POSITIVE SEAL DAMPER

We redefined the meaning of ‘Low Leakage’

EB AIR Control Inc.

EB AIR CONTROL INC.

MANUFACTURERS OF INNOVATIVE HVAC PRODUCTS

TUV Rheinland of North America, Inc. C US

ISO 9001:2000 Certified
KTA 1401 Certified
(Nuclear Safety Standards)

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INTRODUCTION

During the past several years, considerable time and effort have been devoted to energy conservation of buildings. The results of these efforts have been very positive and research is continuing to further reduce the energy consumed in buildings.

A major source of energy wastage in commercial and industrial buildings is the leakage of outside air through fresh and exhaust air dampers. Conventional low leak dampers, although an improvement over standard dampers, are still responsible for considerable air leakage. The low leakage claims made by manufacturers of these dampers, although substantially accurate under laboratory conditions, are far from representing field situations. Actual field measurements through banks of conventional low leak dampers have shown leakage in excess of 10% to 15% to be a common occurrence. Damage occurring to conventional dampers during shipment and the twisting of the shaft driving the damper blades from the actuator to the opposite side of the damper bank, are two of the reasons why leakage through banks of conventional dampers is so much higher than what laboratory results indicate.

THE EBA APPROACH

The EBA approach to stop air leakage through fresh and exhaust air dampers is a revolutionary disc damper that results in air leakage of less than 0.001% at 4" differential static pressure (0.001% at 10" optional).

Close monitoring of several buildings retrofitted with the EBA dampers confirm the virtual leakproof properties of this innovative design. Their normal pay back period associated with retrofitting buildings with the EBA Positive Seal Damper has proven to be approximately one year. It follows that positive seal dampers in new buildings are that much more attractive economically. More and more building owners are insisting that their buildings be equipped with the EBA Positive Seal Dampers.

The industrial version of these dampers have also been used with excellent results to stop air leakage in laboratory chemical exhaust hoods and in clean room applications.

FEATURES

EXTREMELY LOW LEAKAGE

Less than 0.001% of normal rated airflow at 4" differential static pressure. By far the lowest leakage rate obtainable with any commercially built damper. Unlike straight blades, there are no end seals to leak.

POSITIVE FLOW CONTROL

The unique motion of the control disc allows for accurate flow control at minimum volumes. Pneumatic operators are installed as standard equipment to provide control with standard instrument air pressures; however, electric motors can be supplied upon request. Normally open or closed operation can be provided.

FEWER MOVING PARTS

The linkage design has up to half the number of bearing points of conventional dampers.

EASY INSTALLATION

Factory mounted operators eliminate costly field installation errors. Dampers can be easily screwed or riveted into place through the extra wide 2" frame. Rigid lightweight design helps ensure proper alignment because of stiffening provided by the orifice place and torsion bar brace.

LONG GASKET LIFE

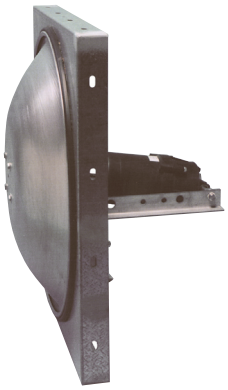
Extruded neoprene material provides years of effective service. EBA provides a ten-year gasket material replacement warranty.

SUB-ZERO TO HIGH TEMPERATURE

EBA offers specially designed silicone gasket suitable for both sub-zero and high temperatures.
(-60° F to 500° F / -51° C to 260° C).

CORROSION-RESISTANT CONSTRUCTION

Dampers are formed of galvanized steel and aluminum construction. As an option, they can also be supplied in stainless steel or epoxy coated construction. Nylon bearings on stainless steel shafts ensure years of trouble-free operation.



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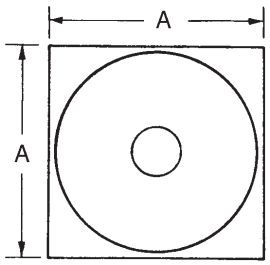
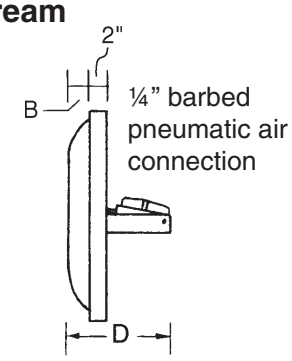
PHYSICAL DIMENSIONS

