

Fire/Smoke Damper

MS1

Class I • 1½ Hour • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • UL Classified Damper

STANDARD CONSTRUCTION

FRAME:	5½" x ⅞" x 16-GA galvanized steel hat channel
BLADES:	16-GA galvanized steel single thickness; Parallel action
AXLES:	Plated solid steel stub
BEARINGS:	Oil impregnated bronze
LINKAGE:	Plated steel angle and crank plates with stainless steel pivots, in-jamb type or on-blade type
STOPS:	18-GA galvanized steel angles at head and sill
BLADE SEALS:	Silicone
JAMB SEALS:	Stainless steel
SLEEVE:	Minimum 20-GA galvanized steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
CAULKING:	Hardcast Irongrip 601 or UL-listed equivalent
ACTUATOR:	Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper
FINISH:	Mill

OPTIONS

Exact Size
Sleeve - Transition
Actuators - 120V, 24V, 230V or Pneumatic
Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
Integral Dual Position Indication (IDPI) Switches
Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
Sensotherm Re-Openable Heat Response Device (EPOT) for Pneumatic Actuator
Model SM-501 Flow-Rated Smoke Detector (10" Minimum Damper Height)
Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
Remote Test Box
Copper Tubing (For Pneumatic Actuators)
Transformers
Tab-Lock Retaining Angles - 1 or 2 Sets
Bearings - Stainless Steel
Axle - Stainless Steel
Security Bars
Short-Width (<16") and/or Short-Height (<8") Transitions

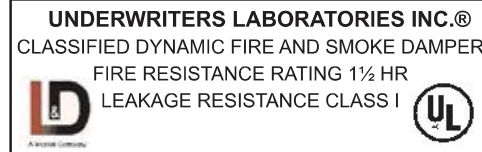
NOTES

- "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
- Damper with smoke detector must have a minimum sleeve of 19" (10.5" on the actuator side and 3" on the non-actuator side).
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete material.

DAMPER SIZE

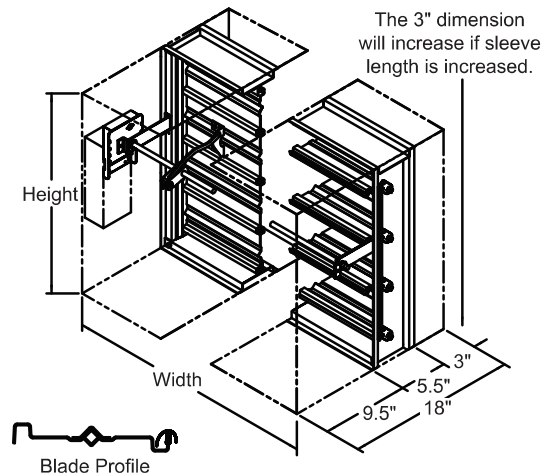
		2000 fpm, 4 in.wg						3000 fpm, 4 in.wg		
Orientation	Hor & Vert	Horizontal		Vertical				Hor & Vert	Horizontal	Vertical
Panels	Minimum Panel	Max Panel 250°/350°	Max Assy 250°/350°	Max Panel 250°	Max Panel 350°	Max Assy 250°	Max Assy 350°	Max Panel 250°	Max Assy 250°	Max Assy 250°
Rectangular	4"W x 4"H (16"W x 8"H frame)	36"W x 48"H	72"W x 48"H	36"W x 48"H 48"W x 36"H	36"W x 48"H	144"W x 70"H	128"W x 62"H	36"W x 36"H	72"W x 36"H	108"W x 36"H
Round	4" dia. (16"W x 8"H frame)	34" dia.	46" dia.	34" dia.	34" dia.	68" dia.	60" dia.	34" dia.	34" dia.	34" dia.
Oval	4"W x 4"H (16"W x 8"H frame)	34"W x 46"H	70"W x 46"H	34"W x 46"H 46"W x 34"H	34"W x 46"H	45 sq.ft 106"W or 68"H	106"W x 60"H	34"W x 34"H	70"W x 34"H	106"W x 34"H

*Dampers smaller than minimum frame size require a transitions. Reference SD-TRFS.



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:119
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



MS1

Fire/Smoke Damper

Class I • 1½ Hour • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • UL Classified Damper

Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Rating:

UL Class I

4 cfm per sq.ft. maximum @ 1 in.wg

8 cfm per sq.ft. maximum @ 4 in.wg

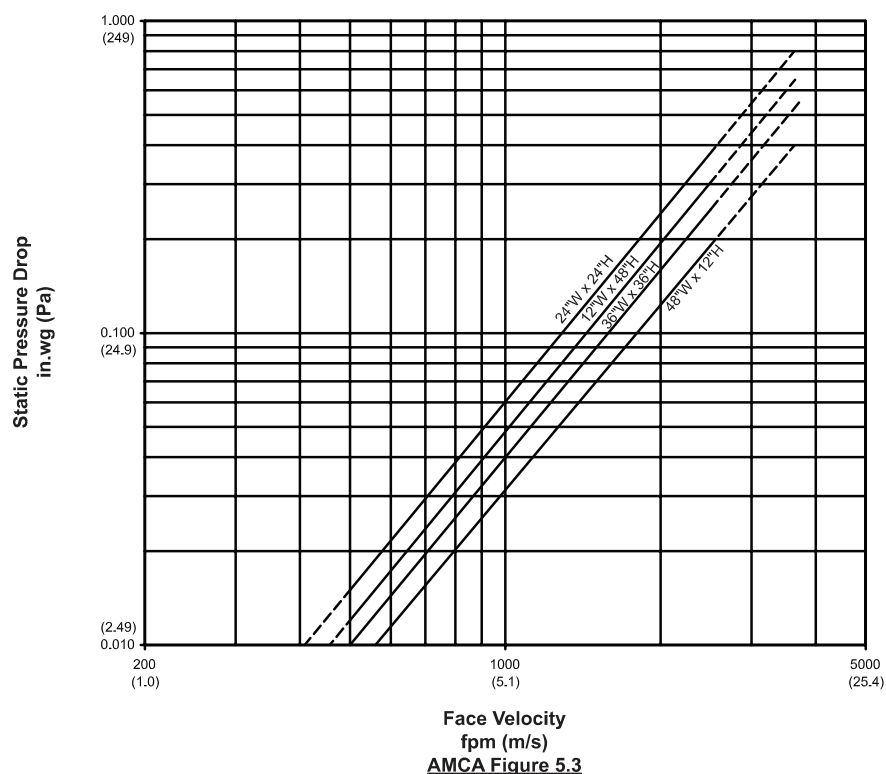
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	n/a

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance to AMCA
Standard 500D.

S L E E V E S A N D S I D E P L A T E S ---



Sleeves & Sideplates

Combination Fire/Smoke Damper Models: FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA

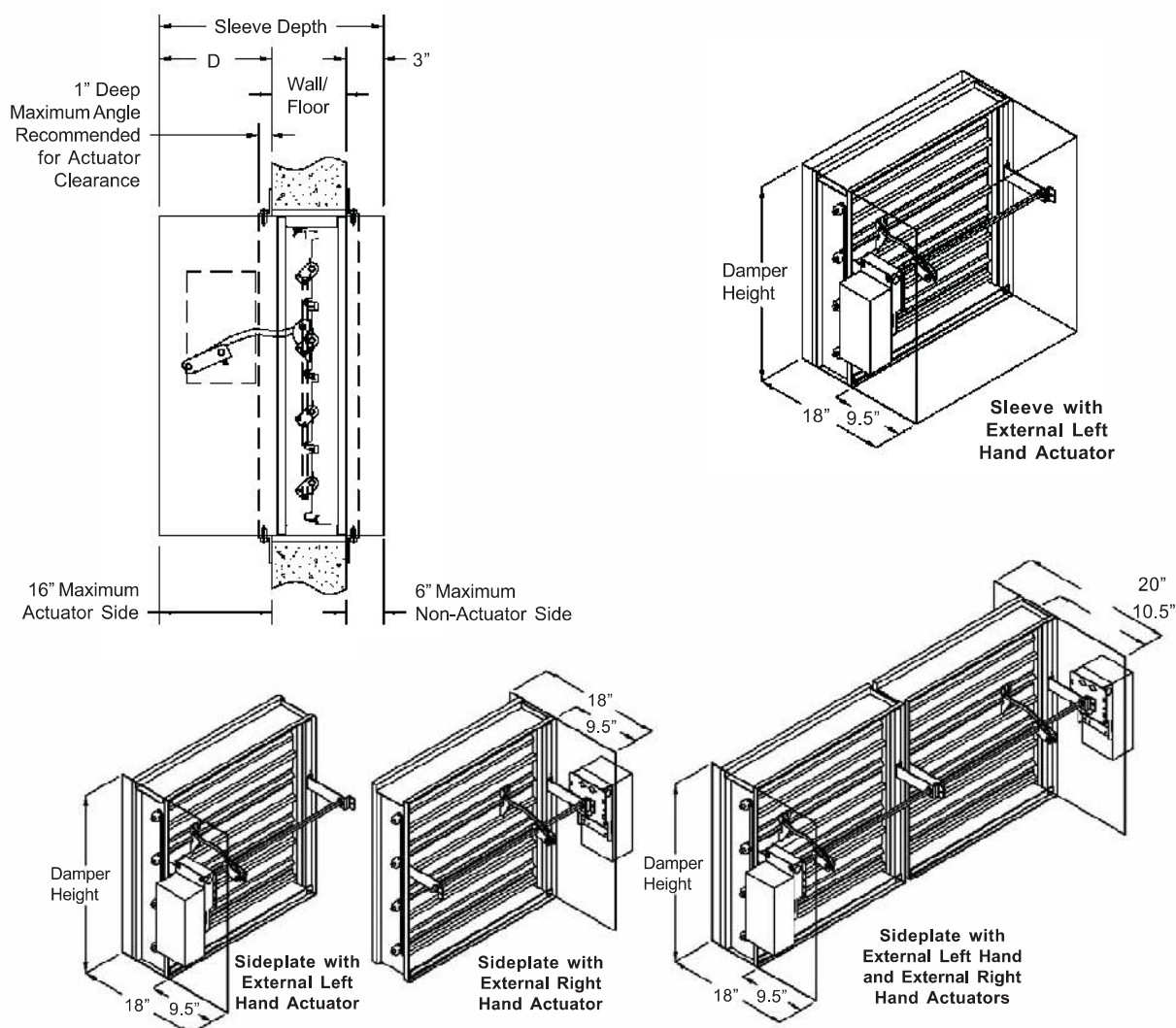
Notes

1. Sleeves are required for the proper installation of fire rated dampers, but need not be factory provided. Reference damper installation instruction for sleeve attachment procedure.
2. Large units that require multiple ship sections will be individually sleeved if sleeve is factory provided.
3. Units with externally mounted actuators require a factory supplied sleeve or sideplate.
4. The standard sleeve is 20-GA x 18" deep (dampers that exceed 84" in width or height require minimum 18-GA sleeve).
5. 10-GA, 12-GA, 14-GA, 16-GA, and 18-GA sleeves are available.
6. Sleeve depths through 48" are available (sleeve distance extending outside of fire barrier must adhere to UL maximums).
7. Refer to Installation Instruction II-FS for sleeve attachment in the field.

Sleeve Depth Determination (for optional mounting in barrier)

The standard sleeve depth allows for an external actuator, 1" retaining angles on both sides of the wall, and 1.5" duct connections on both ends of the sleeve. Sleeve depth and "D" will increase by 1" if a factory-mounted smoke detector is required. A shorter sleeve may be provided and properly installed if internal actuators or one-side retaining angles are utilized, or if the duct connections on one or both ends of the damper are not required. Consult the factory for details.

Standard Sleeve Depth (18") = D (9") + wall/floor thickness (6") + non-actuator side distance (3").



MESTEK, INC.

INSTALLATION INSTRUCTIONS —



INSTALLATION INSTRUCTION

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Standard Installation

Combination Fire/Smoke Damper Models: MS, CG, AS, MT, CH, AT, MA, CA, UA, LA, CT
Fire Damper Models: 17MD, 15MD, MD17, 38MD, 30MD, MD37

APPLICATION

These dynamically rated fire/smoke and fire dampers are intended to restrict the passage of flame. The dynamically rated fire/smoke dampers are also intended to restrict the passage of smoke. When the damper is intended to be used as a fire rated damper, the standard installation requires that the damper is positioned so that the closed plane of the blades is within the fire rated masonry/concrete or metal or wood framed gypsum wallboard barrier. When the damper is to be used as a leakage rated damper only, the damper is to be installed within 24" of the smoke barrier and upstream of any duct outlets.

This damper may be mounted in the vertical or horizontal position with the damper blades running horizontally. Airflow can be from either direction. When mounted in the vertical position, the damper may be mounted right side up or upside down and can be mounted in a fire barrier constructed of masonry/concrete or metal or wood framed gypsum wallboard materials. When mounted in the horizontal position, the damper must be mounted with the actuator on the top side of the floor and can only be mounted in a fire barrier constructed of masonry/concrete materials.

MULTIPLE PANEL SIZE LIMITATIONS

Actuation		Electric					
Orientation		Horizontal			Vertical		
Assembly		Max Panel	Max Assy 250°	Max Assy 350°	Max Panel	Max Assy 250°	Max Assy 350°
Model	MS, CG, AS	36"Wx48"H	72"Wx48"H	72"Wx48"H	36"Wx48"H 48"Wx36"H	144"Wx70"H	128"Wx62"H
	MT, CH, AT	30"Wx48"H 36"Wx30"H	60"Wx48"H	60"Wx48"H	36"Wx48"H 42"Wx36"H	126"Wx48"H	126"Wx48"H
	MA, CA, UA	32"Wx48"H	96"Wx96"H	96"Wx96"H	32"Wx48"H	128"Wx96"H	128"Wx96"H
	LA, CT	30"Wx48"H	60"Wx48"H	60"Wx48"H	30"Wx48"H	60"Wx48"H	60"Wx48"H

Actuation		Pneumatic					
Orientation		Horizontal			Vertical		
Assembly		Max Panel	Max Assy 250°	Max Assy 350°	Max Panel	Max Assy 250°	Max Assy 350°
Model	MS, CG, AS	36"Wx48"H	72"Wx48"H	72"Wx48"H	36"Wx48"H	108"Wx48"H	108"Wx48"H
	MT, CH, AT	30"Wx48"H 36"Wx30"H	60"Wx48"H	60"Wx48"H	36"Wx48"H 42"Wx36"H	126"Wx48"H	126"Wx48"H
	MA, CA, UA	32"Wx48"H	96"Wx96"H	96"Wx96"H	32"Wx48"H	128"Wx96"H	128"Wx96"H
	LA, CT	30"Wx48"H	60"Wx48"H	60"Wx48"H	30"Wx48"H	60"Wx48"H	60"Wx48"H

Actuation		Non-Motorized					
Orientation		Horizontal			Vertical		
Assembly		Max Panel	Max Assy 165°	Max Assy 212°	Max Panel	Max Assy 165°	Max Assy 212°
Model	17MD, 15MD, MD17	36"Wx48"H	72"Wx48"H	72"Wx48"H	36"Wx48"H	72"Wx60"H 126"Wx48"H	72"Wx60"H 126"Wx48"H
	38MD, 30MD, MD37	30"Wx48"H 36"Wx30"H	60"Wx48"H	60"Wx48"H	36"Wx48"H	126"Wx48"H	126"Wx48"H

SUPPLEMENTAL INSTALLATION INSTRUCTIONS / SUBMITTAL DATA

One-Side Retaining Angles (II-FSOS)
 Out-of-Wall/Floor
 Sleeve Extension
 Integral Duct Access Door
 Electric or Pneumatic Heat Response Device (SD-EHRD or SD-PHRD)
 Integral Dual Position Indication (SD-IDPI)
 Electric or Pneumatic Sensotherm (SD-ESOT or SD-PSOT)
 Flow-Rated Smoke Detector (SM-501)
 No-Flow Smoke Detector (2151)
 Transitions (SD-TRFS)
 Sleeves (SD-SLVFS)

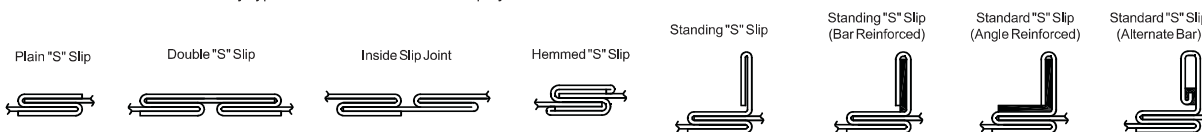
INSTALLATION INSTRUCTION

INSTALLATION

- General:** The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA-90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555 when the damper is intended to be used as a fire damper.
- Actuators:** Dampers must be supplied with factory mounted actuators (except Model MD19, MD39 and MA19, MA39) and are intended to close automatically when sensing heat or upon loss of electrical power or release of air pressure. When this damper is used as a leakage rated damper only, it shall be arranged to operate automatically and is to be controlled by a smoke detector. See additional instructions, which detail damper actuator sequence of operations.

Multiple actuators in a mechanically linked section that are factory wired/plumbed together have only one heat response device and one supply connection point. The supply connection point must be at the "master" actuator package, which contains the heat response device. The heat response device must be wired/plumbed between the supply connection point and the master actuator and all slave actuators.
- Multiple Panel / Multiple Section Assembly:** Large damper assembly sizes may require multiple factory assembled modules that ship separately. Refer to page 4 for details.
- Sleeves:** Sleeves are required for the proper installation of fire rated dampers, but need not be factory mounted. Dampers with factory mounted external actuators can be supplied without sleeves, but require sideplates. Dampers with factory mounted internal actuators can be supplied without sleeves or sideplates. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards. A field supplied sleeve is attached to the damper frame with 3/16" diameter steel rivets, 1/4" diameter steel bolts, #10 steel sheet metal screws, or 1/2" long welds. Fasteners shall be staggered on each side of the damper frame on 6" maximum centers and 3-1/2" maximum from each corner. For Class I Fire/Smoke dampers, approved caulking (reference note 7) shall be applied along the perimeter between the sleeve and the damper on both sides. For Class II Fire/Smoke dampers, approved caulking (reference note 7) shall be applied along the perimeter between the sleeve and the damper on only one side.
- Expansion Clearance:** The opening in the wall for the fire rated damper shall be sized to provide expansion clearance between the sleeve and the opening. The minimum expansion clearance shall be the greater of 1/4" or 1/8" per foot of overall damper/sleeve width and height. The maximum expansion clearance shall not exceed 1/8" per foot of overall damper/sleeve width and height plus 2".
Example: For a damper with exact outside dimensions of 36"W x 48"H, the gap at the top plus the gap at the bottom must be between 0.50" and 2.5". The gap at the left side plus the gap at the right side must be between 0.375" and 2.375". The damper can be located anywhere in the opening and need not be centered.
- Retaining Angle Attachment:** Perimeter retaining angles shall increase in size, proportionately, so there will be a minimum of 1" overlap on the wall, including at the corners. The angles shall be flush against the barrier. The leg attached to the damper can turn away from or into the opening. In metal frame construction, the angles can be mounted under or over the gypsum board. In wood frame construction, the angles must be mounted over the gypsum board. The perimeter mounting angles shall be fastened on all four sides and on both faces of the damper to the sleeve only, with 3/16" diameter steel or stainless steel nuts and bolts or by tack welding with beads 1/2" ± 1/4" in length or with #10 steel or stainless steel sheet metal screws or 3/16" steel or stainless steel pop rivets. All connections shall be spaced on 6" maximum centers and 3" maximum from each corner (a minimum of 2 fasteners are required per side). For perimeter angle mounting on one side of the fire barrier only, reference Installation Instruction II-FSOS. Perimeter retaining angles shall be a minimum of 1-1/2" x 7/8" x 16-GA steel. Corners of angles are not welded together for dampers with width or height dimensions exceeding 24". For dampers 24"W x 24"H or smaller, the corners of the perimeter mounting angles can be welded. Some local codes may not allow welded corners. Attachment of these angles must not restrict operation of the damper. Perimeter retaining angles and their mounting fasteners are not typically supplied with the damper.
- Caulking:** Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. Caulking is allowed between the retaining angles and the damper sleeve, and between the retaining angles and the face of the floor or wall construction. Caulking is not allowed between the damper sleeve and the wall or floor inside the opening.

Breakaway flange caulking shall be Design Polymeric's DP1010 or Precision's PA2084T
- Duct Connections:** All connecting ducts shall not be continuous, but shall terminate at the fire damper sleeve. Duct connections not listed as breakaways shall be considered rigid. For rigid type duct connections, the sleeve shall be a minimum of 16-GA on dampers not exceeding 36" wide or 24" high or 24" diameter and 14-GA on larger units. Maximum sleeve thickness shall not exceed 10-GA galvanized steel. Dampers supplied with thinner sleeves require a breakaway connection. The following breakaway duct-to-sleeve connections may be used: Plain "S" Slip, Double "S" Slip, Inside Slip, Hemmed "S" Slip, Standing "S" Slip, Standing "S" Slip (Bar Reinforced), Standing "S" Slip (Angle Reinforced), and Standing "S" Slip (Alternate Bar). Breakaway joints shall have no more than two No. 10 sheet metal screws on each side and on the bottom. The screws shall penetrate both sides of the slip pocket. When a breakaway joint is used along the top and bottom duct connection, a flat drive slip no longer than 20 inches is permitted on the two sides. The damper is normally supplied with a factory attached sleeve (see Note 4 when field supplied sleeve). The standard factory supplied sleeve is 20-GA galvanized steel (18-GA on dampers wider or higher than 84") and assumes that a breakaway type duct connection will be employed.



The factory supplied round/oval transition provides the breakaway connection if the following conditions are satisfied.

- Round duct diameter is no larger than 36".
- Oval duct size is no larger than 71"W x 30"H.
- Duct gauges conform to the SMACNA or ASHRAE standard.
- An oval duct or round duct less than or equal to 24" is attached to the transition collar with #8 sheet metal screws (a minimum of 4 fasteners per connection). A round duct diameter greater than 24" is attached to the transition collar with #10 sheet metal screws (a minimum of 5 fasteners per connection).

Dampers with round/oval transitions that fall outside of these restrictions must use a 4" wide drawband connection as shown in the SMACNA Fire, Smoke, and Radiation Damper Installation Guide.

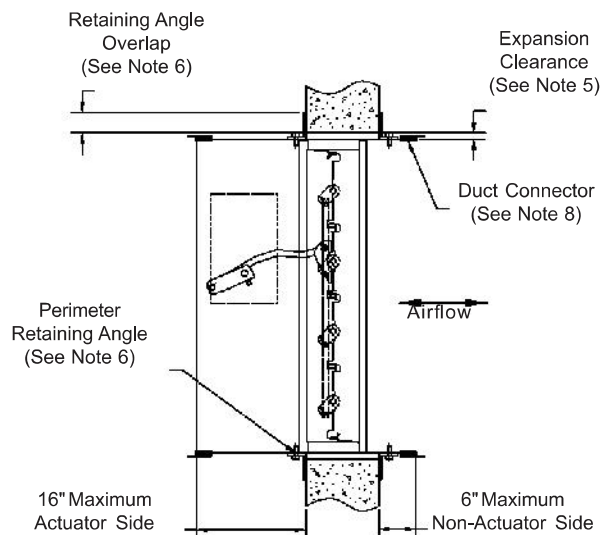
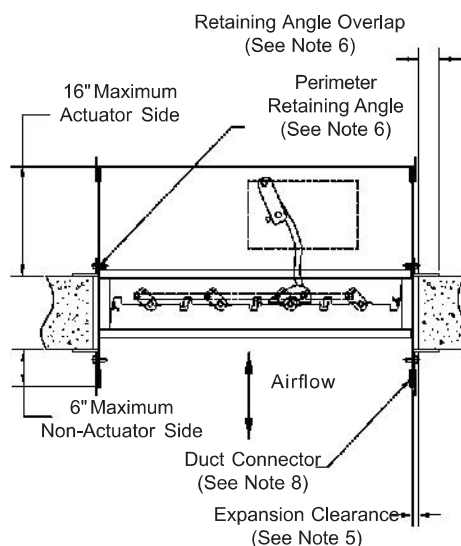
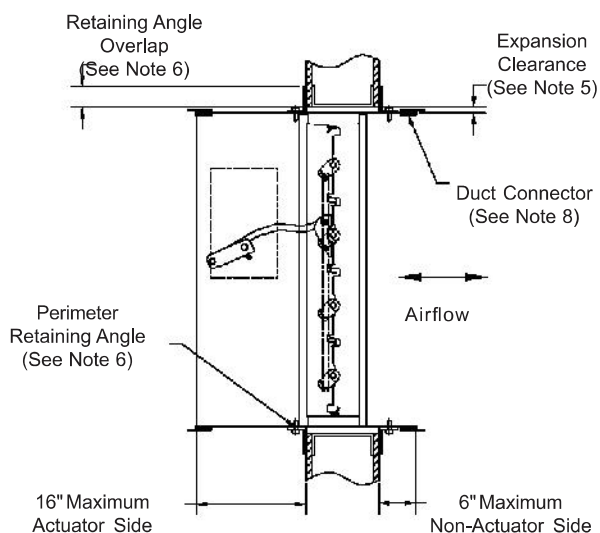
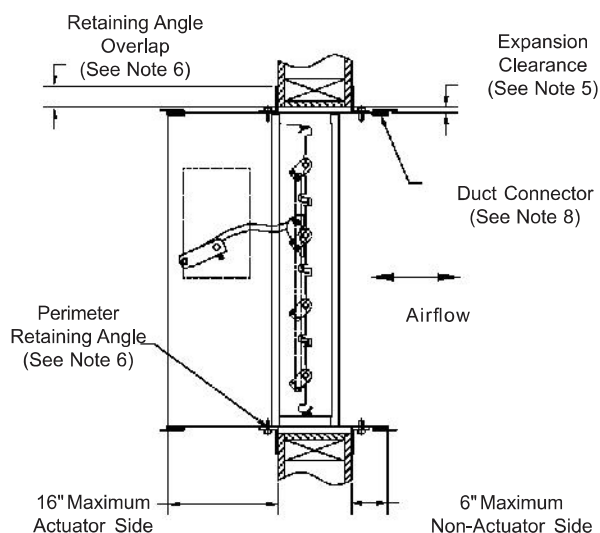
- Maintenance:** Dampers shall be maintained at intervals as stated in NFPA 90A and 92A. Local codes or building conditions may require more frequent inspections and maintenance. A duct access door is to be located on the jackshaft side of each damper for periodic inspection and maintenance.



INSTALLATION INSTRUCTION

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STANDARD MOUNTING DETAILS

Vertical, 2-Side Retaining, Masonry**Horizontal, 2-Side Retaining, Masonry****Vertical, 2-Side Retaining, Metal Stud****Vertical, 2-Side Retaining, Wood Stud**

INSTALLATION INSTRUCTION

MULTIPLE PANEL / MULTIPLE SECTION INSTALLATION DETAILS

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Fire/Smoke Dampers (Models MS, CG, AS, MT, CH, AT, MA, CA, UA, LA, CT)

1. Damper assemblies ordered without factory mounted sleeves are limited in size, so that the entire assembly ships as a single section.
2. Multiple panel high damper assemblies are electrically/pneumatically, but not mechanically linked between top and bottom panels if assembled within a common sleeve. Large sizes may require multiple sleeve sections - multiple sleeve sections are not mechanically or electrically/pneumatically linked.
3. Multiple panel wide damper assemblies are mechanically and electrically/pneumatically linked if assembled within a common sleeve. Large sizes may require multiple sleeve sections - multiple sleeve sections are not mechanically or electrically/pneumatically linked.
4. Damper assembly sections that are not mechanically or electrically/pneumatically linked each have their own heat response device and their own supply connection point, such that they operate independently. Multiple actuators within a linked section are factory wired/plumbed together.
5. Damper assembly sections that are mechanically and electrically/pneumatically linked share a single heat response device and a single supply connection point. Multiple actuators within a linked section are factory wired/plumbed together.
6. Damper assemblies that ship in multiple sections shall be fastened together using 1/4" diameter steel bolts, lockwashers, and nuts. Fasteners shall be on 6" maximum centers on both faces of the frame.

Fire Dampers (17MD, 15MD, MD17, 38MD, 30MD, MD37)

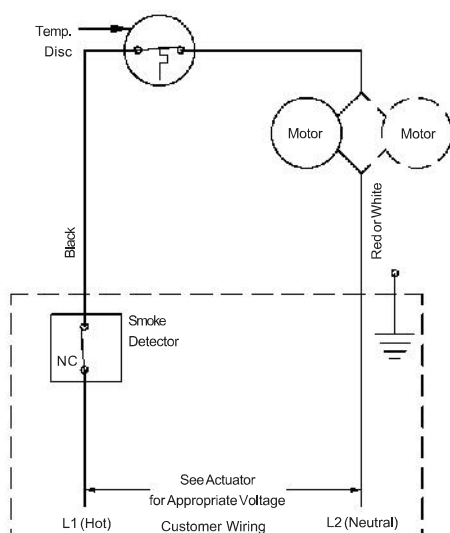
1. Damper assemblies ordered without factory mounted sleeves are limited in size, so that the entire assembly ships as a single section.
2. Multiple panel high damper assemblies are not mechanically linked between top and bottom panels.
3. Multiple panel wide damper assemblies are not mechanically linked between panels.
4. Damper assembly sections that are not mechanically linked each have their own heat response device, such that they operate independently.
5. Damper assemblies that ship in multiple sections shall be fastened together using 1/4" diameter steel bolts, lockwashers, and nuts. Fasteners shall be on 6" maximum centers on both faces of the frame.

ELECTRIC WIRING SCHEMATICS

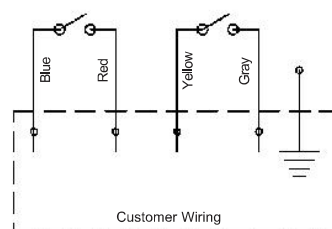
Notes

1. All wiring to be in accordance with N.E.C. (NFPA 70).
2. Refer to actuator label for appropriate voltage.
3. Connect incoming ground to the actuator assembly.
4. If the actuator remains electrically energized, yet the damper remains in the closed position, check to ensure that the reset button on the heat response device is depressed.

Electric Heat Response Device (EHRD)



Integral Dual Position Indication (IDPI)



Integral Dual Position Indication (IDPI) Wiring Chart			
actuator mounting location	damper full open	damper full close	damper mid-stroke
	closed circuit		
external left	red / blue	yellow / gray	none
external right	yellow / gray	red / blue	none
internal left	yellow / gray	red / blue	none
internal right	red / blue	yellow / gray	none

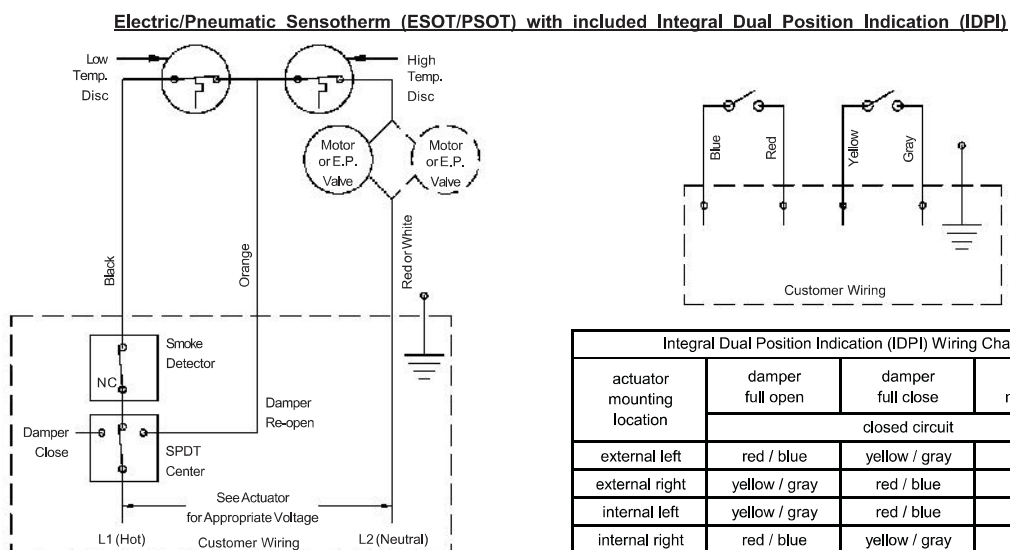
* This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.



INSTALLATION INSTRUCTION

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ELECTRIC WIRING SCHEMATICS (CONT.)



* This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.

ESOT/PSOT Wiring, Test, and Operating Instructions

Damper is supplied with one low temperature thermal disc and one high temperature thermal disc. All dampers require a master control switch (supplied by others) for re-openable operation.

CUSTOMER WIRING

1. Connect input power lead L1 from the normal closed position lead of the (MCS) switch to damper lead L1.
Note: If a smoke detector or other sensing device is to be employed, its NC contact set should be wired in series between the (MCS) position switch normal wire and lead L1.
2. Connect incoming lead L2 to damper lead L2.
3. Connect the reopen switch lead from (MCS) to orange damper lead.
4. Connect the incoming ground lead to the wiring enclosure.
5. Install IDPI (if used) per the schematic.
6. Replace enclosure cover.

CIRCUIT TEST

1. Place (MCS) switch in damper close position.
2. Apply power.
Result: The closed indicator light (if used) should be on and the damper blades closed.
3. Transfer (MCS) switch to damper re-open position.
Result: The damper blades should open; the closed indicator light (if used) should go off and the open indicator light (if used) should go on.
4. Transfer (MCS) switch to the normal position.
Result: The damper blades should remain open and the open indicator light (if used) should remain on.
5. Transfer the (MCS) switch to the closed position.
Result: The damper blades should close; the open indicator light (if used) should go off and the closed indicator light (if used) should go on.

EMERGENCY OPERATION (SMOKE MANAGEMENT)

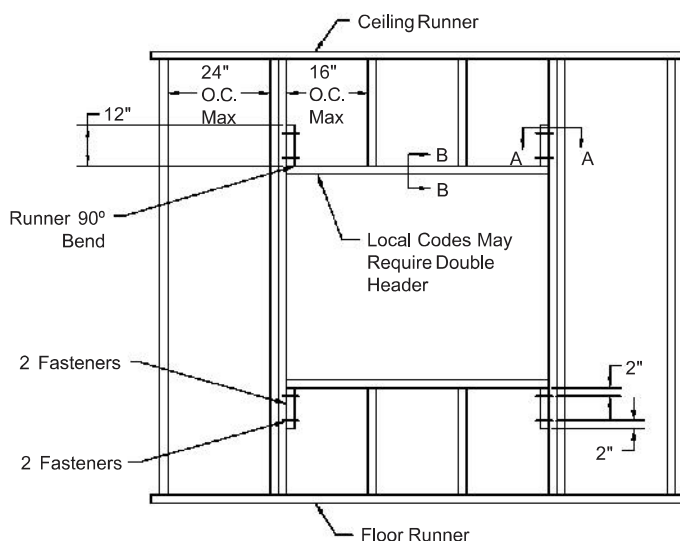
1. **MCS closed position:** Damper will close regardless of whether the thermal switch device has activated or not and regardless of the command from the smoke system.
2. **MCS re-open position:** If the damper has not been exposed to an elevated temperature higher than its rating, the damper will open. Also, the damper will open regardless of whether the low temperature thermal disc (165°F or 212°F) has activated or not and regardless of a command from additional sensing devices, such as a smoke detector.

NOTE: If the master control switch (MCS) is in the re-open position and the high temperature thermal disc has not been tripped, the damper will remain open regardless of whether the low temperature thermal disc and/or other sensing devices have tripped or not. If the damper has been exposed to an elevated temperature higher than its temperature degradation rating, or if the electrical or pneumatic supply has been disconnected, the damper will close and remain closed regardless of any (MCS) position.

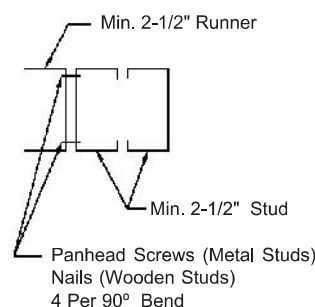
INSTALLATION INSTRUCTION

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FRAMING DETAILS (METAL OR WOOD 1 HOUR AND 2 HOUR RATED BARRIERS)



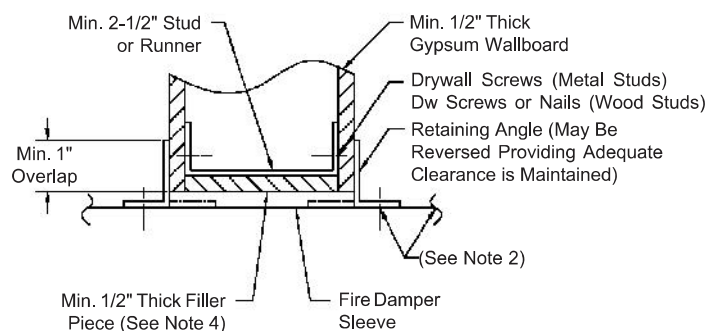
Section A-A



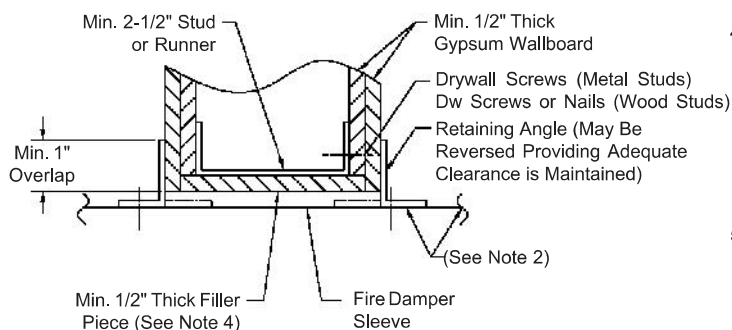
NOTES:

1. These illustrated partition designs have successfully been tested in conjunction with 1-1/2 hour classified fire dampers, for additional designs, reference Underwriters Laboratories, Inc. Fire Resistance Directory. Specific framing requirements of openings may vary with the Local Authority that has jurisdiction. Specific framing requirements should be provided in the architectural and structural drawings.
2. Reference the damper's installation instructions regarding the approved method of attaching the damper to the sleeve, attaching the retaining angles to the sleeve, required expansion clearances, sleeve gauge, etc. Type of framing does not affect the stated required expansion clearance.
3. Gypsum panels surrounding the opening are to be fastened to all stud and runner flanges, 12" o.c. maximum.
4. When wooden studs are used, filler pieces must be installed around the entire opening. Filler pieces are optional when metal studs are used (consult local codes to determine if filler pieces are required). Filler pieces are to be double screwed (or nailed to wooden studs) on 12" max. centers to the web of runners and studs.
5. Double jamb studding shown and required when opening width or length exceeds 36". Single jamb studding acceptable for openings 36"W x 36"H and smaller.

Section B-B (1 Hour Rated Fire Barrier)



Section B-B (2 Hour Rated Fire Barrier)



NOTES