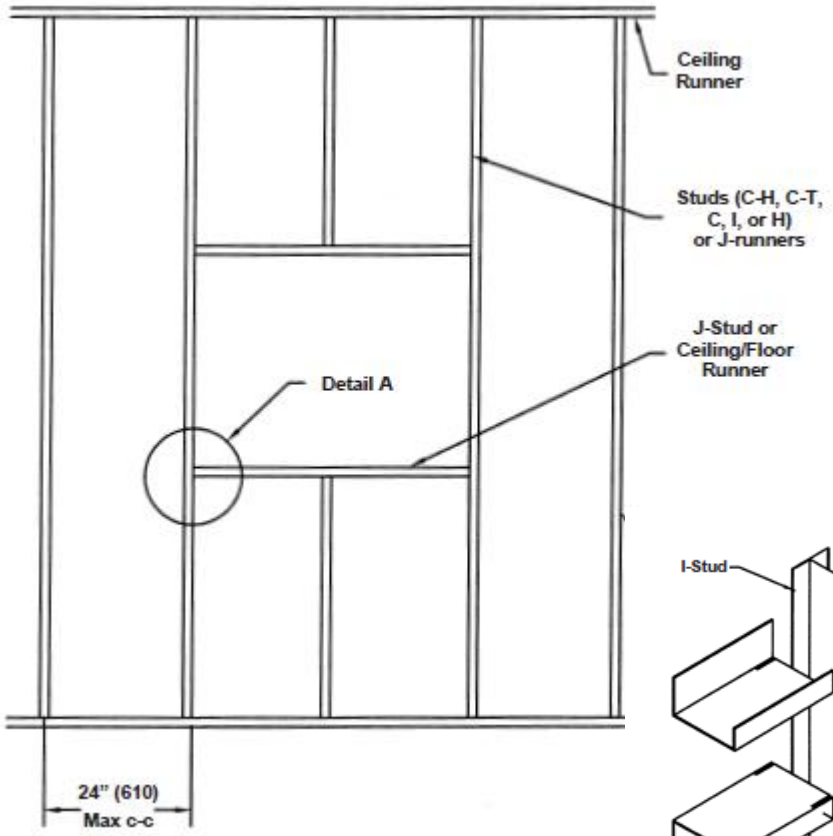
Front Access

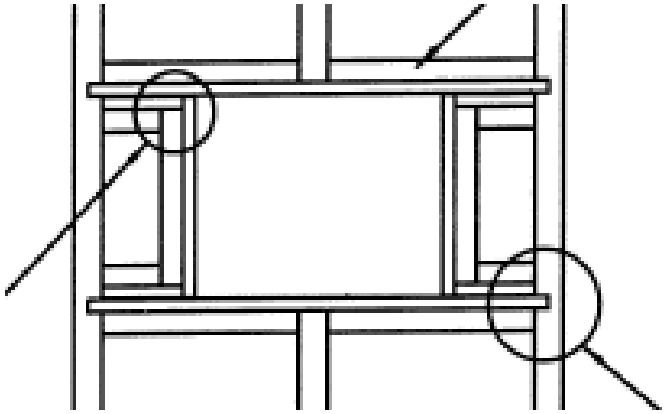
1.5 Hour Fire Rating

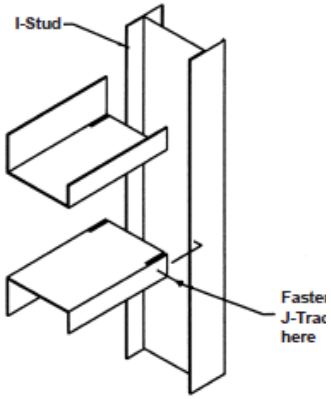
Shaft Wall Framing

UL Shaft Wall Designs – U415, U437, U438, U467, U469, U497

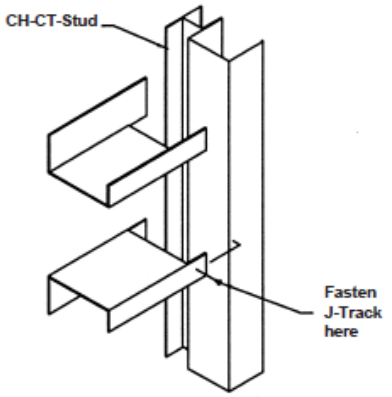
Shaft wall construction may utilize C, E, H, I, J. C-H or C-T stud wall construction.