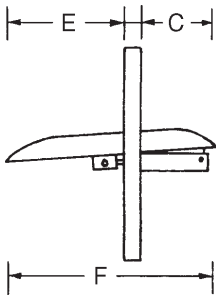
(A) Actuator in air stream



Front View
(Closed position)



Side View
(Closed position)



Side View
(Open position)

Damper Model	Dimensional (Inches)					
	A	B	C	D	E	F
PSD-12	12	3	9½	14	7½	18½
PSD-16	16	3	9½	14	9½	20½
PSD-24	24	4	10¾	16½	13½	26¼
PSD-36	36	5½	13	21	20	35

These dimensions are for N/C linkage. Contact factory for N/O linkage

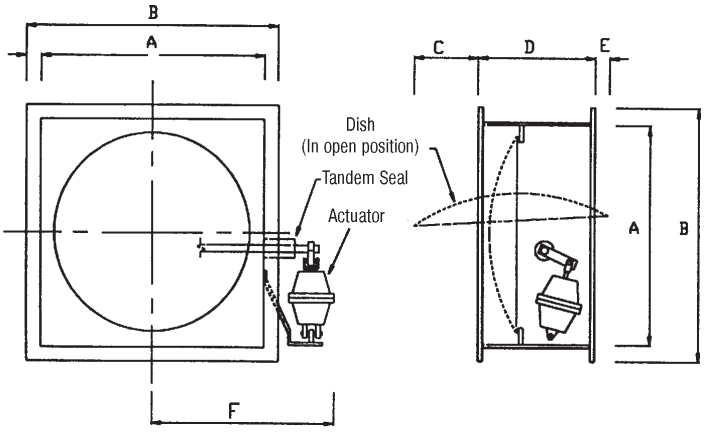
STANDARD CONSTRUCTION

Frame:	Formed W.C.G steel
Disc:	Formed galv. steel
Shafts:	304 stainless steel
Linkage:	Aluminum / HDPE
Bearings:	Nylon
Gasket:	Extruded neoprene
Operator:	Pneumatic
Finish:	Mill
Damper Weight:	12" - 6 lbs 16" - 14 lbs 24" - 30 lbs 36" - 50 lbs

OPTIONS

- Pilot positioning
- Electronic, manual, or high pressure operators
- All stainless steel, aluminum or epoxy coated construction
- Silicone gasket
- Contact your local representative or the factory for other special requirements

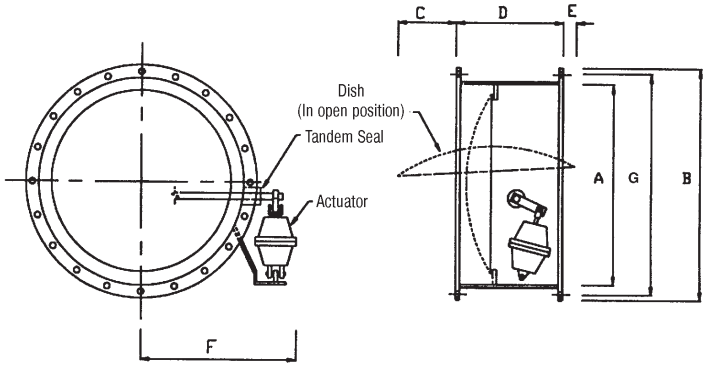
(B) Actuator outside of air stream



Square Positive Seal Damper Dimensional Data

Imperial Units

Damper Model	Dimensional (Inches)				
	A	B	C	D	E approx
PSD-12	12	15	5	-	12
PSD-16	16	19	5	-	14
PSD-24	24	27	10	1	19
PSD-36	36	39	15	6	27



Circular Positive Seal Damper Dimensional Data

Imperial Units

Damper Model	Dimensional (Inches)						
	A	B	C	D	E approx	F	# Holes
CPSD-12	12	15	5	-	12	$13^{13}/_{16}$	12
CPSD-16	16	19	5	-	14	17½	12
CPSD-24	24	27	10	1	19	$25^{7}/_{8}$	20
CPSD-36	36	39	15	6	27	$38^{1}/_{8}$	30

