FIRE DAMPERS 101
BACK TO BASICS – LIFE SAFETY DAMPERS

Presented by: Dane Carey
September 9, 2019
PRODUCT OVERVIEW

► FIRE DAMPERS
  Protect duct and air transfer openings, penetrating fire rated partitions

► SMOKE DAMPERS
  Leakage and elevated temperature rated dampers for smoke barriers

► COMBINATION FIRE/SMOKE DAMPERS
  Dampers that meet both fire and smoke damper requirements

► CEILING FIREFRSTOP FLAP ASSEMBLIES
  (Ceiling/radiation dampers) rated ‘heat barrier’ damper/component
PREDOMINANT THREAT
SMOKE

- Smoke is present from the beginning of a fire until it is too late.
PREDOMINANT THREAT
SMOKE

- Is the leading cause of firefighter injuries and fatalities.
- Impedes visibility.
- Can contain toxic and unburned gases.
- Fire consumes the oxygen in the air.
- CO poisoning accounts for 50% of fatalities.
- Can reach temperatures as high as 1,300 °C (2,370 °F)
STANDARDS & GOVERNING BODIES

- National Building Code of Canada (NBC)
- National Fire Code of Canada (NFC)
- National Farm Building Code of Canada (NFBC)
- National Plumbing Code (NPC)
- National Energy Code of Canada for Buildings (NECB)
STANDARDS & GOVERNING BODIES

- Underwriters Laboratories of Canada (ULC)
  a) ULC-S112 / UL 555 – Fire Damper Standard
  b) ULC-S112.1 / UL 555S – Leakage Rated (Smoke) Damper Standard
  c) ULC-S112.2 / UL 555C – Ceiling Firestop Flap (Radiation Damper) Standard
  d) ULC-S101 / UL 263 – Structural Ceiling Test Standard
- National Fire Protection Association (NFPA) – NFPA 90A, 80, 92, 105
- SMACNA – Break Away Duct Connections
- Air Movement & Control Association Intl. (AMCA) – AMCA 500D
- Others: Warnock-Hersey (Intertek), ETL, ARL, FM, Gypsum Assoc.
CURTAIN FIRE DAMPERS
## Typical Specifications

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hourly Fire Rated</td>
<td>1½ or 3 hours</td>
</tr>
<tr>
<td>Static Systems</td>
<td>Airflow stops in fire-alarm mode.</td>
</tr>
<tr>
<td>Dynamic Systems</td>
<td>Airflow continues in Fire-Alarm Mode.</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Horizontal or Vertical</td>
</tr>
<tr>
<td>Installation</td>
<td>“In Wall” or “Out of Wall”</td>
</tr>
<tr>
<td>Blade Type</td>
<td>Curtain or Multi-Blade</td>
</tr>
<tr>
<td>Closure Speed</td>
<td>Motorized or Instantaneous</td>
</tr>
</tbody>
</table>
FIRE DAMPERS

BASIC MODELS

► For Static Systems Only
   Heat Response Device: Standard 71 °C (165 °F),
   Optional 100 °C

► For Dynamic or Static Systems
   Heat Response Device: Standard 71 °C (165 °F),
   Optional 100 °C, 121 °C, 177 °C

(NBC of Canada, section 3.1.8.10 states 30°C above max. system temperature)

OPTIONS:

► Horizontal or Vertical Mount
► Out of Wall/Floor
► Grille Mount
► Multi-Blade, 3V, or Airfoil
► Static HRD/Fuse Link Temp., 71-100 °C (165-212 °F)
► Dynamic HRD/Fuse Link Temp., 71-177 °C (165-350 °F)
► Motorized (Multi-Blade only)
CURTAIN FIRE DAMPERS