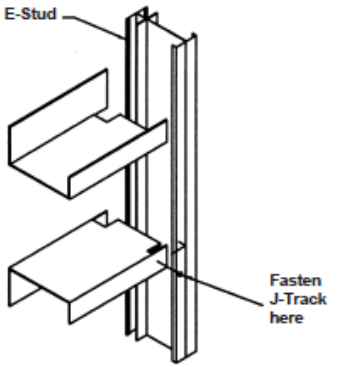




I-Stud

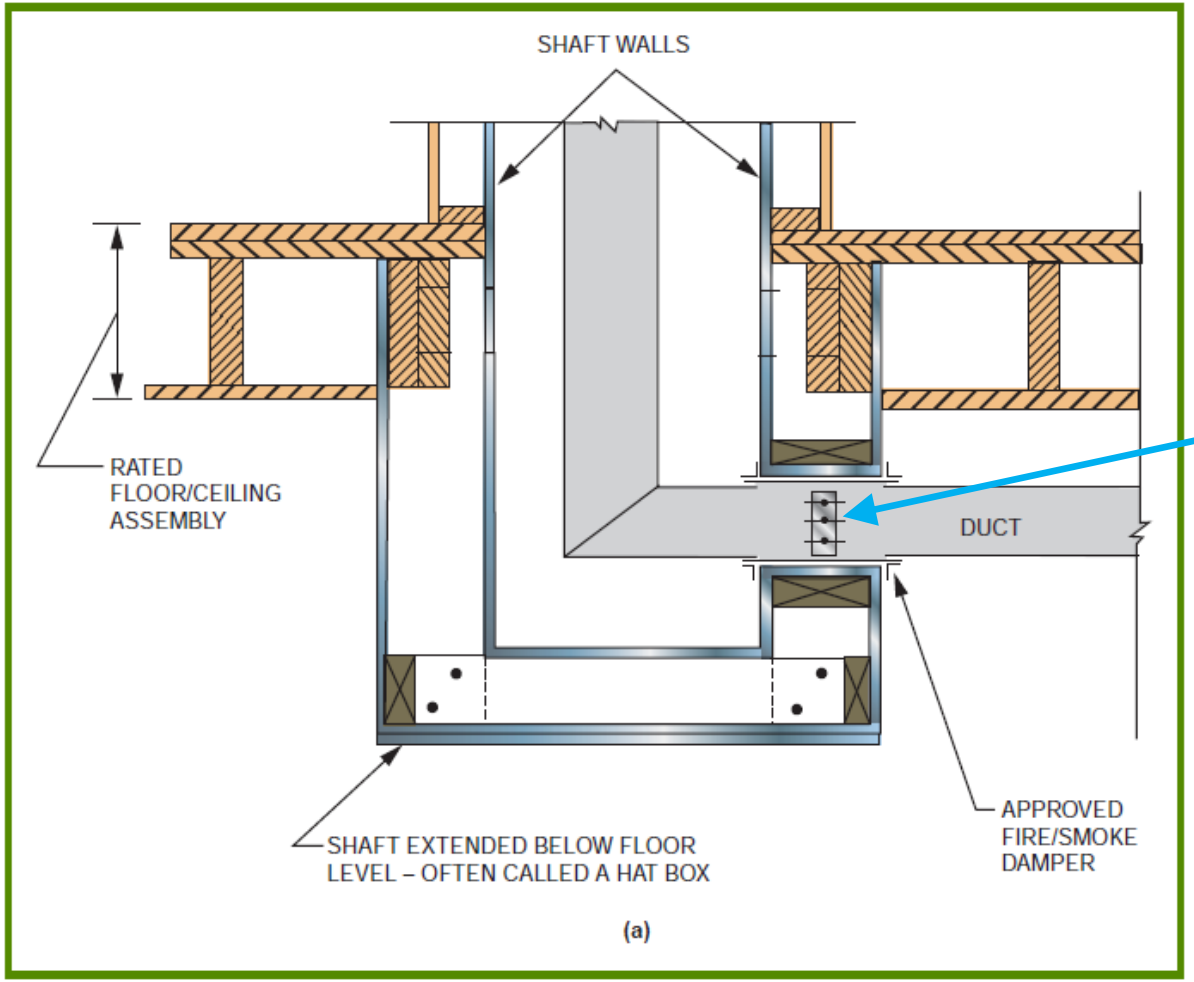


CH-CT-Stud

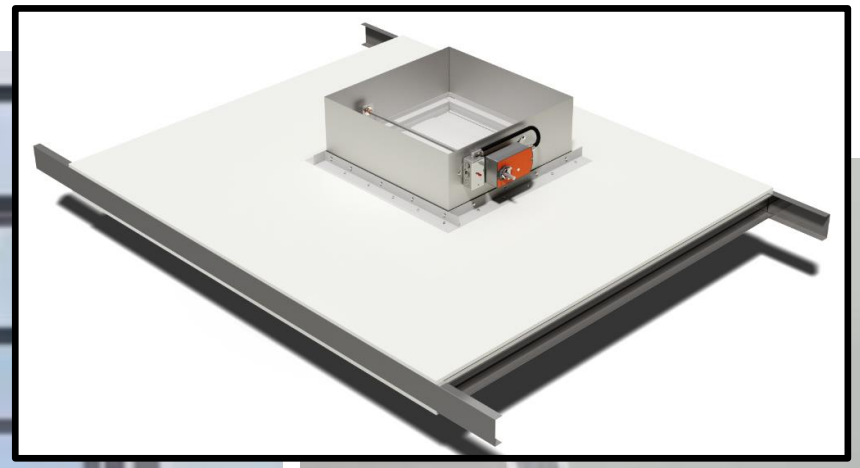


E-Stud

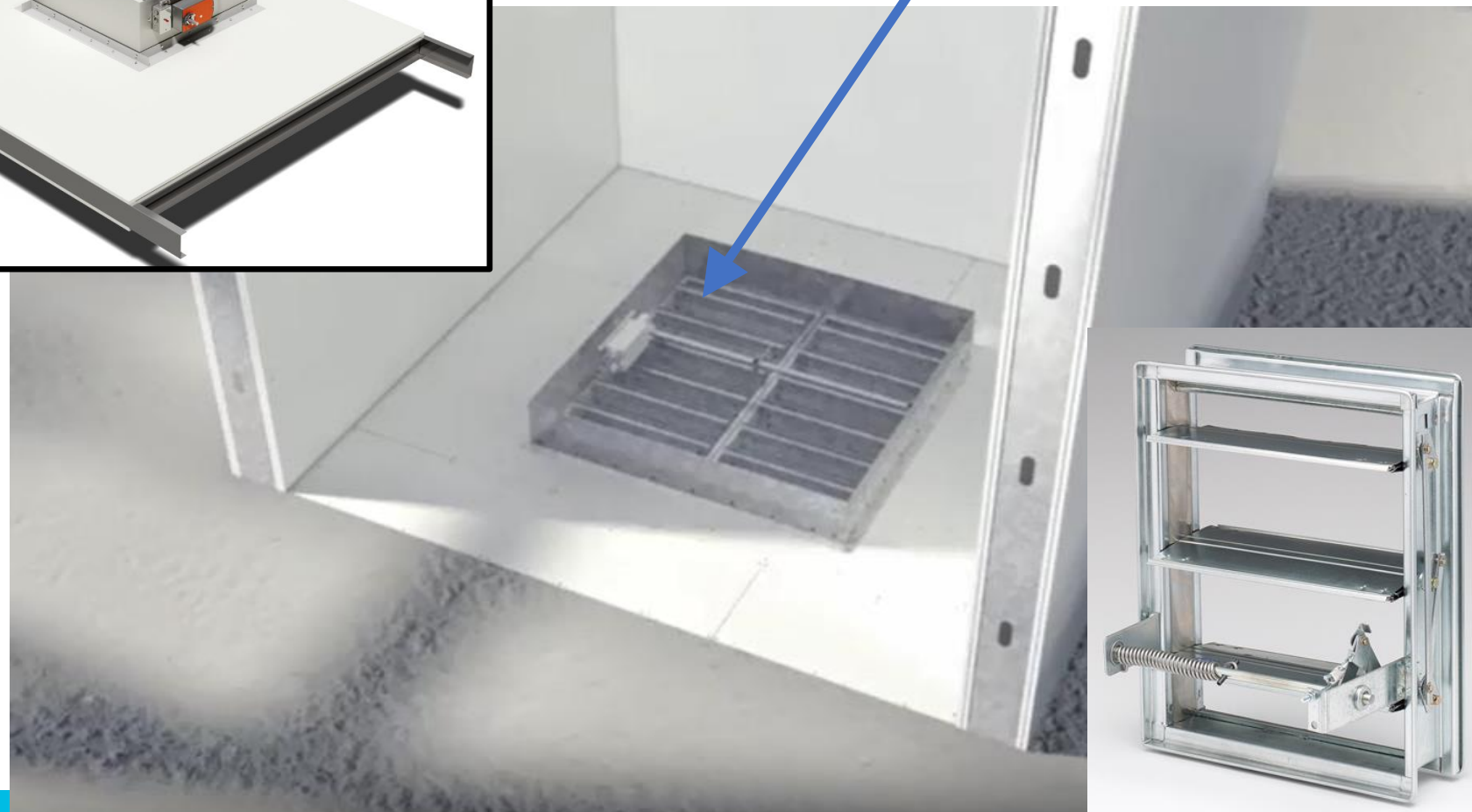
Shaft Enclosures (At the bottom of the shaft)



Shaft Enclosures (At the bottom of the shaft)