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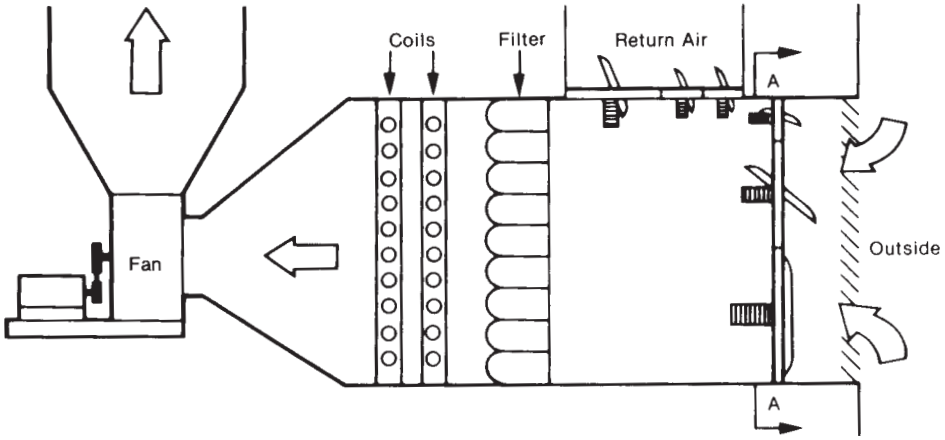
TYPICAL INSTALLATION



To produce continuous, accurate volume control, the dampers are provided in various sizes with various operator spring ranges.

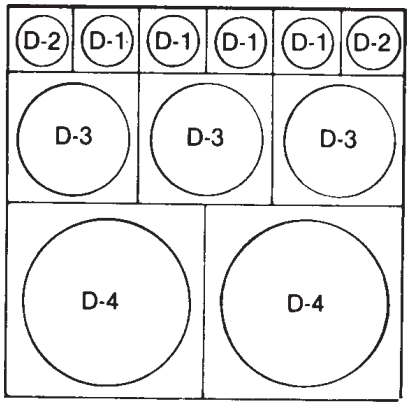
As the economizer control increases line pressure, the dampers open; the minimum O.A. damper first, then the variable O.A. dampers. Dampers can be positioned in all directions. In this example, dampers are positioned so that top rows open first and air is deflected towards entering return air.

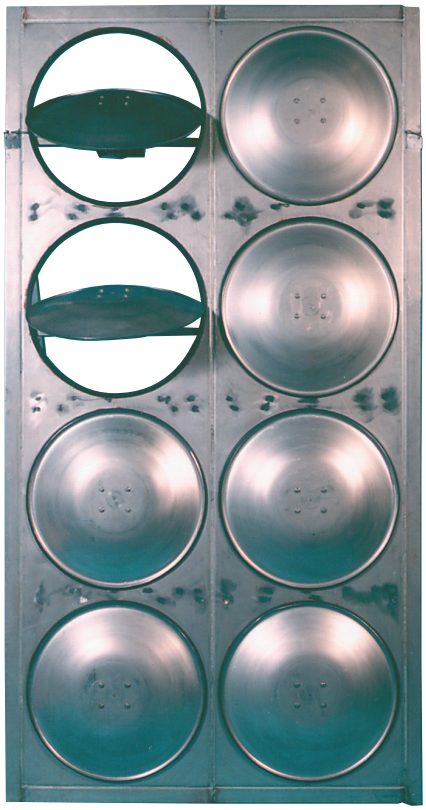
See installation and maintenance instruction sheet for proper installation procedure.

TYPICAL DAMPER SCHEDULE

Mark #	Model	Size	Spring Range	Control	Remarks
D-1*	M&I-PSD-12	12”	8 - 13	NC/NO	Minimum outside air
D-2	M&I-PSD-12	12”	8 - 13	NC/NO	Variable outside air
D-3	M&I-PSD-24	24”	8 - 13	NC/NO	Variable outside air
D-4	M&I-PSD-36	36”	8 - 13	NC/NO	Variable outside air

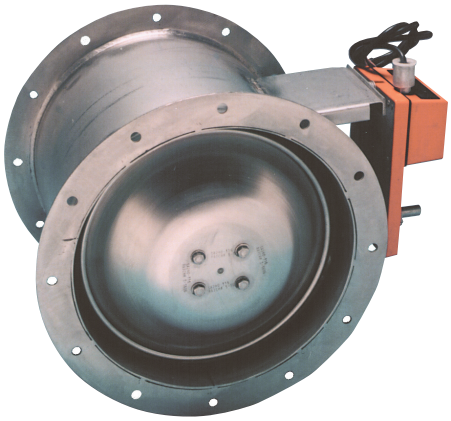
*To be connected separately to the minimum positioner