OPTIONAL TRANSITIONS

TYPE “A”
DAMPER OD SAME AS DUCT ID

TYPE “B”
DAMPER OPENING HEIGHT SAME AS DUCT HEIGHT

TYPE “CR”
ROUND TRANSITION
FIRE DAMPERS
OPTIONAL STYLES

TRUE ROUND

MULTI-BLADE
## FIRE DAMPERS

### ULC LISTING EXAMPLE – FD, STATIC VS. DYNAMIC, ULC RATED SIZES

**Fire Dampers for Use in Static Systems (No Airflow)**

<table>
<thead>
<tr>
<th>Model</th>
<th>Hr Class</th>
<th>Damper Mounting Position</th>
<th>Single-Section Damper Size (mm)</th>
<th>Multiple-Section Damper Size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FD, FD-XX</td>
<td>1½</td>
<td>V</td>
<td>1524 W 1524 H</td>
<td>3048 W 3048 H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H</td>
<td>1219 W 1219 H</td>
<td>2438 W 1219 H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H</td>
<td>1016 W 1016 H</td>
<td>3048 W 1016 H</td>
</tr>
</tbody>
</table>

**Fire Dampers for Use in Dynamic Systems**  
Dampers rated 2000 fpm @ 4.0” WC (10.2 m/s @ 1.0 kPa)

<table>
<thead>
<tr>
<th>Model</th>
<th>Hr Class</th>
<th>Damper Mounting Position</th>
<th>Single-Section Damper Size (mm)</th>
<th>Multiple-Section Damper Size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDD, FDD-XX</td>
<td>1½, 3</td>
<td>V</td>
<td>914 W 914 H</td>
<td>1829 W 914 H</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H</td>
<td>610 W 610 H</td>
<td>914 W 1829 H</td>
</tr>
</tbody>
</table>
# FIRE DAMPERS

## STATIC AND DYNAMIC

<table>
<thead>
<tr>
<th>STATIC FIRE DAMPERS</th>
<th>Are designed to be used where the HVAC system shuts down in the event of a fire. There is a great chance this type of damper may not close fully under airflow and/or static pressure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DYNAMIC FIRE DAMPER</td>
<td>Are used in systems where the fan pressure and airflow will be running during a fire incident. The damper is tested and shown to close under a specific airflow and pressure. All combination Fire/Smoke Dampers, Smoke Dampers, and Dynamic Fire Dampers have been tested to close under heated airflow.</td>
</tr>
</tbody>
</table>
FIRE DAMPERS

DYNAMIC

TESTING:

- Dampers are labeled for mounting in Horizontal plane or Vertical plane.
- Maximum approved single section size and assembled size must be tested.
- Just because the damper has springs, does not mean it is approved for Dynamic Systems.
- Dampers have labels showing: ”TOP OF UNIT”.

HORIZONTAL HEATED AIRFLOW
FIRE DAMPERS
BASIC OR TYPICAL INSTALLATION

TWO-SIDED ANGLE INSTALLATION
► Angle on each side of the wall

Every fire damper and combination fire/smoke damper must have an access door installed next to it.
FIRE DAMPERS
OPTIONAL INSTALLATIONS
(Check with manufacturer and local municipalities)

STEEL/GYPSUM WALL
MACSONRY WALL
GRILLE MOUNT

IN WALL TYPE
- One retaining angle method
FIRE DAMPERS

OPTIONAL INSTALLATIONS

*(Check with manufacturer and local municipalities)*

**IN WALL TYPE B**
- Retaining angle around outer sleeve

**OUT OF WALL TYPE**
- Factory-supplied
- Insulation required
FIRE DAMPERS

OPTIONAL INSTALLATIONS – Firestop Caulking in Annular Space
(Check with damper manufacturer and local municipalities)
## FIRE DAMPERS

### STATIC FIRE DAMPER BASE TEST

<table>
<thead>
<tr>
<th></th>
<th>ULC S112</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CYCLING</strong></td>
<td>Non-motorized damper is cycled manually, from open to close: 250 times.</td>
</tr>
</tbody>
</table>
| **FIRE ENDURANCE & HOSE STREAM** | 1½ Hour Test: (205 kPa hose for 16.2 s/m²)  
3 Hour Test: (310 kPa hose for 32.5 s/m²)  
*Both side of a damper are tested.* |
| **RIGIDITY**                   | **Lateral** and **longitudinal** forces must be applied to the largest damper.  
There is a limit to how far it can move. |
| **SALT SPRAY EXPOSURE**        | Dampers subjected to 20% salt spray solution for 5 days  
Followed by 24 hours in ambient air to dry. |
| **SPRING CLOSURE**             | If spring is used, then it must be 2.5 times the required closing force.  |
### FIRE DAMPERS

#### DYNAMIC FIRE DAMPER TEST – ADDITIONAL TO STATIC FIRE DAMPER TEST

<table>
<thead>
<tr>
<th><strong>ULC S112</strong></th>
</tr>
</thead>
</table>
| **DYNAMIC CLOSURE** | Cycled 250, 20,000 or 100,000 times.  
Installed in a duct and cycled 3 times under ambient airflow and static pressure.  
(*min. 10.2 m/s @ 1 kPa*)  
Ramped heated airflow allowing the HRD to close the damper.  
*Dampers are run with airflow in both directions.* |
| **HYDROSTATIC STRENGTH TEST** | For pneumatic actuators. 5X operating pressure for 1 minute. |
FIRE DAMPERS
HORIZONTAL FIRE TEST – BEGINNING
FIRE DAMPERS
HORIZONTAL FIRE TEST – 1.5 HOURS

980 °C (1792 °F)
FIRE DAMPERS

HORIZONTAL FIRE TEST – AFTER FIRE EXPOSURE

- Hose stream immediately after fire exposure
- 207 kPa (30 psi) or 310 kPa (45 psi)
- From 6.1 m (20 ft.) away
FIRE DAMPERS & COMBINATION FIRE/SMOKE DAMPERS

APPROVED BREAKAWAY DUCT CONNECTIONS

PLAIN “S” SLIP

HEMMED “S” SLIP

DOUBLE “S” SLIP

INSIDE SLIP JOINT

FLAT DRIVE SLIP

DRIVE SLIP JOINT

STANDING “S”

STANDING “S” BAR REINFORCED

STANDING “S” ANGLE REINFORCED
FIRE DAMPERS

DUCT IMPACT TEST

REFERENCES: CLAUSES
12.2, 12.3

<table>
<thead>
<tr>
<th>DUCT SIZE</th>
<th>SAND-FILLED DRUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 610 mm (24 in)</td>
<td>125 kg (275 lb)</td>
</tr>
<tr>
<td>&gt; 610 mm (24 in)</td>
<td>181 kg (400 lb)</td>
</tr>
</tbody>
</table>
SMOKE DAMPERS
WHAT HAPPENS WHEN YOU INHALE SMOKE?

- Smoke contains chemicals and poisons (CO & Cyanide) that cause your lungs to become irritated, swollen, and blocked.

HOW LONG DOES IT TAKE TO DIE FROM SMOKE INHALATION?

- It can take from 2 to 10 minutes to pass out or die.
- Fire burns oxygen, so the bigger the fire, the less oxygen.
### TYPICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Leakage Class</th>
<th>Leakage Rate</th>
<th>Equivalent Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0.0406 m³/s/m² @ 1.1kPa</td>
<td>8 cfm/ft²</td>
</tr>
<tr>
<td>II</td>
<td>0.1016 m³/s/m² @ 1.1kPa</td>
<td>20 cfm/ft²</td>
</tr>
<tr>
<td>III</td>
<td>0.4064 m³/s/m² @ 1.1kPa</td>
<td>40 cfm/ft²</td>
</tr>
</tbody>
</table>

- **Airflow**: Minimum duct velocity: 10.2 m/s (2000 fpm)
- **Static Pressure**: Minimum: 1 kPa (4 in wg)
- **Temperature**: 121 or 177 °C (250 or 350 °F)
- **Mounting Position**: Horizontal or Vertical
- **Installation**: Up to 24” out of the smoke barrier
SMOKE DAMPERS

BASIC MODELS

► Triple-V blade damper
► Air-foil blade damper
► True round damper

OPTIONS:

► Transition: A, CR, CO, C, Sleeved, Not Sleeved
► Leakage Class: I, II, III
► Temperature Rated: 121 °C or 177 °C
► Actuator Mounting: Internal, External
► Actuator Power Source: 24v, 120v, 230v, Pneumatic
► Blade Indicators: Open, Closed
► Smoke Detectors: Photoelectric, Ionization
SMOKE DAMPERS
MINIMUM TEST SIZES

► SINGLE SECTION
MAXIMUM HEIGHT X MINIMUM WIDTH:

► SINGLE SECTION
MINIMUM HEIGHT X MAXIMUM WIDTH:
SMOKE DAMPERS
MAXIMUM TEST SIZES

► SINGLE SECTION
MAXIMUM HEIGHT X MAXIMUM WIDTH:
- Internal actuator
- Approved for internal and external actuator mounting.

► SINGLE SECTION
MAXIMUM HEIGHT X MAXIMUM WIDTH:
- External actuator
- Approved for external actuator mounting only.
SMOKE DAMPERS
MAXIMUM TEST SIZES

► MULTIPLE SECTION APPROVAL

TWO SECTIONS HIGH BY
TWO SECTIONS WIDE:
External actuators direct-coupled
to drive rods
# SMOKE DAMPERS

## BASE TEST (LEAKAGE RATED)

<table>
<thead>
<tr>
<th><strong>ULC S112.1</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. CYCLING</strong></td>
</tr>
<tr>
<td>Damper and actuator are cycled, from open to close. Two-Position: 20,000 times  Modulating: 100,000 times</td>
</tr>
</tbody>
</table>

| **2. AMBIENT OPERATION** |
| Following cycle test, damper must be opened and closed 3 consecutive times at 12.2 m/s *(2400 fpm)* and 1.12 kPa *(4.5” wg)*, under ambient airflow. |

| **3. TEMPERATURE DEGRADATION** |
| Cycled damper is exposed to 121 °C *(250 °F)* at 12.2 m/s *(2400 fpm)* for 15 minutes. |

| **4. HEATED OPERATION** |
| Damper must close and re-open under the following conditions: |
| **Airflow:** 12.2 m/s *(2400 fpm)* |
| **Static Pressure:** 1.12 kPa *(4.5” wg)* |
| **Temperature:** 121 °C *(250 °F)* |

| **5. LEAKAGE** |
| Damper is reheated to 121 °C *(250 °F)*. Blades are closed. Damper is leakage tested at this temperature. |

| **STEPS 2 THROUGH 5** |
| Repeated with same damper or another cycled damper with airflow in the opposite direction. |
# SMOKE DAMPERS

## ADDITIONAL TESTING

<table>
<thead>
<tr>
<th>ULC S112.1</th>
<th></th>
</tr>
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<td><strong>RIGIDITY</strong></td>
<td>Lateral and longitudinal forces must be applied to the largest damper. There is a limit to how far it can move.</td>
</tr>
<tr>
<td><strong>SALT SPRAY EXPOSURE</strong></td>
<td>Dampers subjected to 20% salt spray solution for 5 days Followed by 24 hours in ambient air to dry.</td>
</tr>
<tr>
<td><strong>ACCELERATED AGING</strong></td>
<td>Non-metallic components tested for 1440 hours at 125 °C (257 °F).</td>
</tr>
<tr>
<td><strong>HYDROSTATIC STRENGTH TEST</strong></td>
<td>For pneumatic actuators. 5X operating pressure for 1 minute</td>
</tr>
</tbody>
</table>
SMOKE DAMPERS
CYCLE TESTING

MINIMUM REQUIREMENTS
ONE OF EACH OF THE FOLLOWING DAMPERS PER ACTUATOR MODEL:

- Minimum Width x Maximum Height
- Maximum Width x Minimum Height
- Maximum Width x Maximum Height

APPROVAL OBTAINED

- Temperature rating
- At a specific airflow
- For one damper model, one actuator model
- No options

Portion of samples in queue for cycle testing
SMOKE DAMPERS
ELEVATED TEMPERATURE CHAMBER
SMOKE DAMPERS
ELEVATED TEMPERATURE CHAMBER
SMOKE DAMPERS

ELEVATED TEMPERATURE LEAKAGE CHAMBER
SMOKE DAMPERS

TESTING: ULC WITNESSES

- Verify operation
- Approve all test results
SMOKE DAMPERS
INSTALLATION REQUIREMENTS
NFPA 90A-15, 5.3.5.1

- Maximum allowable distance from smoke barrier: 610 mm (24”)

Diagram:
- No openings between smoke partition and damper
- Smoke Partition
- Sealant
- DUCT
- Air Duct Outlet: Inlet or Branch
- 24” max (610 mm)
COMBINATION FIRE/SMOKE DAMPERS
## LIFE SAFETY DAMPERS

### COMBINATION FIRE/SMOKE DAMPERS

<table>
<thead>
<tr>
<th><strong>Leakage Class</strong></th>
<th><strong>Typical Specifications</strong></th>
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<tbody>
<tr>
<td>I:</td>
<td>0.0406 m³/s/m² @ 1.1kPa (8 cfm/ft²)</td>
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<td>II:</td>
<td>0.1016 m³/s/m² @ 1.1kPa (20 cfm/ft²)</td>
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<td>III:</td>
<td>0.4064 m³/s/m² @ 1.1kPa (40 cfm/ft²)</td>
</tr>
</tbody>
</table>

| **Airflow**       | Minimum duct velocity: 10.2 m/s (2000 fpm) |
| **Static Pressure** | Minimum: 1 kPa (4 in wg) |
| **Temperature**   | 121 or 177 °C (250 or 350 °F) |
| **Mounting Position** | Horizontal or Vertical |
| **Installation**  | “In Wall” or “Out of Wall” |
| **Actuator**      | Factory-installed |
COMBINATION FIRE/SMOKE DAMPERS

BASIC MODELS

OPTIONS:

- Transition: A, CR, CO, C, Sleeved, Not Sleeved
- Higher Static Pressure: 2.0 or 3.0 kPa (6.0” or 8.0” wg)
- Higher Airflow: 15.2, or 20.3 m/s (3,000 or 4,000 fpm)
- Leakage Class: I, II, III
- Temperature Rated Damper: 121 °C or 177 °C
- Heat Response Device: 71 °C, 100 °C, 121 °C, 177 °C
- Actuator Mounting: Internal, External
- Actuator Power Source: 24v, 120v, 230v, Pneumatic
- Hourly Rating: 1½ or 3 Hour
- Blade Indicators: Open, Closed
- Smoke Detectors: Photoelectric, Ionization
- Re-openable: Primary and secondary heat sensors
COMBINATION FIRE/SMOKE & SMOKE DAMPERS
STATIC AND DYNAMIC SYSTEMS

TESTED AND APPROVED FOR USE IN:

- Dynamic Systems
- Static Systems

*Tested for closure under heated airflow (Dynamic Systems).*

TWO UTILIZATION METHODS:

1. CONTAINMENT
   - Maintain compartmentalization. Use local duct smoke detectors to close damper to prevent spread of smoke spread.

2. RE-OPENABLE
   - As part of an engineered smoke control system.
   - When properly located in or immediately adjacent to returns, area smoke detectors are clear indicators of where the fire is located.
   - Sprinkler flow switches are necessary back-up.
COMBINATION FIRE/SMOKE DAMPERS
TYPICAL INSTALLATION

IN FLOOR

IN WALL
COMBINATION FIRE/SMOKE DAMPERS
TYPICAL INSTALLATION

METAL STUD / GYPSUM FIREWALL
COMBINATION FIRE/SMOKE DAMPERS

VERTICAL FIRE TEST
COMBINATION FIRE/SMOKE DAMPERS
VERTICAL FIRE TEST
COMBINATION FIRE/SMOKE DAMPERS

VERTICAL FIRE TEST

1½ hours elapsed test time – Approximately 978 °C (1800 °F)
COMBINATION FIRE/SMOKE DAMPERS

VERTICAL FIRE TEST

Fire side just before hose stream
COMBINATION FIRE/SMOKE DAMPERS

VERTICAL FIRE TEST

207 kPa (30 psi) for 3 minutes
COMBINATION FIRE/SMOKE DAMPERS
HORIZONTAL FIRE TEST

During test
COMBINATION FIRE/SMOKE DAMPERS
HORIZONTAL FIRE TEST

End of test: 978 °C (1800 °F)
COMBINATION FIRE/SMOKE DAMPERS

HORIZONTAL FIRE TEST

Hose stream after test
COMBINATION FIRE/SMOKE DAMPERS
HORIZONTAL FIRE TEST

Single-blade damper after test
SMOKE DETECTORS
CEILING FIRESTOP FLAP ASSEMBLIES
Ceiling Radiation Dampers
# CEILING FIRESTOP FLAP ASSEMBLIES

<table>
<thead>
<tr>
<th>TYPICAL SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated for Installation</strong></td>
</tr>
<tr>
<td>in Specific ULC Approved Ceilings</td>
</tr>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>Round or Rectangular</td>
</tr>
<tr>
<td><strong>Testing</strong></td>
</tr>
<tr>
<td>Static Rated Only</td>
</tr>
<tr>
<td><strong>Mounting Position</strong></td>
</tr>
<tr>
<td>Horizontal Only</td>
</tr>
<tr>
<td><strong>Blade Types</strong></td>
</tr>
<tr>
<td>Butterfly or Fabric</td>
</tr>
<tr>
<td><strong>Installation</strong></td>
</tr>
<tr>
<td>Usually within 7.6 – 10 cm of ceiling</td>
</tr>
<tr>
<td><strong>Fuse Link</strong></td>
</tr>
<tr>
<td>Usually 71 °C or 100 °C (160 °F or 212 °F)</td>
</tr>
</tbody>
</table>
CEILING FIRESTOP FLAP ASSEMBLIES
BASIC MODELS – HORIZONTAL MOUNT TYPE ONLY
CEILING FIRESTOP FLAP ASSEMBLIES

BASIC MODELS

- Round damper
- Rectangular or square damper
- Fabric blade damper, rectangular

OPTIONS:

- Fuse Link: 100 °C (212 °F) Standard, 71 °C (160 °F) available
- Volume Control: Adjustable feature to vary blade position from below damper
- Thermal Blanket: Provides thermal protection on square diffusers with round necks
- Hourly Rating: Not hourly rated
  Rated as part of an assembly
- Approved with or without a grille *(See manufacturer)*
- Approved for ducted or non-ducted applications *(See manufacturer)*
CEILING FIRESTOP FLAP ASSEMBLIES
TYPICAL INSTALLATIONS

Figure 1

Figure 1A

Figure 2

Figure 7
CEILING FIRESTOP FLAP ASSEMBLIES
ULC CEILING DESIGN

- No damper.
- Thus “No Penetration” can be made through the lower membrane.
CEILING FIRESTOP FLAP ASSEMBLIES

ULC CEILING DESIGN

- Hinged door type damper
- Any damper listed as a ceiling firestop flap.
CEILING FIRESTOP FLAP ASSEMBLIES

ULC CEILING DESIGN

8(b). **Ceiling Firestop Flap** – (CABSC). May be used as an alternate to acoustical material described in 8(a) above.

For alternate means of protecting air duct outlets, see Air Handling Systems under the General Information Section under “Floor and Roof and Ceiling Constructions and Beam Protection” and listings of Air Terminal Units under (BXUVC). 1-1/2A

- Hinged door type damper
- Any damper listed as a ceiling firestop flap.

CARNES CO INC
CENTRAL VENTILATION SYSTEMS CO LLC
NCA MFG LTD
NAILOR INDUSTRIES INC
NAILOR INDUSTRIES (WESTERN) INC
PRICE INDUSTRIES LTD
REVERSOMATIC MFG LTD
RUSKIN COMPANY
UNITED ENERTECH CORP
CEILING FIRESTOP FLAP ASSEMBLIES
ULC CEILING DESIGN

4. Damper (Optional, To be used with Air Duct Item 3) — For use with min 18 in. deep trusses. Max nom 21 in. long by 18 in. wide, fabricated from galvanized steel. Plenum box max size nom 21 in. long by 18 in. wide by 14 in. high (inner dimension) fabricated from either galvanized steel or min 1 in. thick Listed Duct Board bearing the UL Listing Marking having a min R-Value of 4.3. Installed in accordance with the instructions provided by the manufacturer. Max damper openings not to exceed 180 sq in. per 100 sq ft of ceiling area.

Damper Brand XXX — Model CRD-YYY

▶ Only Dampers Listed in Design are Approved.
CEILING FIRESTOP FLAP ASSEMBLIES

ULC CEILING DESIGN

4. Ceiling Damper* — (Optional) — Max nom area shall be 0.128 sq m (198 sq in.) Max rectangular size shall be 305 mm wide by 419 mm long. Max height of damper shall be 238 mm Aggregate damper openings shall not exceed 0.064 sq m per 9.29 sq m (99 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 7) shall be installed in accordance with installation instructions.

AIR KING VENTILATION PRODUCTS — Series AS, Series AK

PRICE INDUSTRIES LTD — Models CD-S/R-HC, CD-RD-HC

- Hinged door type damper
- Any damper listed as a ceiling firestop flap.
CEILING FIRESTOP FLAP ASSEMBLIES
INSTALLATIONS
CEILING FIRESTOP FLAP ASSEMBLIES

FIRE TEST – ULC S101/UL 263

Ceiling is loaded to its design load
CEILING FIRESTOP FLAP ASSEMBLIES

FIRE TEST

Grille falls of during 1 hour test
CEILING FIRESTOP FLAP ASSEMBLIES

FIRE TEST – CEILING DESIGN L501

At 1 hour
CEILING FIRESTOP FLAP ASSEMBLIES

FIRE TEST – CEILING DESIGN L501

1 Hour test, 2 x 10’s and sheet rock
LIFE SAFETY DAMPERS
Uh-Oh!
Garbage found behind damper.
TROUBLESHOOTING
FIELD ISSUES

Damper installed racked.

Misaligned jackshaft on damper, or the jack shaft was used as a ladder.
TROUBLESHOOTING
FIELD ISSUES

Screw fastened through linkage, through middle of warning label
Field-bent blades
Screw fastened in track of curtain damper
TROUBLESHOOTING

FIELD ISSUES
TROUBLESHOOTING

FIELD ISSUES
AGE OLD DILEMMA:
How to install a square damper in a round hole.
TROUBLESHOOTING

FIELD ISSUES

Humm, We may have several issues here
TROUBLESHOOTING
FIELD ISSUES

DEALING WITH CREATIVE PROBLEM SOLVING
STORAGE

WATER DAMAGED

- Actuators now contain circuit boards.
- Should have been stored in a dry environment.
THANK YOU