Fire or Fire-Smoke Damper



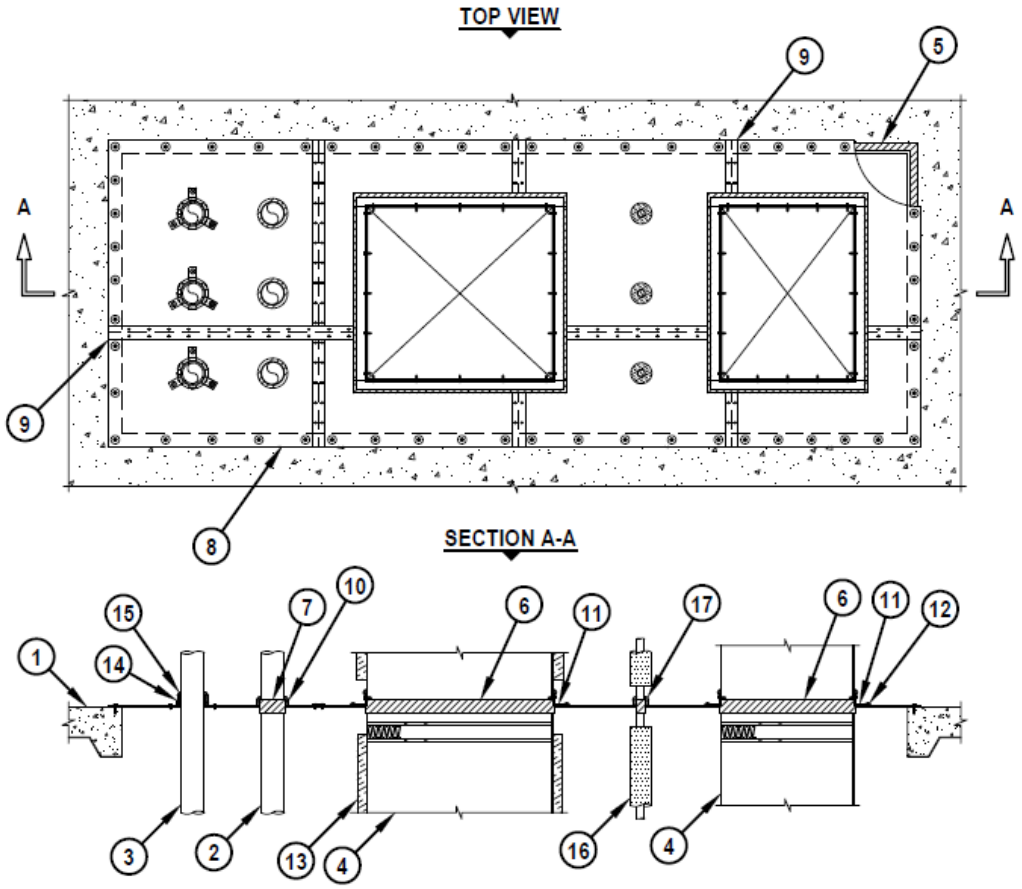
Fire Stop Systems

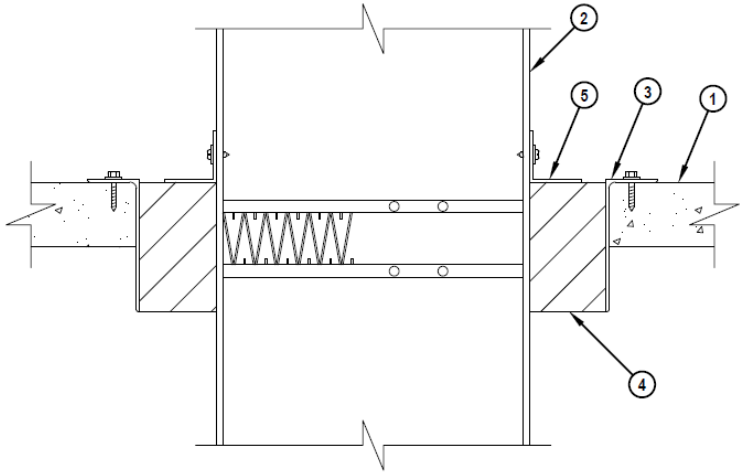
ICC INTERNATIONAL CODE COUNCIL

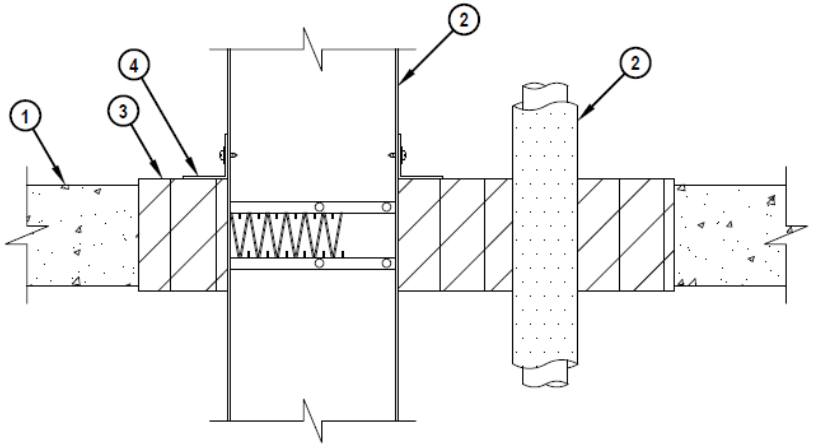
NFPA®

RUSKIN

Important: Prior to Installation of this firestop system, Verify with the fire damper manufacture the addition of fire stop product will not adversely affect the fire-rating or performance of the fire damper.

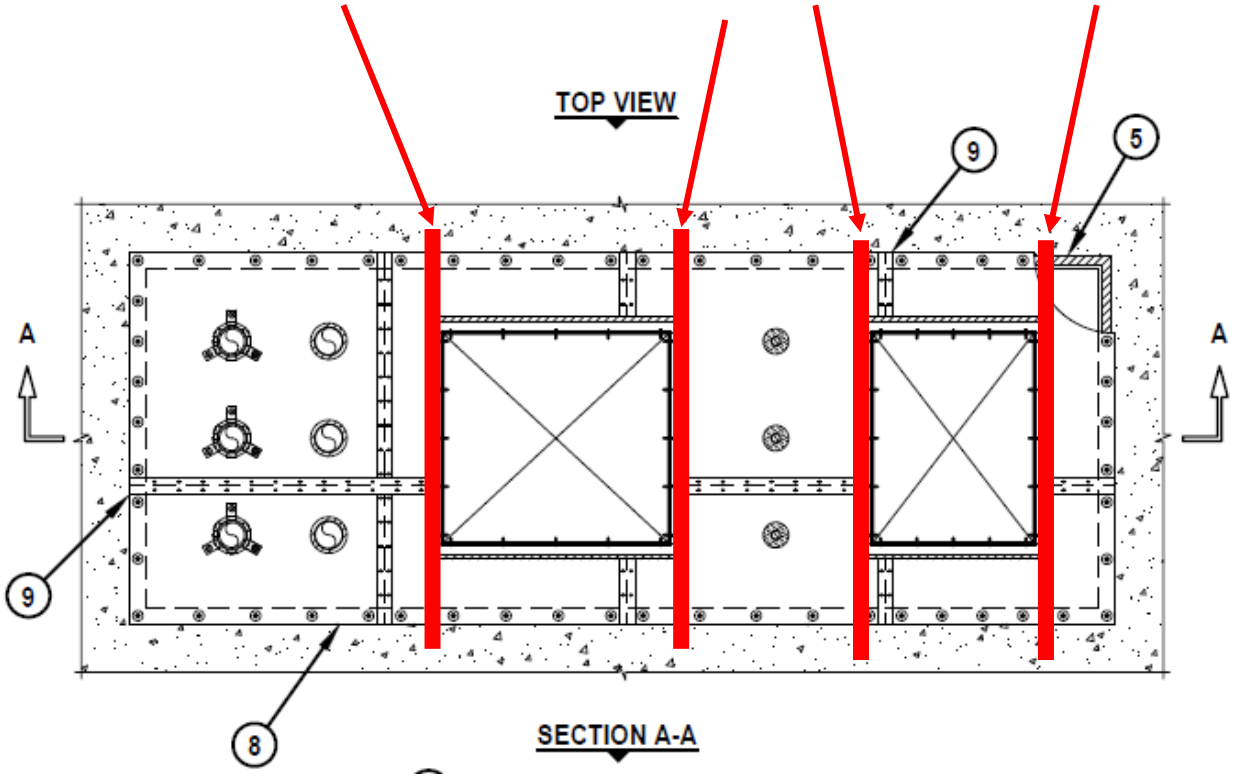






Fire Stop Systems

Please show the angles around the damper at a minimum opposite sides extending onto the top of the concrete floor.