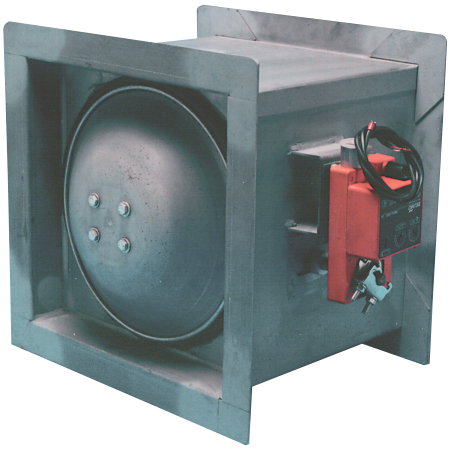




TYPICAL APPLICATIONS

- **Fresh Air Intake**
- **Return Air Damper**
- **Exhaust / Relief Air Damper**
- **Staircase Pressurisation**
- **Room Isolation**
- **Roof Exhauster**





APPLICATION DATA

1. As the dampers are spring closed, the higher the spring range the tighter the seal. If the dampers are two positions, then 10 to 15 PSIG spring range should be used.
2. Pneumatic lines to the fresh air damper actuators which are subject to freezing should be sloped downward to a dirt and water leg with a blowdown valve.
3. In cold climates, air dehydrators should be used and installed inside the building as close as possible to the dampers.
4. If EBA Positive Seal Dampers for the outside air are combined with conventional return air dampers, the outside air dampers should start opening before the return air dampers begin to close. The sequence should also be followed with electric controls.
5. Generally, the EBA outside air damper operators outnumber by 3 to 4 times the number of return air operators of conventional dampers. Care should be taken to sequence the dampers, otherwise at fan startup the return air dampers will close before the outside air dampers open. In extreme cases, the air plenum following the dampers could buckle.
6. This sequence can be achieved by increasing the air supply to the positive seal damper operators through a pilot positioner. The result will be that the outside air dampers begin to close, thus minimizing the negative pressure on the dampers and improve the modulation.
7. In applications where the pilot positioner would be exposed to freezing temperatures, a better arrangement is to install a simple air booster on the outside air dampers and to locate the pilot positioner on the return air dampers. This will eliminate the possibility of freezing the pilot positioner and at the same time achieve the proper sequence.
8. For proper modulation of the round dampers, positive pilot positioners or booster relays and ratio relays should be used.
9. In the case where the dampers exceed 20 modules, it is necessary to use more than one positive positioner.
10. Pilot positioners or booster relays are functional for the Direct Digital controls.
11. In the event of 15 or more dampers, we strongly recommend the use of a 3/8” main line and tee off to 1/4” line to Positive Positioners and actuators.
12. In a damper bank where Positive Positioners are used, we recommend a closed loop.
13. In case of retrofit when only fresh air and exhaust air dampers are replaced by EBA dampers, we recommend that Positive Positioners be used in the return air and that Boosters be used in the fresh air.
14. Dryers and air filters are very essential for smooth operation of EBA dampers, to avoid freeze ups and to prevent malfunction of the Positive Positioners.

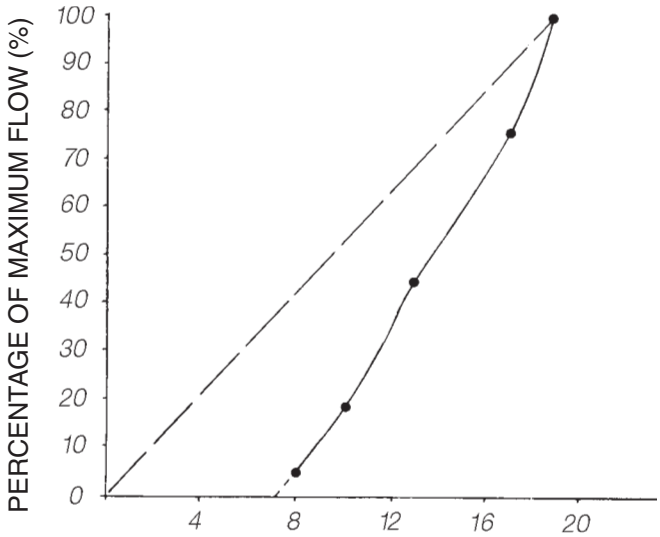
EB AIR Control Inc.