New Coming Soon

RUSKIN

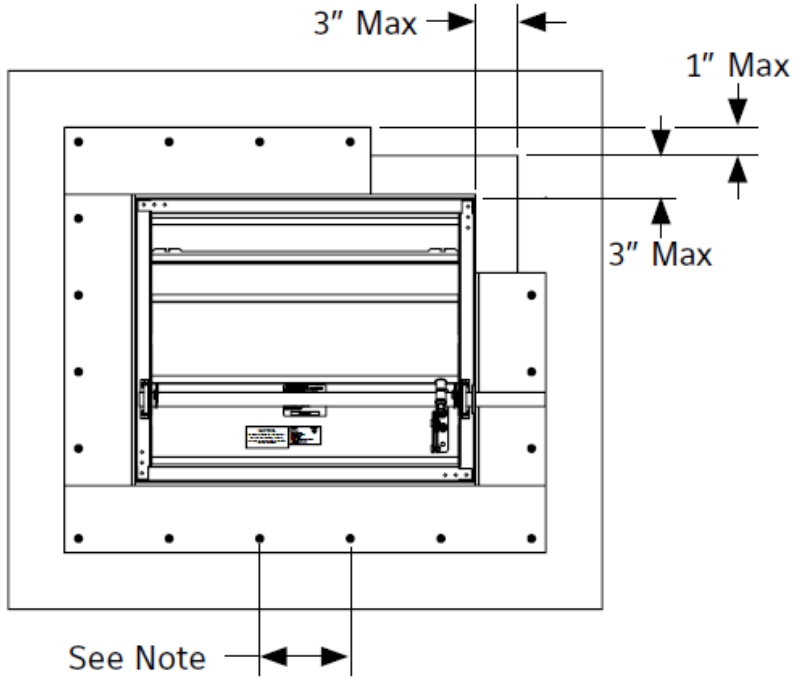
6″ MAX. OPENING CLEARANCE

Installation Instruction Supplement

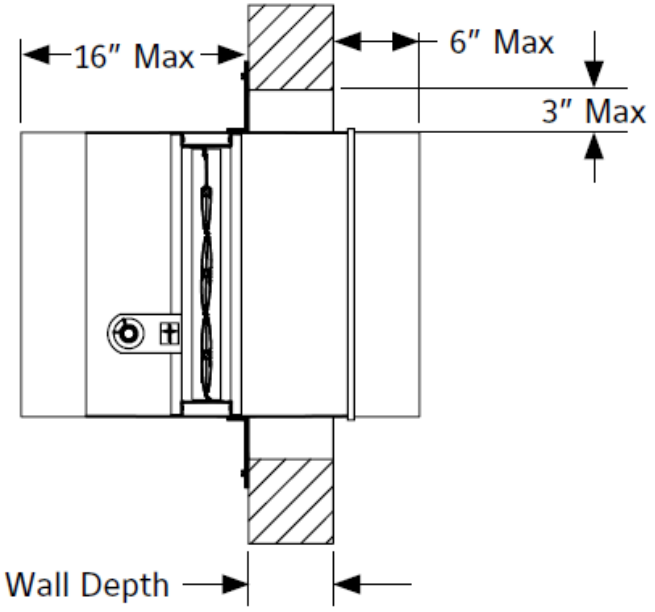
(D)IBD, (D)FD and FSD

UL555 and UL555S 1 1/2 Hour Rated

RUSKIN
AUTHORITY IN AIR CONTROL



FACE VIEW



SIDE VIEW

Ceiling Fire (Radiation) Damper

ICC INTERNATIONAL CODE COUNCIL

NFPA®

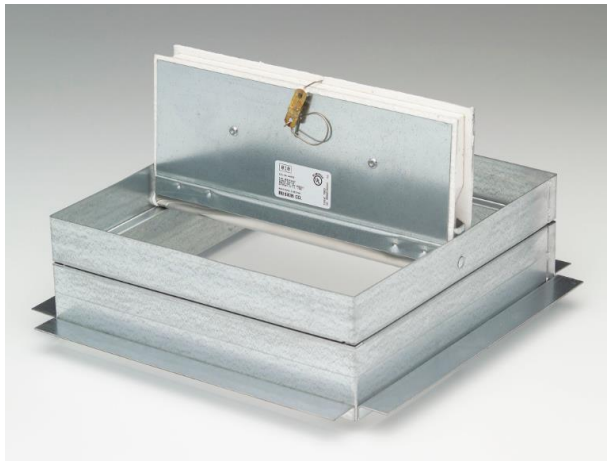
RUSKIN

Ceiling Radiation/Fire Damper Ratings

Rating: 1 to 4 hours

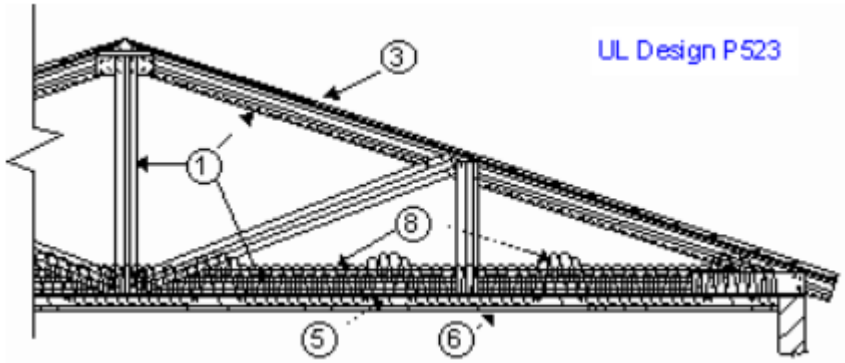
- CFD assumes the rating of the ceiling assembly

Static rated only

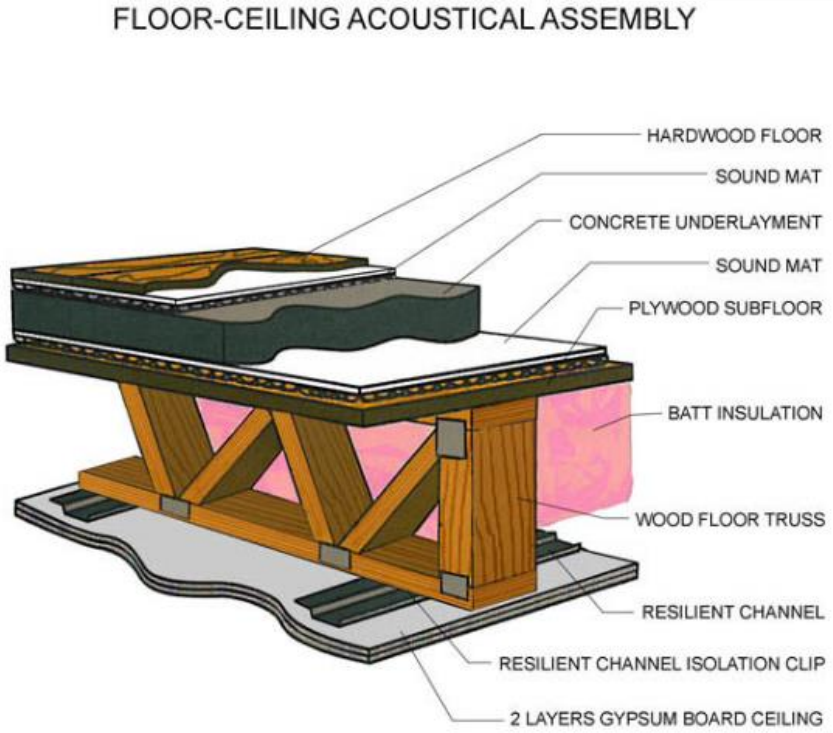


Horizontal Assemblies (CD/CRD)

- **Roof-Ceiling**
- **Floor-Ceiling**
- **Concrete Slab**

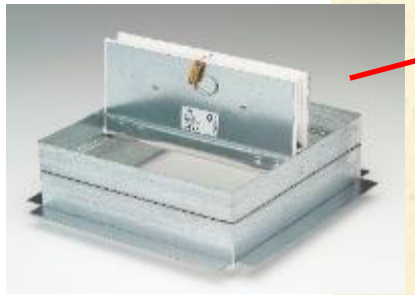


- ✓ UL design number
- ✓ Proprietary Ceiling Designs
- ✓ Unevaluated Ceiling Design



Membrane Penetration (CFD/CRD)

- **UL555C ceiling radiation damper at lower membrane**



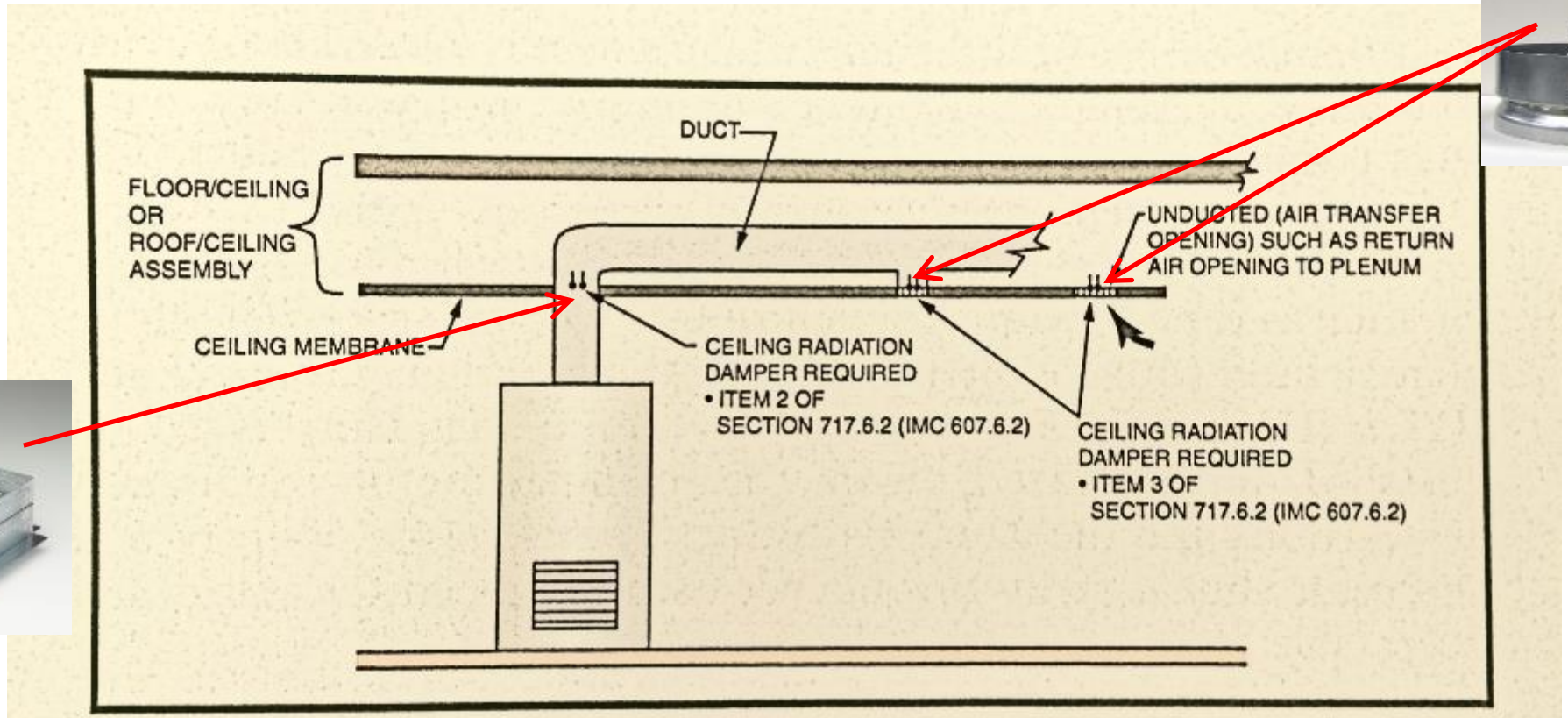


Figure 39
Protection of Ceiling Membrane Penetrations

Proprietary Ceiling Design (owned by a damper company)