SAVING ENERGY MEANS SAVING MONEY

AERODYNAMICS ENGINEERING & TESTING LABORATORY LTD.	PROJECT: EBA MADE 26" Ø ROUND DAMPER	5720-9 JUNE 26, 87

DAMPER LINEARITY CHART

Inlet Static 0.25" wg



(ABOVE TEST CONDUCTED PER AMCA 500-75 STANDARD)

SAVING ENERGY MEANS SAVING MONEY

Let's consider a 250,000 ft^2 office building in Toronto having 200,000 CFM air handling units. The building is unoccupied 118 hours per week, the fans operate 24 hours per day, the existing outside air damper leakage rate is 10% and the cost of enery is $0.05 per KWH.

To simplify calculations, the 118 hours per week is converted to 16.86 hours per day.

Annual degree day for Toronto is 6827
(Source: 1981 ASHRAE Handbook of Fundamentals)

Total Air Leakage = 200,000 x 0.10 = 20,000 CFM.

Therefore yearly BTU required to heat the air leaking into the building through the outside air dampers is:

$$1.08 \frac{(\text{min Btu})}{(\text{hr. ft}^3\text{. }^0\text{F})} \times 20{,}000 \frac{(\text{ft}^2)}{(\text{min})} \times 16.86 \frac{(\text{hr})}{(\text{day})} \times 6827 \frac{(\text{deg.day})}{(\text{year})} = 2.49 \times 10^9 \text{ Btu / year}$$

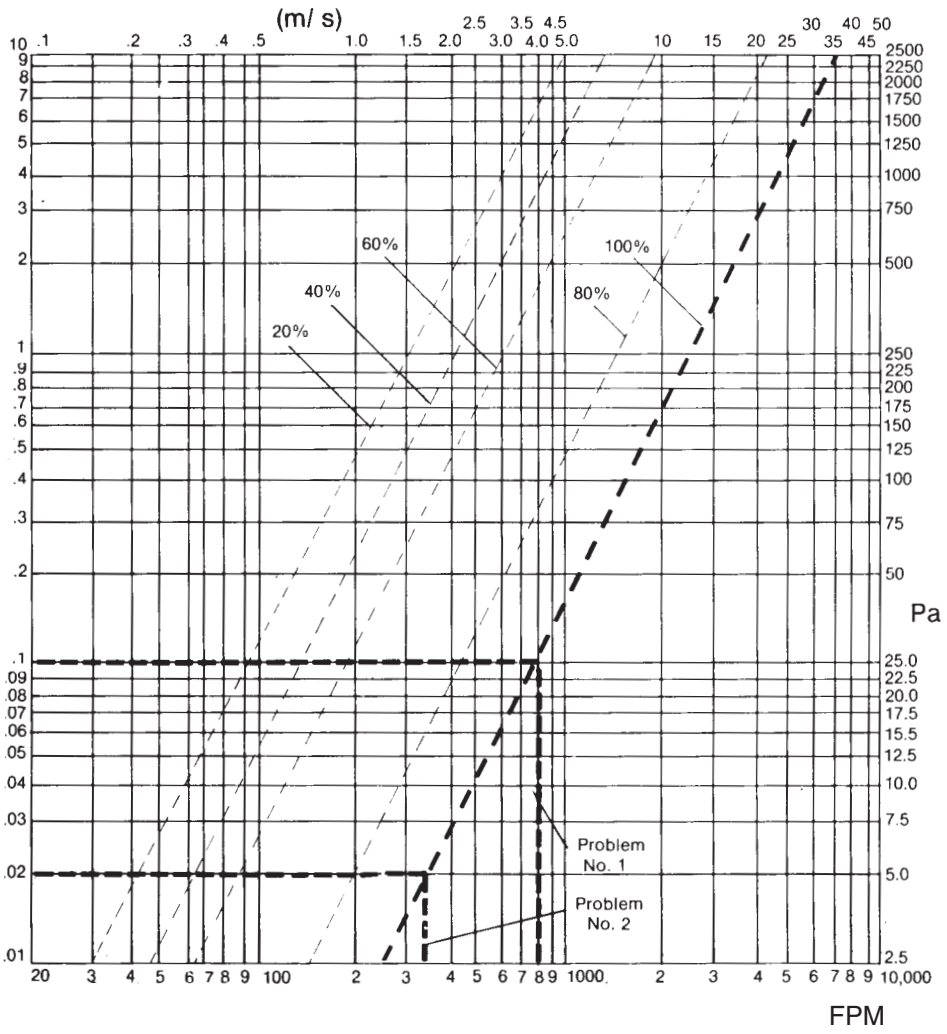
$$2.49 \times 10^9 \frac{(\text{Btu})}{(\text{year})} \times \frac{1}{3413} \frac{(\text{KWH})}{(\text{Btu})} \times 0.05 \frac{(\$)}{(\text{KWH})} = \$36{,}480$$