Design No. L521

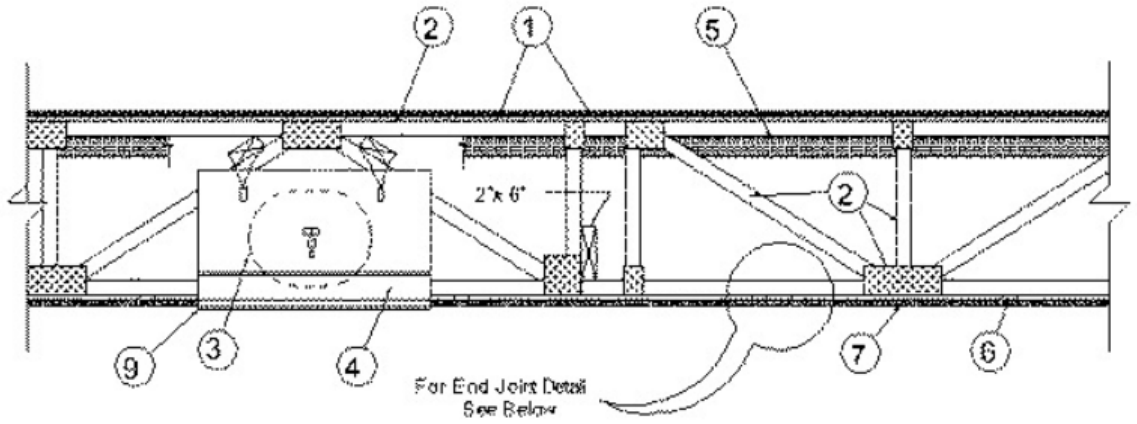
January 31, 2018

Unrestrained Assembly Rating — 1 Hr

Finish Rating — 25 Min (See Items 5 and 5A), 20 Min (See Items 6H and 7A)

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.**



4. **Ceiling Damper*** — For use with min 18 in. deep trusses. Max nom area shall be 324 sq in. with the length not to exceed 24 in. and the width not to exceed 20 in. Max height of damper shall be 14 in. Aggregate damper openings shall not exceed 162 sq in. per 100 sq ft of ceiling area. Damper installed in accordance with the manufacturers installation instructions provided with the damper. A steel grille (Item 9) shall be installed in accordance with installation instructions.

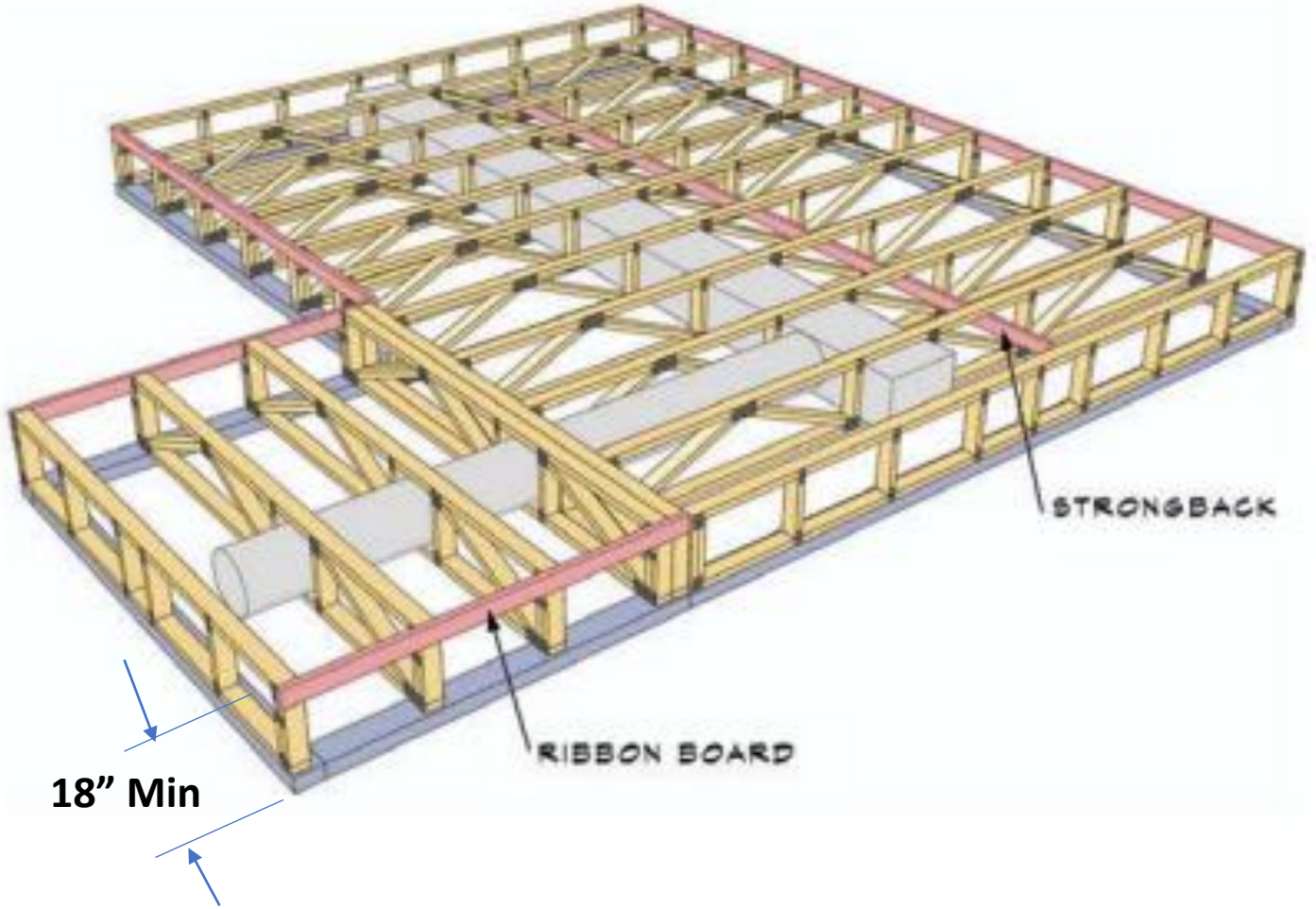
- **Only ONE damper company is listed in the design**
- **Usually creates nuances for the engineer, contractor & AHJ**

What You Need to Know “Wood Truss Dampers”

- **What is the UL Ceiling Design Number?**
- **What is the Height of the Truss? (18” Min.)**
- **Manufactures Installation Instructions.**

Generic Ceiling Design

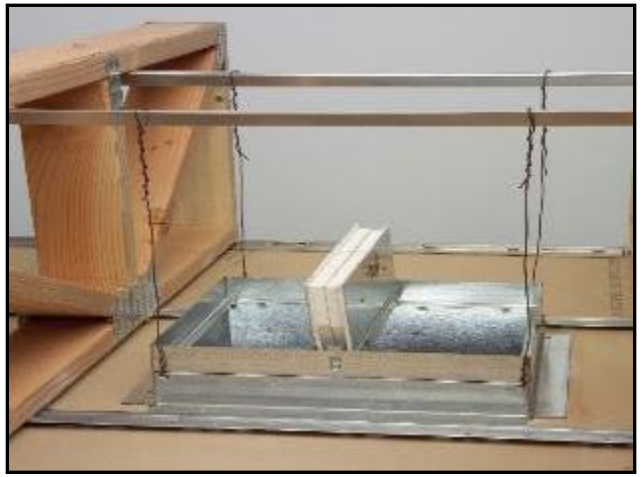
- **L-528**
- **L-546**
- **L-558**
- **L-592**
- **P-533**
- **P-545**



Wood Truss Installation (CFD7T)

Installation 1 – CFD7T can be attached to angles resting on top of the bottom cord of the truss.

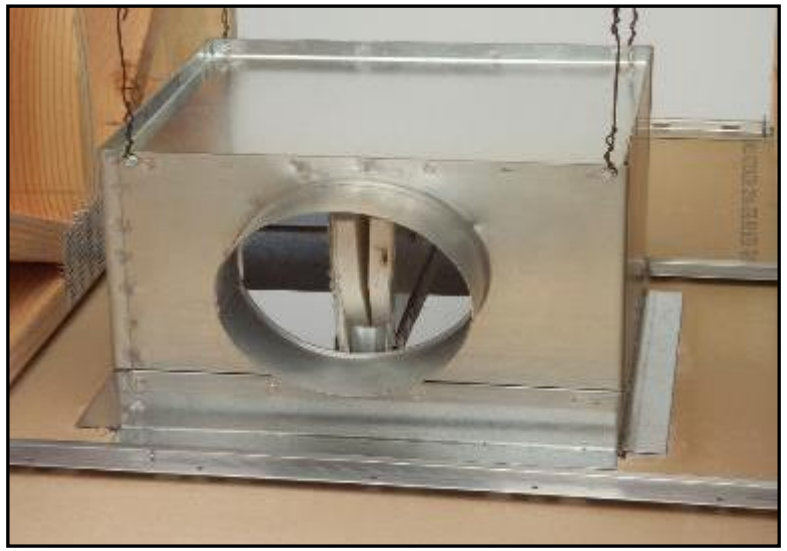
Installation 2 – When the webbing of the truss interfere with the mounting angles, bend a leg up on the angels and attach to the sides of the trusses.



Installation 3 – The CFD7T may be suspended with steel wires from steel angles or 2”x 4” attached to the top cord or the webbing of the trusses.

CFD7T Plenum Types

Ruskin – Plenum can be factory of field supplied



Steel Box w/Duct Lining or
w/o Duct lining

R4, R6 and R8 Duct Board
Plenum Box

**Only Requirement –
Maximum of 10 Lbs.**

End Boot, 90Deg. Boot or
Top Boot

**Other Manufactures
See Installation Instructions**

Through Ceiling Membrane Penetration

APPLICATION

CFD7(T) is the only UL approved radiation damper that can be used as supply/return air plenum to connect to AHU unit below the ceiling assembly.

Ductwork may be connected directly to the bottom side of the CFD7(T) from the AHU below. Retaining angles are utilized in lieu of steel grille flanges that cover the gap in between the gypsum and the CFD7(T).

Wood Joist

- **Ruskin's CFD7**
- **20 Different U.L. Designs (Ref. L501)**

CFD7 can be supplied with or without a steel plenum box. The plenum is to be insulated in the field (Insulation is factory supplied).

Misapplication

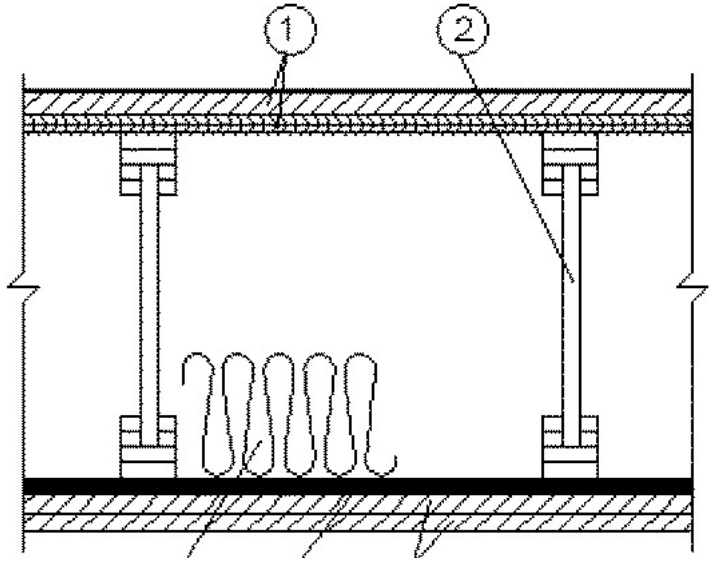
Design No. L570

January 09, 2018

Unrestrained Assembly Rating — 1 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.**



Unevaluated Ceiling Design

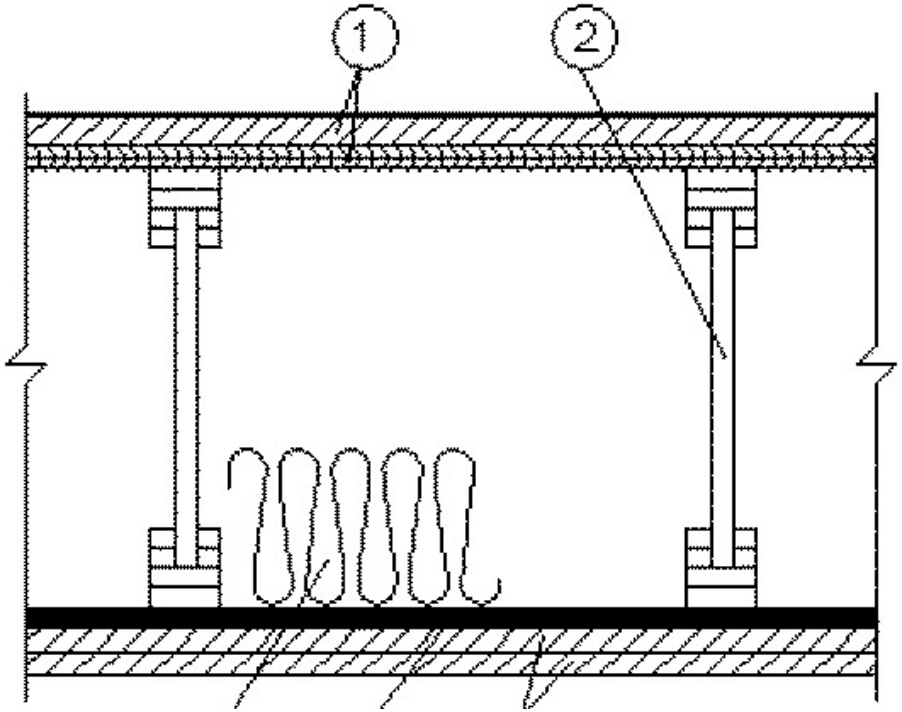
Design No. L570

January 09, 2018

Unrestrained Assembly Rating — 1 Hr.

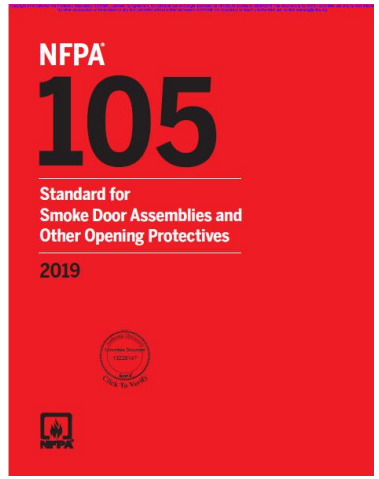
This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

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



- Air duct openings not evaluated in the assembly
- AHJ will need to determine suitability of the application
- AHJ gives final approval for any product installation

Authority having jurisdiction (AHJ)



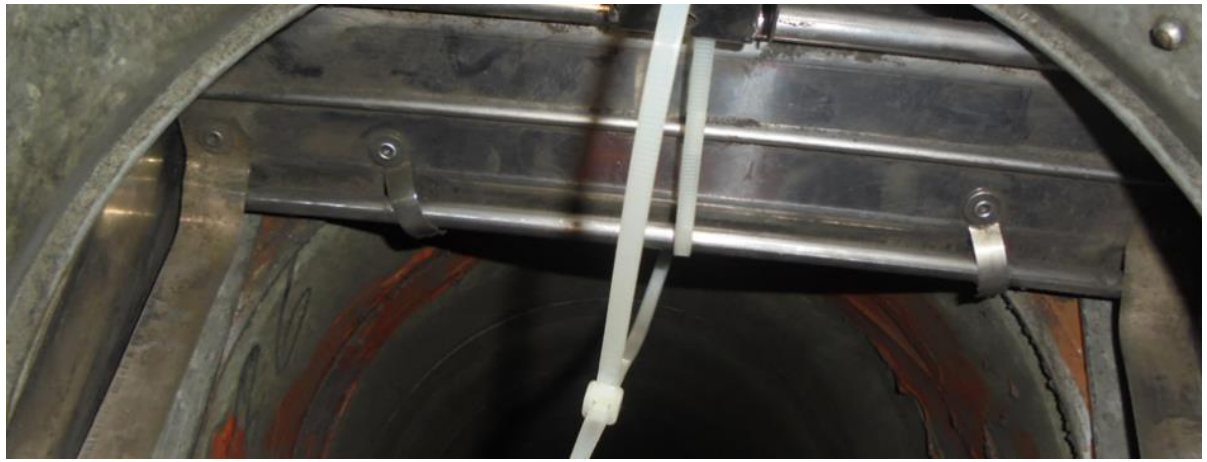
Damper Testing/ Maintenance Requirements

FCIA
Firestop Contractors International Association

Insert your logo here

2021
INFORM. ENGAGE. INSPIRE.

Operational, Testing and Maintenance



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.

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Firestop Contractors International Association

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Operational, Testing and Maintenance

Up to $500

As Low as $1.00

FCIA
Firestop Contractors International Association

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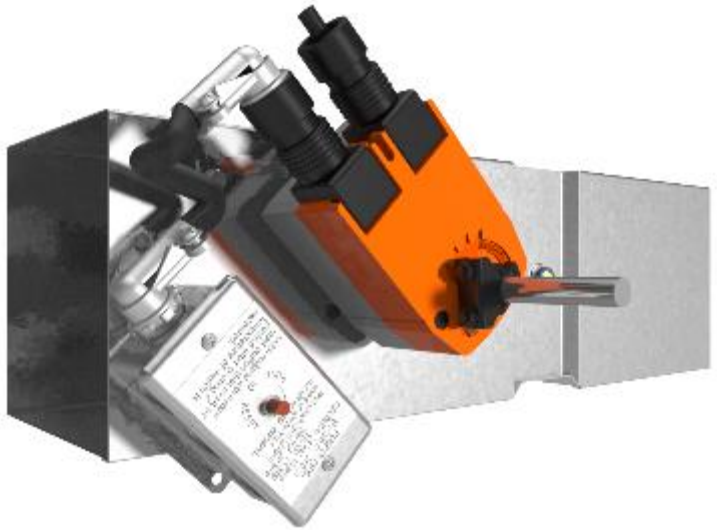
440

Add Motorized Fire, Smoke and Combination Fire Smoke Dampers.

SDRS or FSDR

Vert SD or FSD

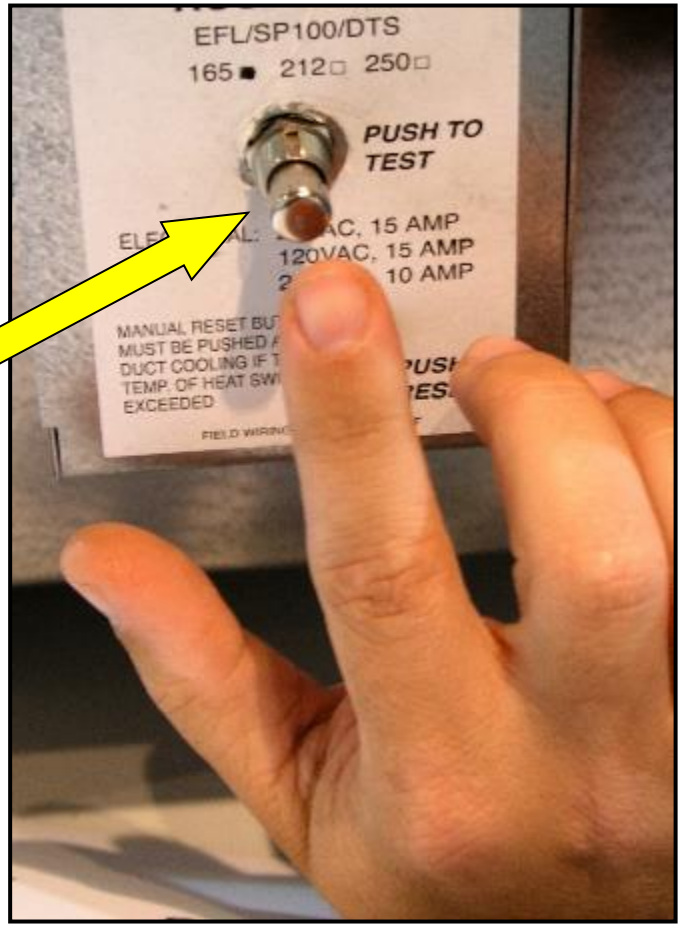


FSD-LP

Std. FSD

Damper Test Switch

Push to test interrupts power momentarily for cycle testing of actuator



Master Control Panel MCP4

Push to test interrupts power momentarily for cycle testing of actuator.

Needs Blade Indication Switches


RUSKIN
WWW.RUSKIN.COM
PUSH TO TEST
OPEN
CLOSED
MCP4, MCP44 CONTROL PANEL
EFL-165°F
(Electronic Fuse Link)
Push to Reset
RUSKIN

Operational, Testing and Maintenance

ADC105(A)

Simplex

FCIA
Firestop Contractors International Association

Insert your logo here

2021
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Operational, Testing and Maintenance

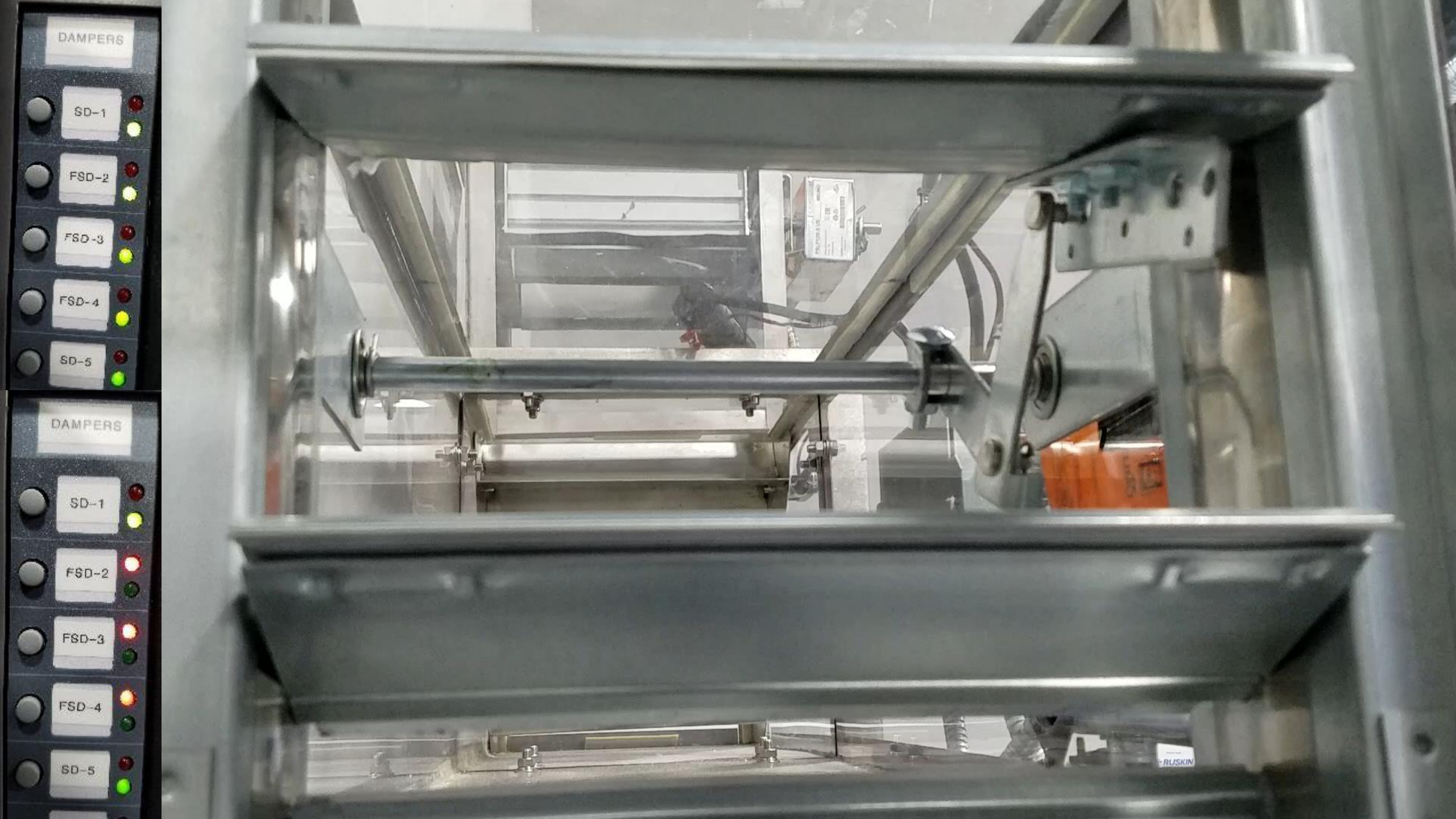
Operational, Testing and Maintenance

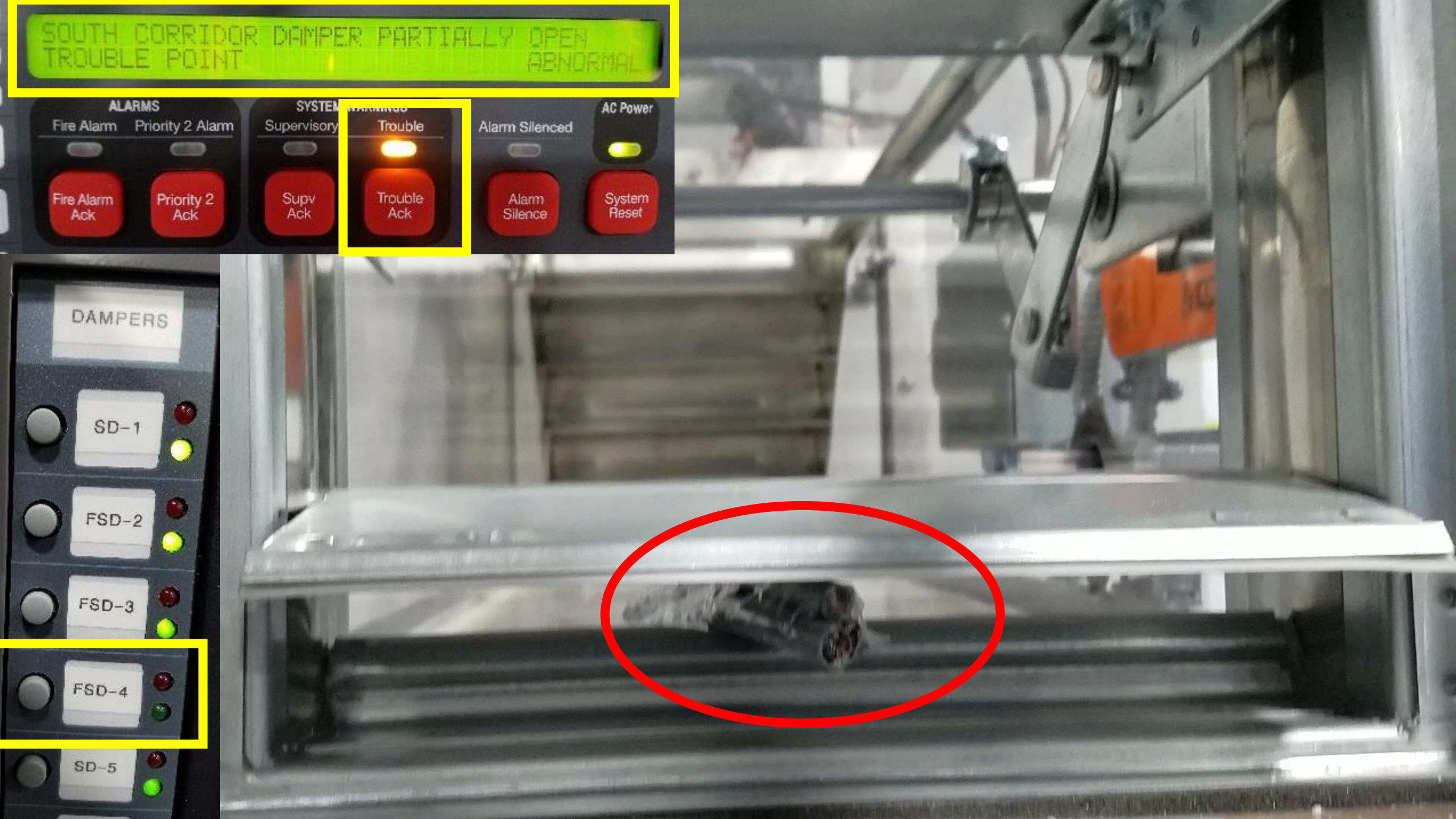
Operational, Testing and Maintenance

Simplex ES Panels

- ES4007 – 250 Devices
- ES4010 – 1000 Devices
- ES4100 – 2,500 Devices

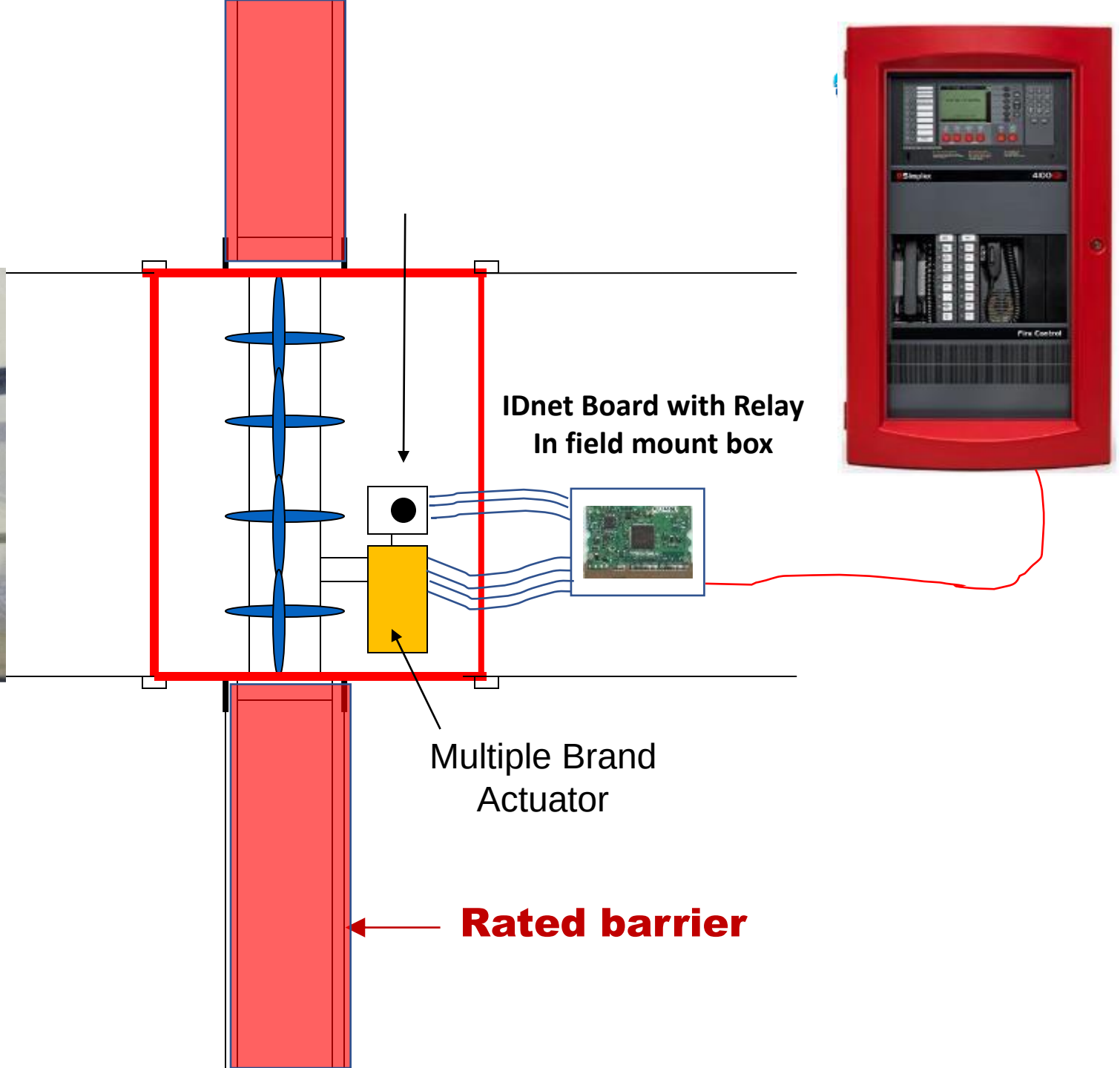
Panels may be Networked together for larger facilities


DAMPERS
SD-1
FSD-2
FSD-3
FSD-4
SD-5
DAMPERS
SD-1
FSD-2
FSD-3
FSD-4
SD-5
RUSKIN


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

ADC105


RUSKIN
ADC105
Simplex


IDnet Board with Relay
In field mount box
Multiple Brand
Actuator
Rated barrier

Questions?

Thank You For Your Time!

FCIA
Firestop Contractors International Association

amca INTERNATIONAL
COMMITTEE CHAIRPERSON

RUSKIN