wasted per year which could be saved by utilizing the EBA Positive Seal Dampers.

NOTE: Above does not include summer wastage.

POSITIVE SEAL DAMPER

PRESSURE DROP VS. FACE VELOCITY



FACE VELOCITY (OVER ENTIRE DAMPER AREA)

(Recommended maximum velocity 800 FPM / 4 m / s)

PROBLEM No. 1

Given an allowed pressure drop of 0.1" w.g., what size dampers are used to handle 6000 cfm ?

SOLUTION:

From the graph, we are allowed a 800 fpm face velocity. Therefore, 6000 cfm ÷ 800 frm = 7.5 ft^2. We can use 36" module since its area is 9 ft^2 or two 24" modules.

PROBLEM No. 2

Find the pressure drop across a 24" square PSD damper module handling 1400 cfm.

SOLUTION:

The area of a 24" square module is 4 ft^2. Therefore 1400 cfm ÷ 4 ft^2 = 350 fpm face velocity. From graph S.P. = 0.02" w.g.

POSITIVE SEAL DAMPER

SPECIFICATION GUIDE

1. Install motor-operated Positive Seal Dampers in the locations outside, as described or scheduled. Positive Seal Dampers shall be as manufactured by EB Air Control Inc. Product shall have shown a minimum of 3 years satisfactory performance in a similar environment.
2. Dampers shall be of the rotating disc-type with linear stroke operators complete with pneumatic motor. The motors shall be supplied complete with pilot positioners (one per bank), where sequency is required.
3. Leakage factor in the closed position shall not exceed 0.001 cfm/ft^2 at 1 Kpa (4") static pressure differential across the damper. Manufacturer to supply certified test data carried out over 250,000 cycles by an independent testing laboratory confirming that it meets the leakage requirements. Straight blade-type dampers are not acceptable.
4. With the dampers in the full-open position and air flowing across the damper at a uniform velocity of 800 feet per minute, the static pressure drop across the damper shall not exceed 25Pa (0.1" w.g.).
5. Extruded neoprene gaskets shall be provided to seal all mating surfaces. The gaskets shall be field-replaceable and carry a 10-year material replacement warranty.
6. The damper banks to consist of multiple rotating discs in a common frame as manufactured by EB Air Control Inc. An angle frame is to surround the Positive Seal Damper's basic frame and shipped from the factory as a single assembly to ensure that the quality and integrity of the end product is maintained.
7. The damper discs to be 36", 24", 16" or 12" diameter and frames shall be constructed of formed W.C.G. steel. Linkage components shall be galvanized steel and aluminum. All shafting shall be stainless steel with the exception of standard actuator-shafts. Critical rotating surfaces shall be protected by nylon bushings.
8. To be considered for a substitute motor operated damper under this contract, the bidder shall be required to submit to the consulting engineer the following documentation: Life cycle test data, leak test data by an independent testing laboratory, list of ten (10) maintenance free damper installations.

Request To Consultants To Include Under Control Section 15900

A. The pilot positioner or booster relay should be sequenced to open the fresh air dampers well before the recirculation dampers start to close.

B. Pneumatic lines to fresh air damper motors subjected to freezing should be graded down to a dirt and water leg with blowdown valve and shall be furnished by control contractor.

C. 55 to 90 Kpa (8 to 13 psig) spring range shall be used for large multi-damper installations. For 2 position dampers, 69 to 104 Kpa (10 to 15 psig) spring range shall be used.

D. To provide a minimum of fresh air, certain damper sections should be selected and as such connected separately by the control contractor from the main fresh air intake system to the control panel. All pneumatic lines to actuators to be furnished by the control contractor.

NOTE: If damper is to be installed horizontally (vertical airflow), please contact factory for sizing of actuators.

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Your local representative: