



**NRD** *Non Return Damper*





## Introduction

With its parallel action blades, the non-return damper is designed to prevent backflow of air. It can also be used to automatically shut-off or isolate a section of the system to prevent ingress of undesirable vapour and vermin. The damper is opened by the air pressure differential between two sides and it closed by help of gravity.

It comes in vertical and horizontal installation configurations.

## CONSTRUCTIONS & MATERIALS

- Parallel blade action
- Available in vertical and horizontal configuration
- Damper sectioning :
  - Length < 625 = none
  - 650 < Length < 1225 = 1 sections
  - 1250 < Length < 1800 = 2 sections
  - Minimum size : 100 x 100 mm
  - Maximum size : 1000 x 1200 mm

### Construction Available



Stainless Steel

### Frame Construction



Galvanized Steel

### Blade Construction

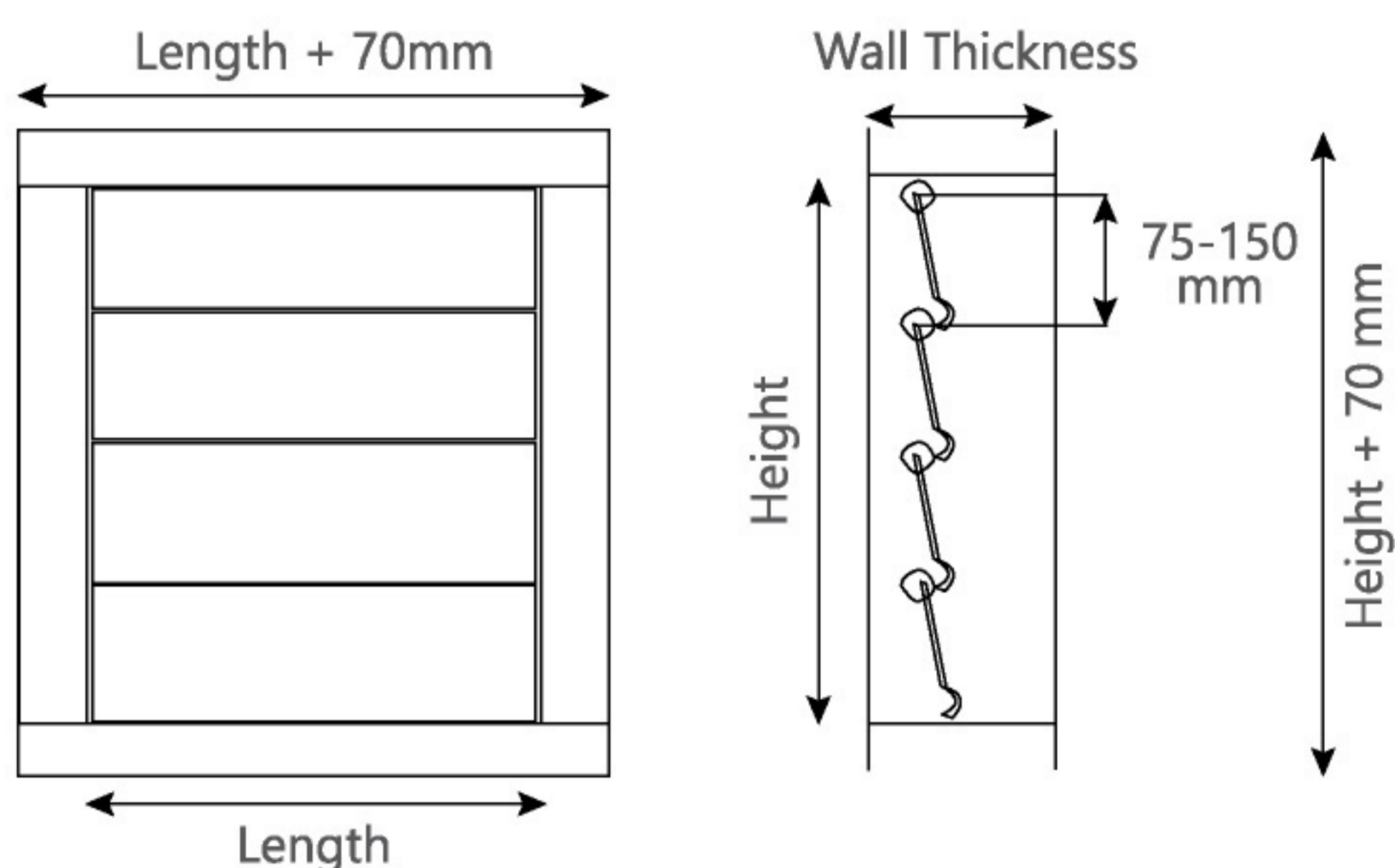


Aluminium  
(For length < 600mm)



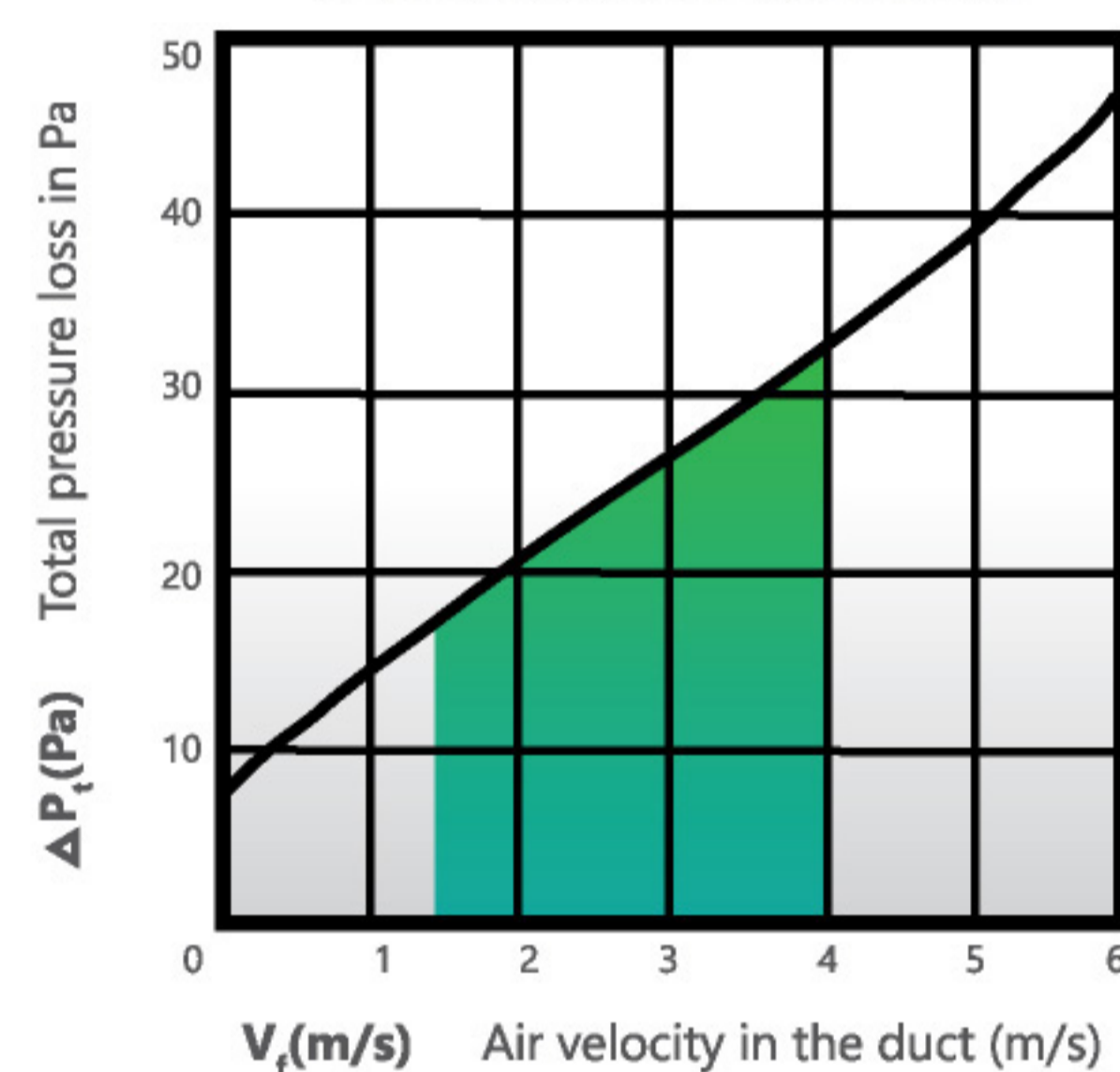
Galvanized Steel  
(For length > 600mm)

## DIMENSIONS



## AERODYNAMICA PERFORMANCE STANDARD

### TOTAL PRESSURE DROP

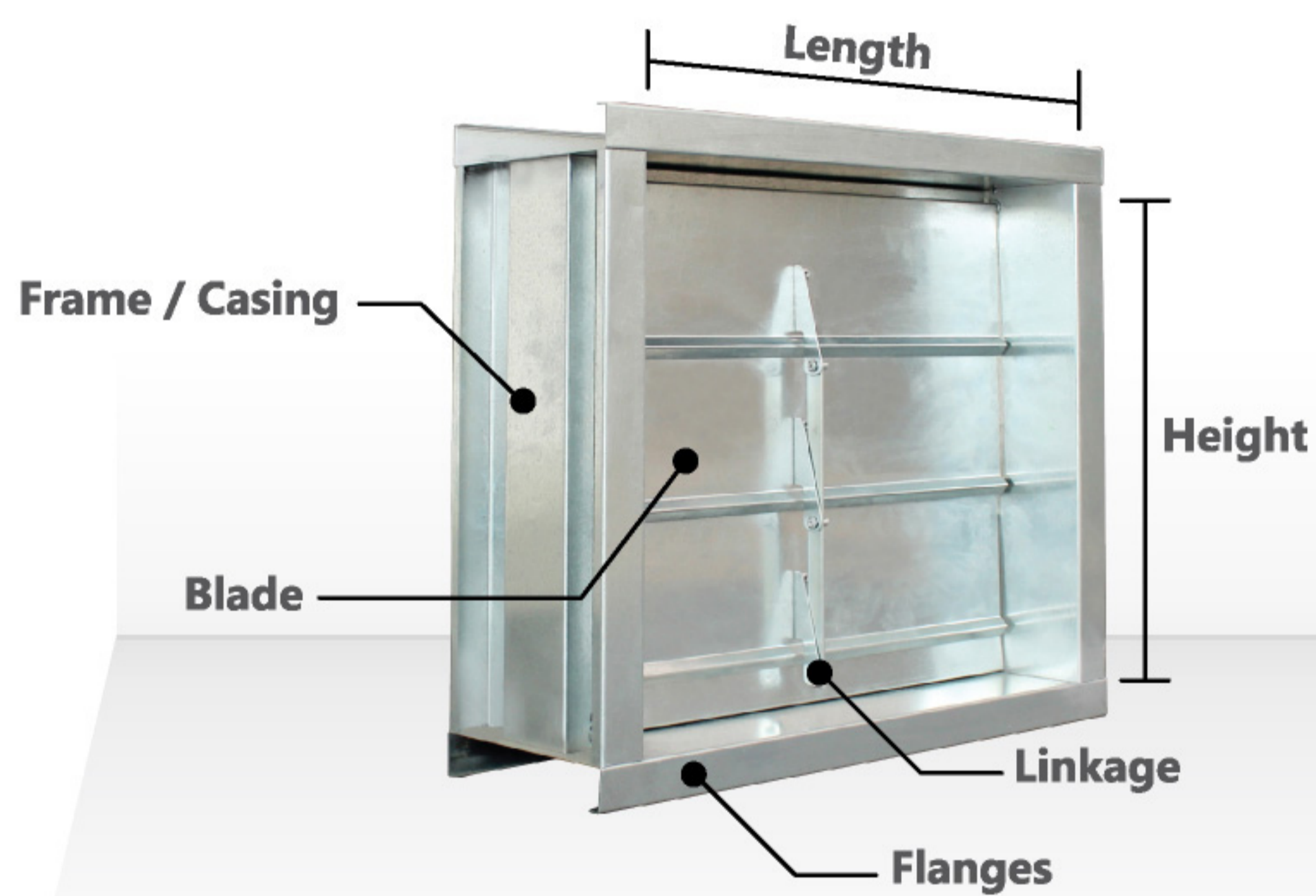
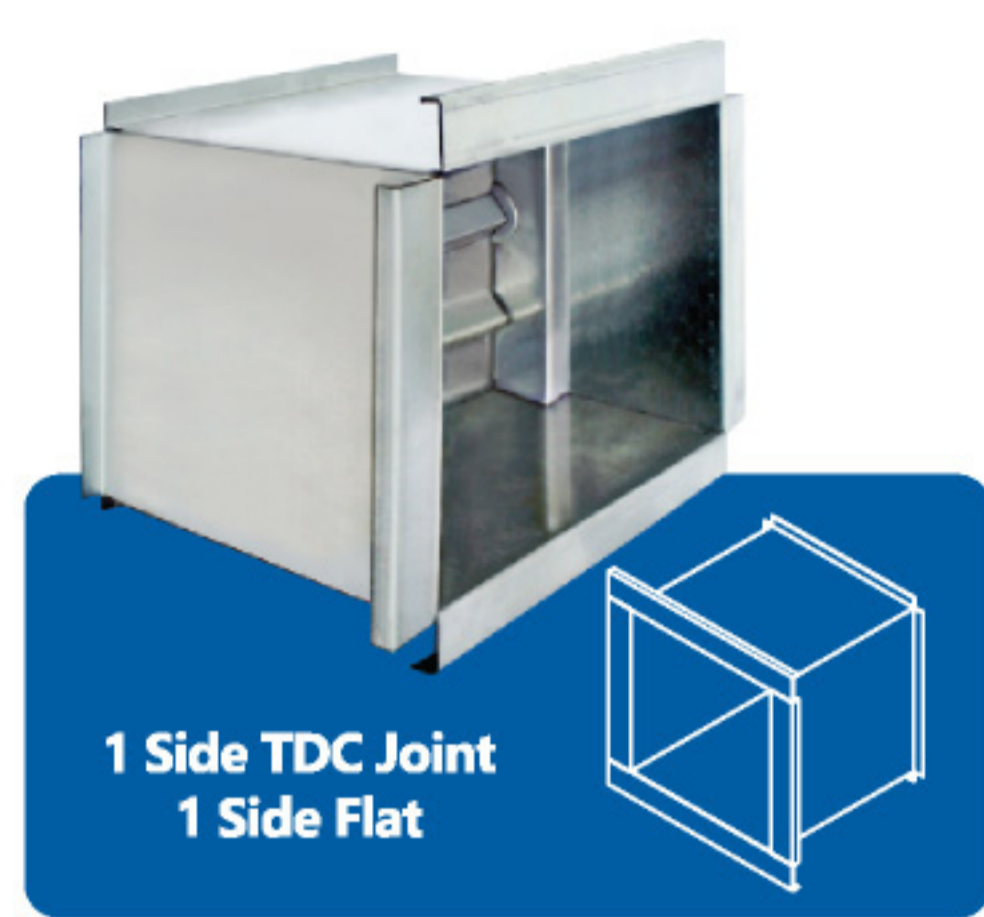
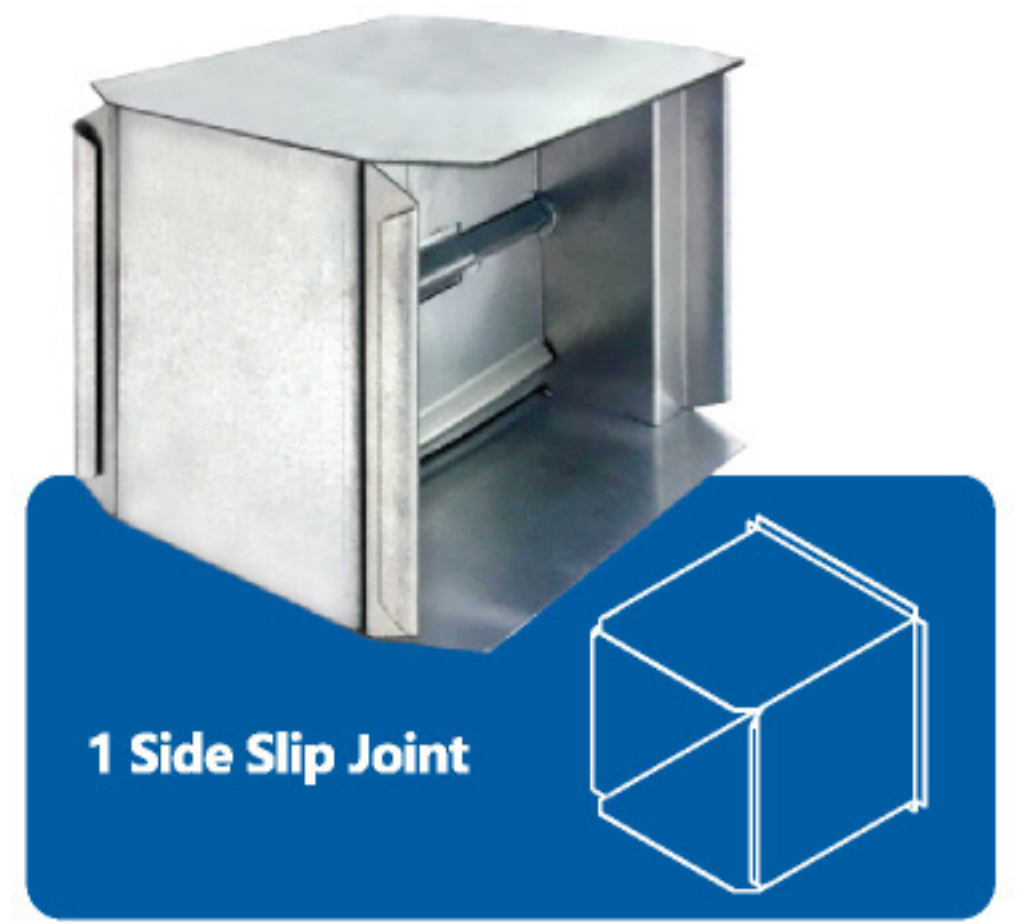
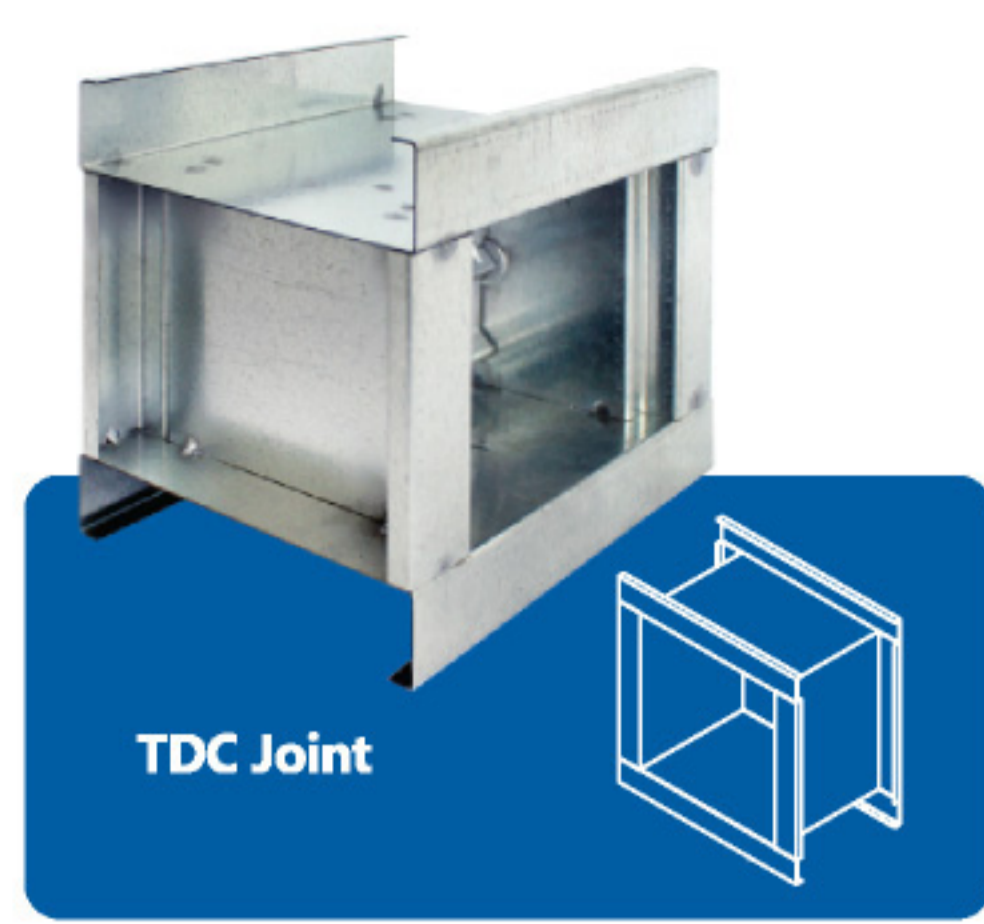


## LEAKAGE PERFORMANCE FOR LOW LEAKAGE CONSTRUCTION

Static Pressure Drop (Pa)	Static Pressure Drop (in WC)	NRD Leakage (CFM)	Leakage Per Sq ft (CFM/Sqft)
101	0.4	0	0
184	0.7	0	0
220	0.9	0	0
285	1.1	0	0
335	1.3	0	0
415	1.7	0	0
470	1.9	0	0
570	2.3	0	0
630	2.5	13.11	1.22
740	3.0	13.11	1.22
810	3.3	13.11	1.22
930	3.8	24.16	2.24
1020	4.1	24.16	2.24
1150	4.6	42.70	3.97

Testing done on a 1000 x 1000mm Non-Return Damper

## JOINING METHODS



### Notice :

**Damper size would be fabricate as exact neck size**

## TECHNICAL SPECIFICATION

### Casing Assembly

- 0.7mm – 1.0mm thick casing sections. Casing section to be welded externally with welding beads to be ground flush. Multiple modular to be provided for damper larger than 1000mm width x 1000mm height. Standard wall thickness to be 150mm, unless otherwise stated.
- Standard joining method to be in TDC joint, unless otherwise stated.
- Material provided to be galvanized steel, unless otherwise stated.

### Damper Blade Assembly

- 0.5mm thick single skin configuration. The individual blade to be in single V-grooves design. Blade operation to be of parallel blade action with linkage system. 6.0mm galvanized steel full length shaft to be provided for each blade section.
- Damper blade to be operated mechanical airflow pressure only.
- Material provided to be galvanized steel, unless otherwise stated.

### Linkage Assembly

- 15.0mm x 3.0mm thick linkage system to be reverted to every single blade. Individual linkage components to be secured with pins at pre-determined geometry locations to ensure accurate blade phasing.

### Linkage Cover & Side Seals

- 1.0mm pre-formed angles to be welded to the damper casing assembly to provide both blade stop and sealing functions.
- Material provided to be galvanized steel, unless otherwise stated.

### Finishing



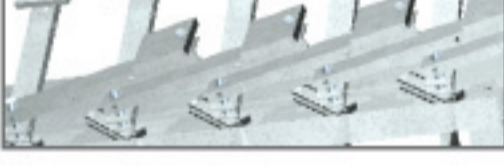




- Damper assembly to be in natural finish of the material.



# **NRD** | *Non Return Damper*



## Products Range

- Grilles 
- Diffusers 
- Dampers  ◀
- Fire & Smoke Protection 
- VAV 
- Others 
- Accessories 



**Prudent Aire Sdn Bhd** 514037-D  
 Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
 43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
 Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
 Fax : +603-9100 4868 Email : sales@prudentaire.com

[www.prudentaire.com](http://www.prudentaire.com)



**PRD** *Pressure Relief Damper*





## Introduction

Pressure relief damper is used to relieve built-up pressure in HVAC system to prevent damage to other components, or to allow pressure for the area to be regulated- to control air movement or Omitting the two closing and counter acting weights system, PRDS series utilizes singular adjustable closing weight to perform the pressure relieving function.

## CONSTRUCTIONS & MATERIALS

- Parallel blade action
- Available in vertical and horizontal configuration
- Damper sectioning:
  - i) Length < 625 = none
  - ii) 650 < Length < 1225 = 1 sections
  - iii) 1250 < Length < 1800 = 2 sections

### Frames Construction

GI  
0.8mm

Galvanized Steel

### Blade Construction

AL  
0.5mm

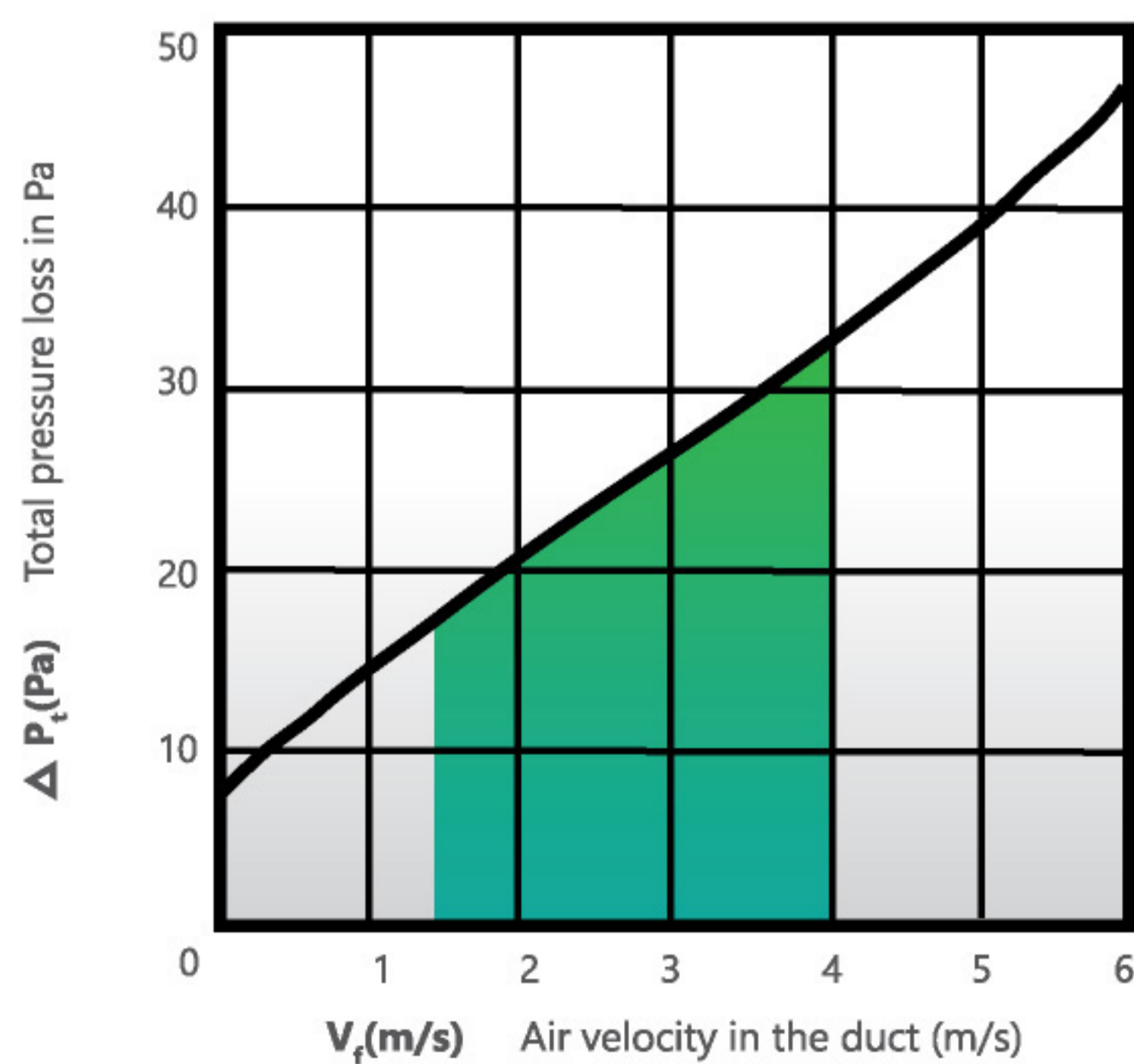
Aluminium  
(For length < 600mm)

GI  
0.5mm

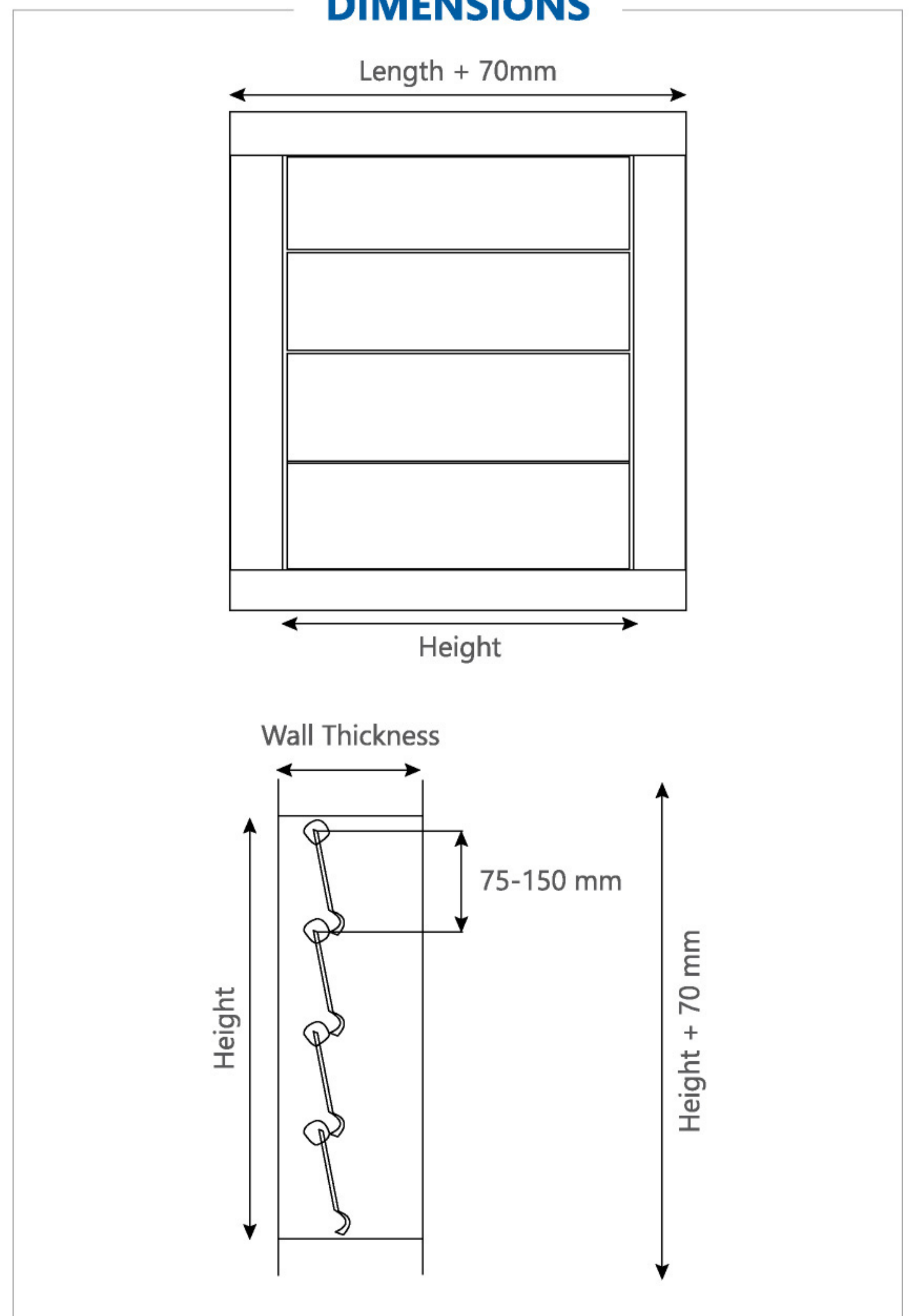
Galvanized Steel  
(For length > 600mm)

## AERODYNAMICA PERFORMANCE STANDARD

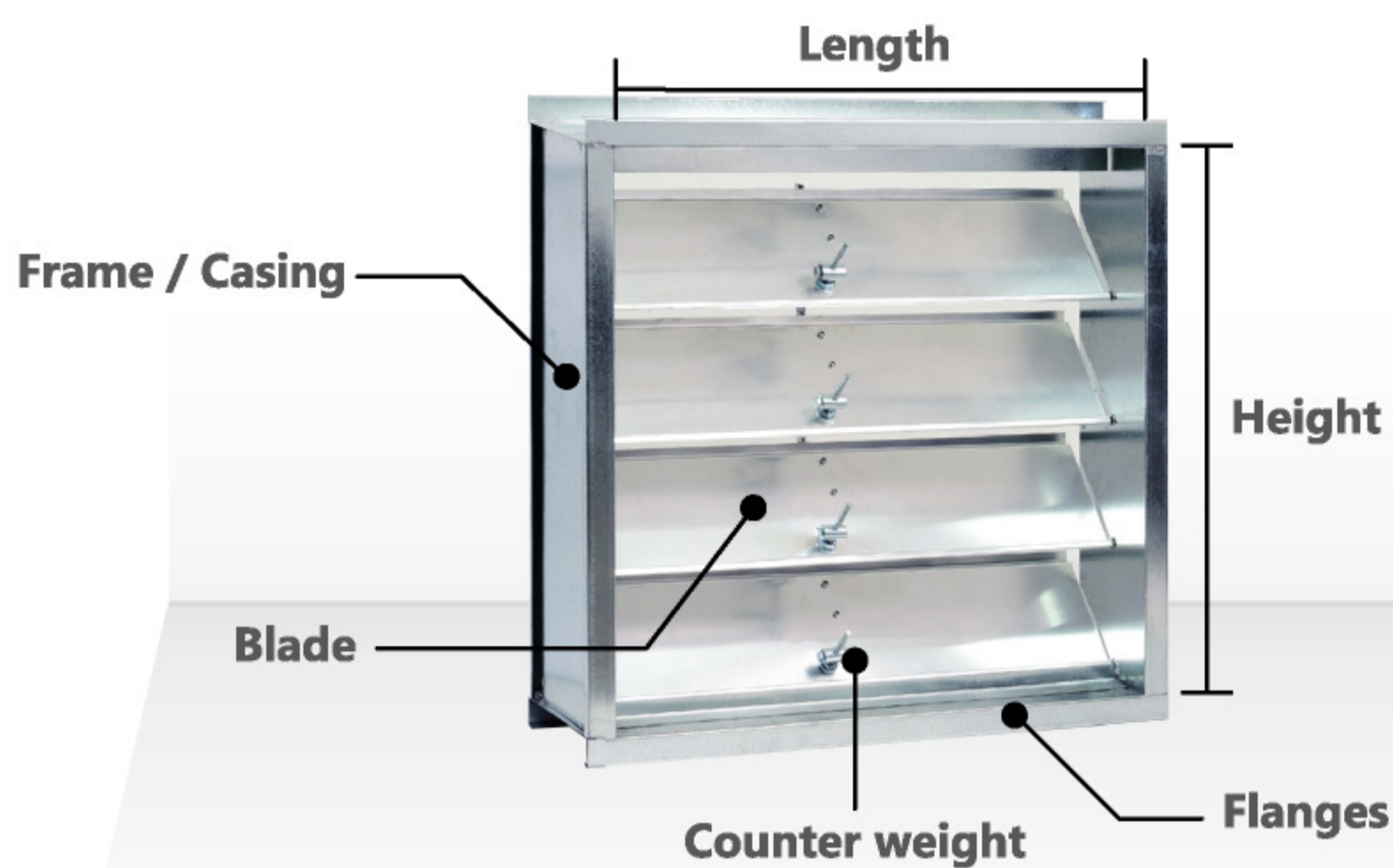
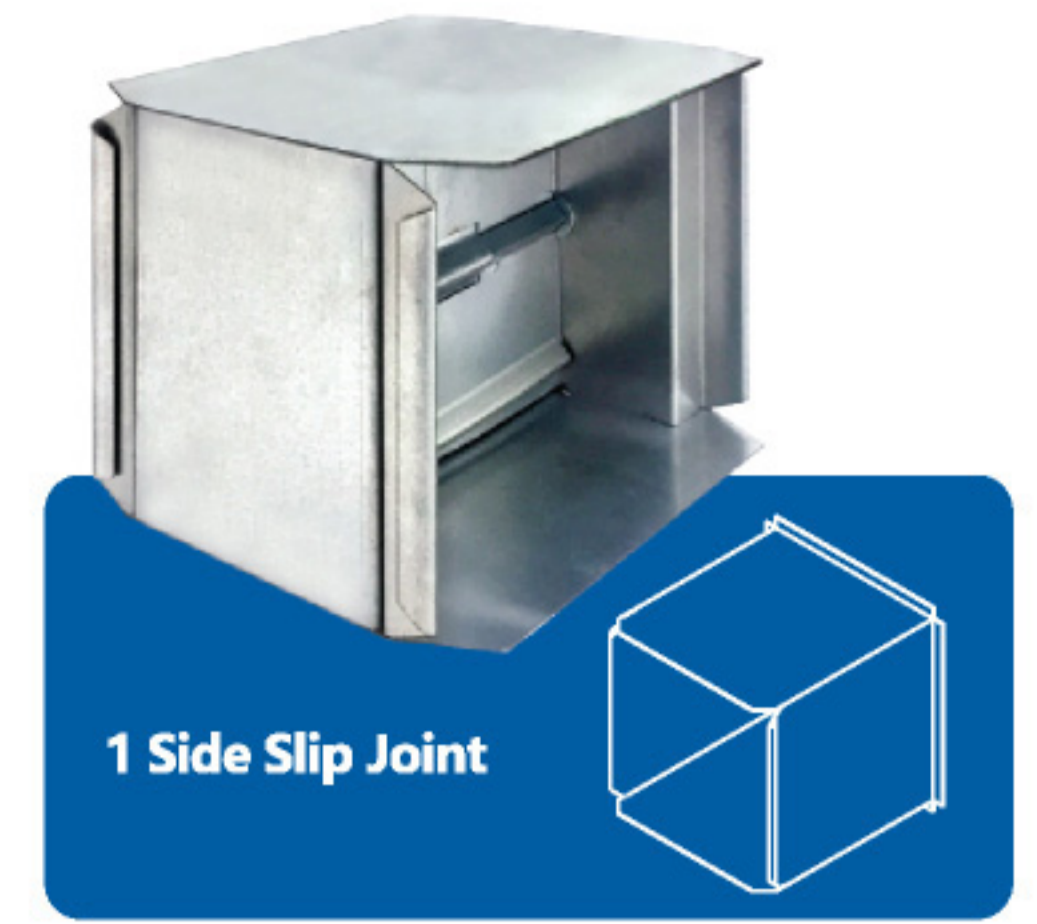
### TOTAL PRESSURE DROP



## DIMENSIONS



## JOINING METHODS



### Notice :

**Damper size would be fabricate as exact neck size**

## TECHNICAL SPECIFICATION

### Casing Assembly

- 0.7mm – 1.0mm thick casing sections. Casing section to be welded externally with welding beads to be ground flush. Multiple modular to be provided for damper larger than 1000mm width x 1000mm height. Standard wall thickness to be 150mm, unless otherwise stated.
- Standard joining method to be in TDC joint, unless otherwise stated.
- Material provided to be galvanized steel, unless otherwise stated.

### Damper Blade Assembly

- 0.5mm single skin configuration. The individual blade to be in single V-grooves design. Blade operation to be of Parallel Blade configuration. 6mm galvanized steel full length shaft to be provided for each blade section.
- Adjustable counter weight to be installed at every single blade for on-site adjustment purpose.
- Material provided to be galvanized steel, unless otherwise stated.

### Linkage Cover & Side Seals

- 1.0mm pre-formed angles to be welded to the damper casing assembly to provide both blade stop and sealing functions.
- Material provided to be galvanized steel, unless otherwise stated.

### Finishing



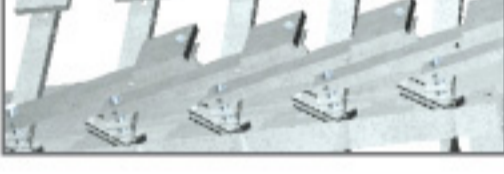




- Damper assembly to be in natural finish of the material.



# PRD | Pressure Relief Damper



## Products Range

- Grilles 
- Diffusers 
- Dampers 
- Fire & Smoke Protection 
- VAV 
- Others 
- Accessories 



**Prudent Aire Sdn Bhd** 514037-D  
 Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
 43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
 Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
 Fax : +603-9100 4868 Email : sales@prudentaire.com

[www.prudentaire.com](http://www.prudentaire.com)





**PRF** *Pressure Relief Flap*





## Introduction

Pressure relief flap is used to relieve pressure from rooms or stairwell. It can be colour coated according to customer's specifications, thus providing aesthetic appearance which blends into the overall building design. An adjustable closing weight (position parallel to the flap) is used to provide adjustment for the room to reach the desired pressure before being relieved.

## CONSTRUCTIONS & MATERIALS

- Customizable colour coating
- Single door flap design
- Available in vertical installation
- Damper sizing:
  - Minimum size : 150 x 150 mm
  - Maximum size: 600 x 600 mm

### Frame Construction



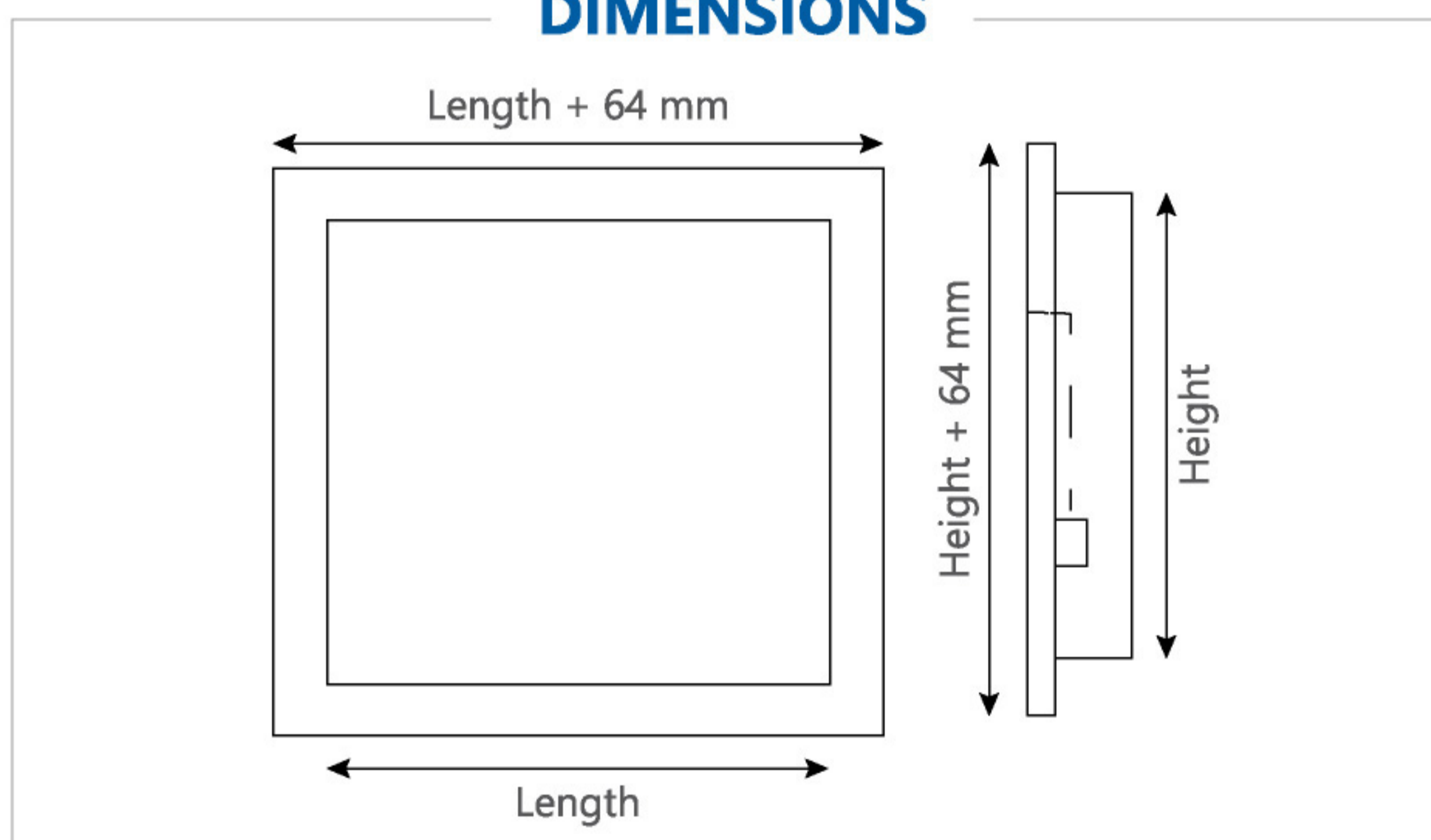
Galvanised Steel

### Blade Construction



Galvanised Steel

## DIMENSIONS



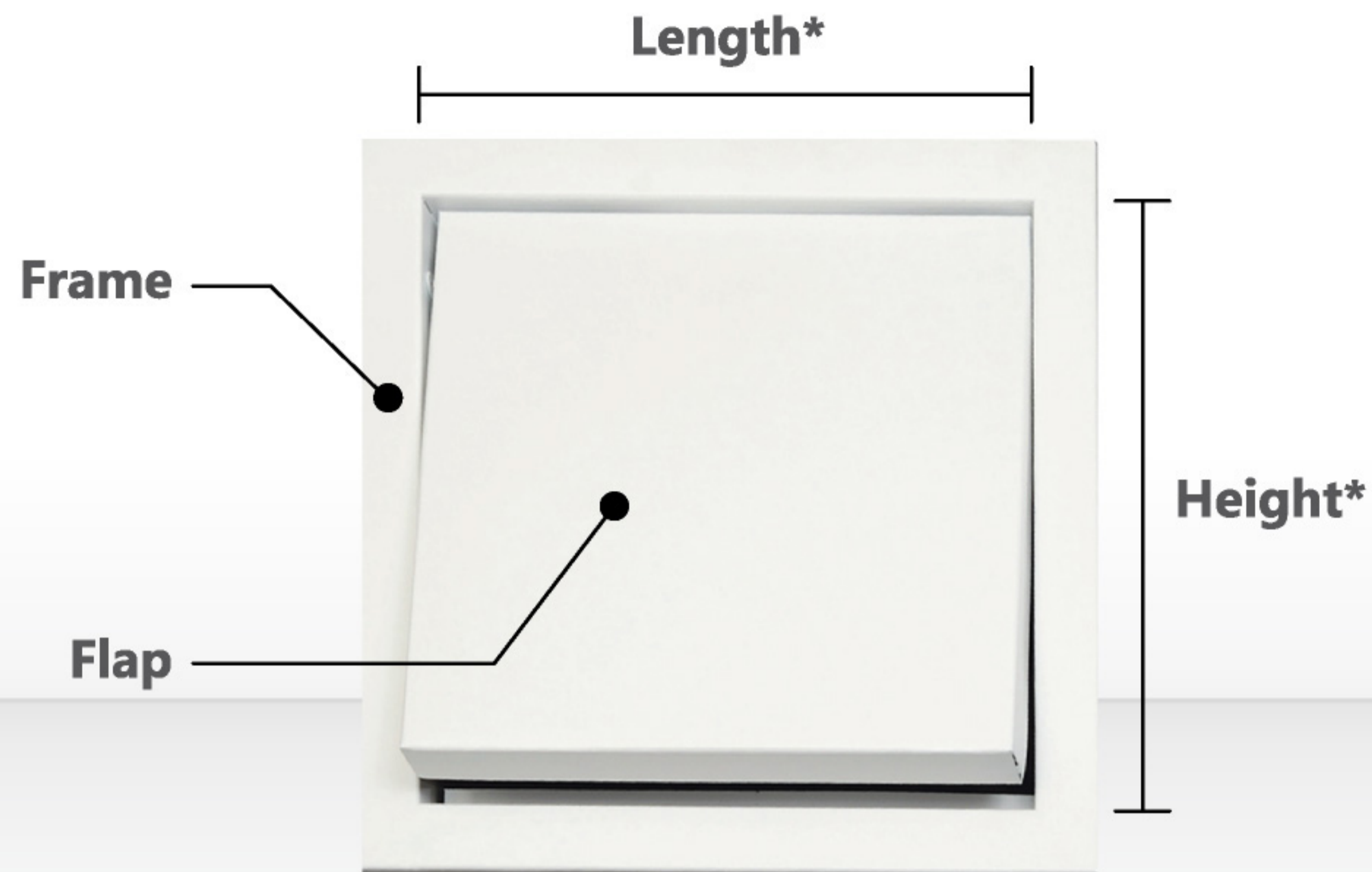
## AERODYNAMIC PERFORMANCE

### RECOMMENDED FLOW AND SIZING

Air velocity (m/s)	Pressure drop (Pa)
2	40
3	65
4	77
5	87
6	95
7	100
8	108
9	110
10	116

### TOTAL PRESSURE DROP

Litres/second Cubic feet per minute	Height										
	150	200	250	300	350	400	450	500	550	600	
Base	150	54 / 114	72 / 153	90 / 191	108 / 229	126 / 267	144 / 305	162 / 343	180 / 381	198 / 419	216 / 458
	200	72 / 153	96 / 203	120 / 254	144 / 305	168 / 356	192 / 407	216 / 458	240 / 508	264 / 559	288 / 610
	250	90 / 191	120 / 254	150 / 318	180 / 381	210 / 445	240 / 508	270 / 572	300 / 636	330 / 699	360 / 763
	300	108 / 229	144 / 305	180 / 381	216 / 458	252 / 534	288 / 610	324 / 686	360 / 763	396 / 839	432 / 915
	350	126 / 267	168 / 356	210 / 445	252 / 534	294 / 623	336 / 712	378 / 801	420 / 890	462 / 979	504 / 1068
	400	144 / 305	192 / 407	240 / 508	288 / 610	336 / 712	384 / 814	432 / 915	480 / 1017	528 / 1119	576 / 1220
	450	162 / 343	216 / 458	270 / 572	324 / 686	378 / 801	432 / 915	486 / 1030	540 / 1144	594 / 1258	648 / 1373
	500	180 / 381	240 / 508	300 / 636	360 / 763	420 / 890	480 / 1017	540 / 1144	600 / 1271	660 / 1398	720 / 1525
	550	198 / 419	264 / 559	330 / 699	396 / 839	462 / 979	528 / 1119	594 / 1258	660 / 1398	726 / 1538	792 / 1678
	600	216 / 458	288 / 610	360 / 763	432 / 915	504 / 1068	576 / 1220	648 / 1373	720 / 1525	792 / 1678	864 / 1831



\* Neck size

## TECHNICAL SPECIFICATION

### Frame Construction

1. Frame to be in galvanized steel. Frame thickness should be in minimum 0.6mm thick, unless otherwise stated.
2. The margin to be in 30mm from the neck height to the edge.
3. Frame height to be in 40mm.

### Damper Blade Assembly

1. 0.5mm single skin configuration. The individual blade to be in single V-grooves design. Blade operation to be of Parallel Blade configuration. 6mm galvanized steel full length shaft to be provided for each blade section.
2. Adjustable counter weight to be installed at every single blade for on-site adjustment purpose.
3. Material provided to be galvanized steel, unless otherwise stated.

### Linkage Cover & Side Seals

1. 1.0mm pre-formed angles to be welded to the damper casing assembly to provide both blade stop and sealing functions.
2. Material provided to be galvanized steel, unless otherwise stated.

### Finishing



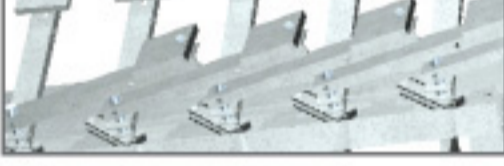



1. Finishing should be in powder coated RAL 9010 SG white matt, unless otherwise stated.



# PRF | Pressure Relief Flap



## Products Range

- Grilles 
- Diffusers 
- Dampers  ◀
- Fire & Smoke Protection 
- VAV 
- Others 
- Accessories 



**Prudent Aire Sdn Bhd** 514037-D  
 Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
 43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
 Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
 Fax : +603-9100 4868 Email : sales@prudentaire.com

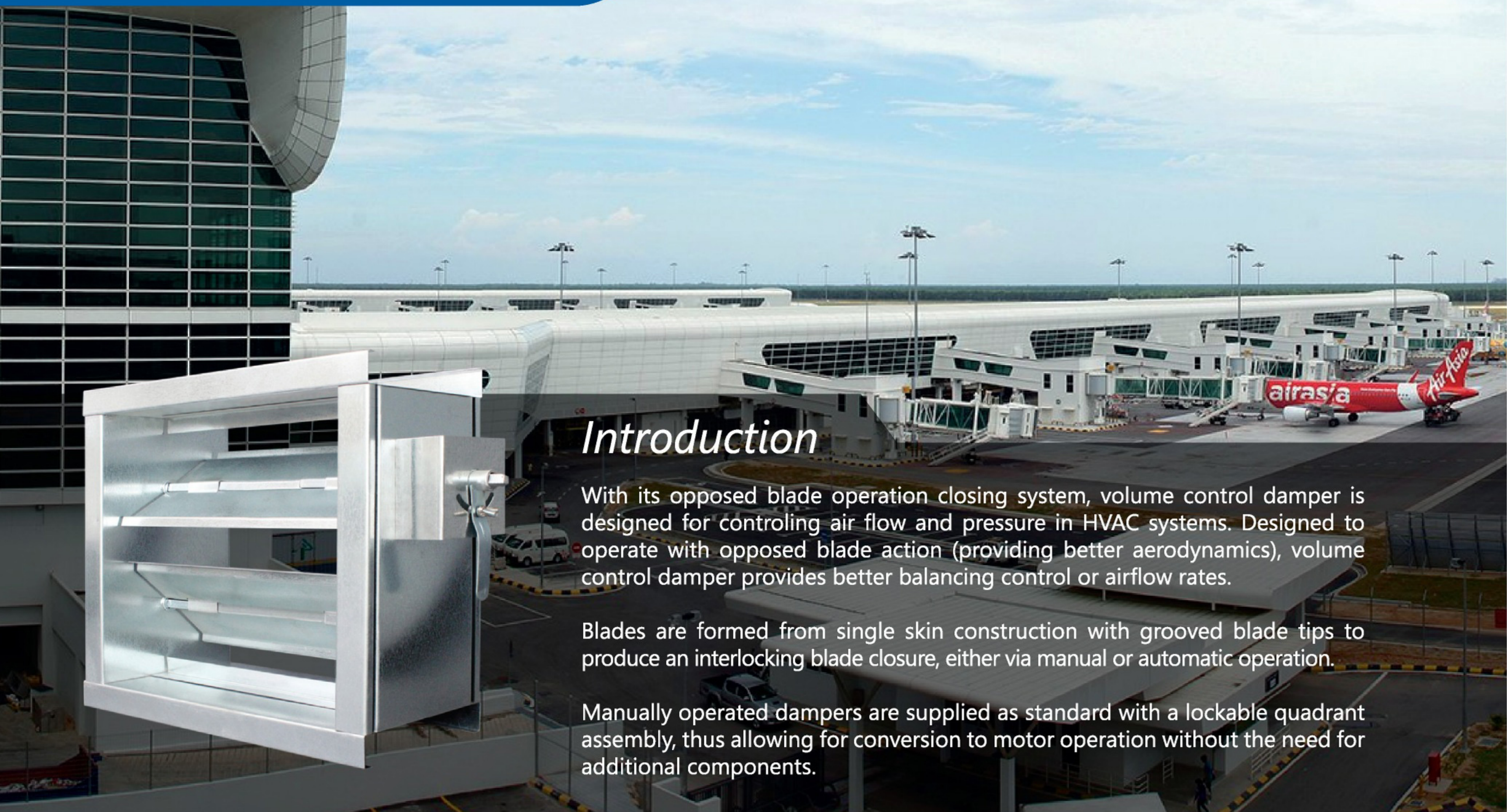
[www.prudentaire.com](http://www.prudentaire.com)



**VCD** *Volume Control Damper*

**MVCD** *Motorized Volume Control Damper*





## Introduction

With its opposed blade operation closing system, volume control damper is designed for controlling air flow and pressure in HVAC systems. Designed to operate with opposed blade action (providing better aerodynamics), volume control damper provides better balancing control or airflow rates.

Blades are formed from single skin construction with grooved blade tips to produce an interlocking blade closure, either via manual or automatic operation.

Manually operated dampers are supplied as standard with a lockable quadrant assembly, thus allowing for conversion to motor operation without the need for additional components.

## CONSTRUCTIONS & MATERIALS

- Square and round VCDs available
- Triple V-Groove Opposed Blade operation
- Available in manual or motorized models
- Actuation available in following configurations:
  - Hand locking quadrant arm
  - Worm gear drive
  - Bare shaft
  - Factory installed actuator

### Construction Available



Stainless Steel

### Frame Construction

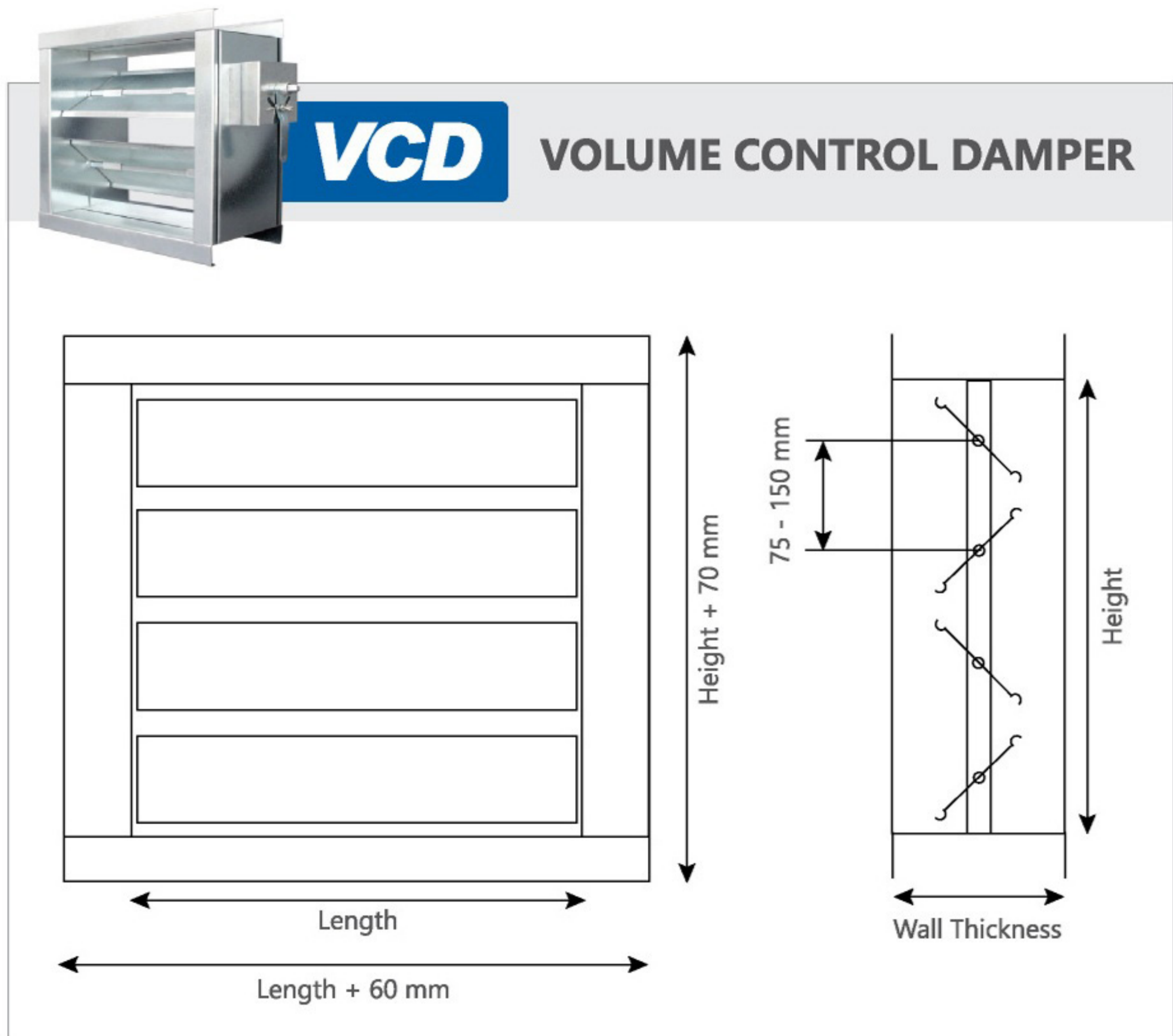


Galvanised Steel  
(Size Dependant)

### Blade Construction

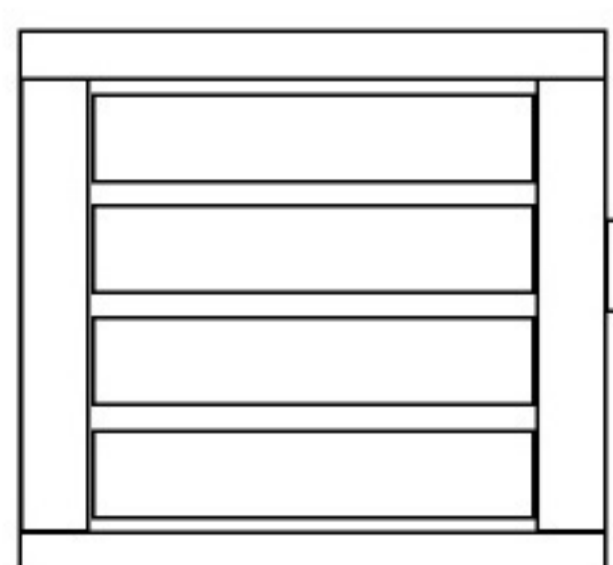


Galvanised Steel  
(Size Dependant)

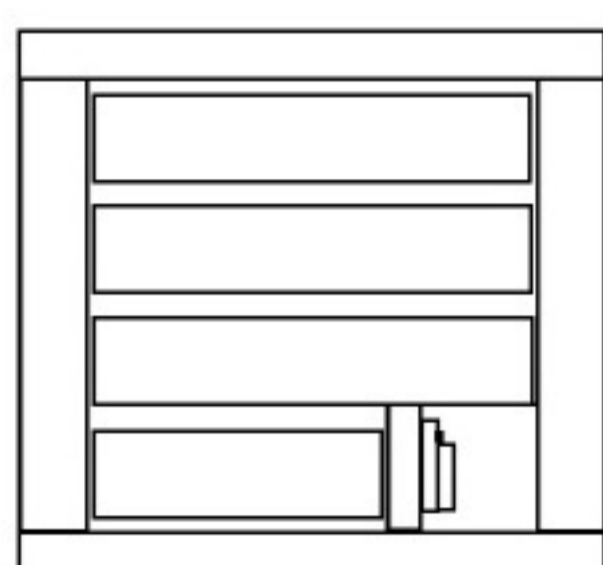


## MVCD

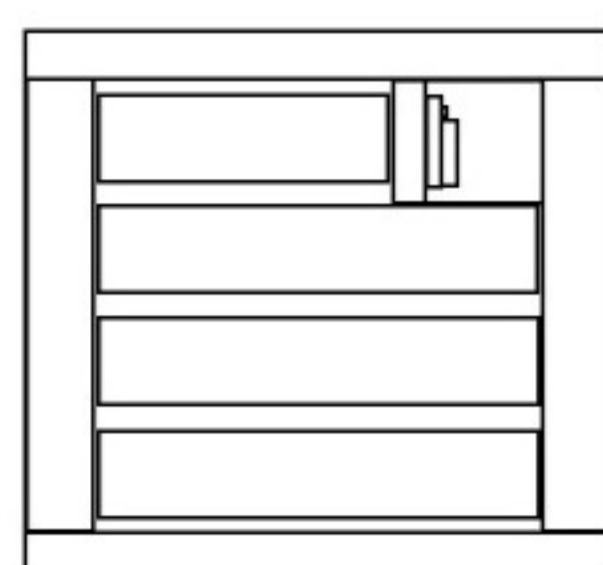
### MOTORIZED VOLUME CONTROL DAMPER - ACTUATOR LOCATION



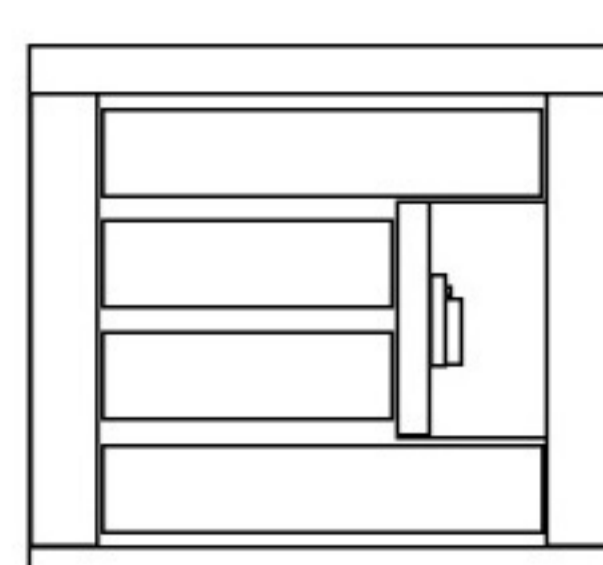
**Configuration A**  
Shaft Outside



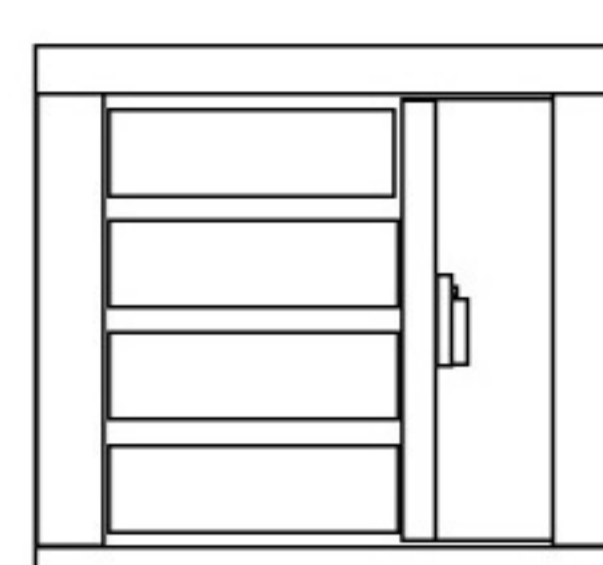
**Configuration B**  
Inside Bottom



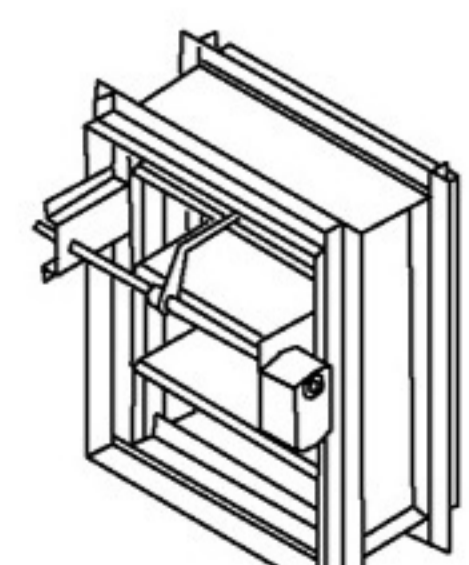
**Configuration C**  
Inside Top



**Configuration D**  
Inside Middle



**Configuration E**  
Compartment

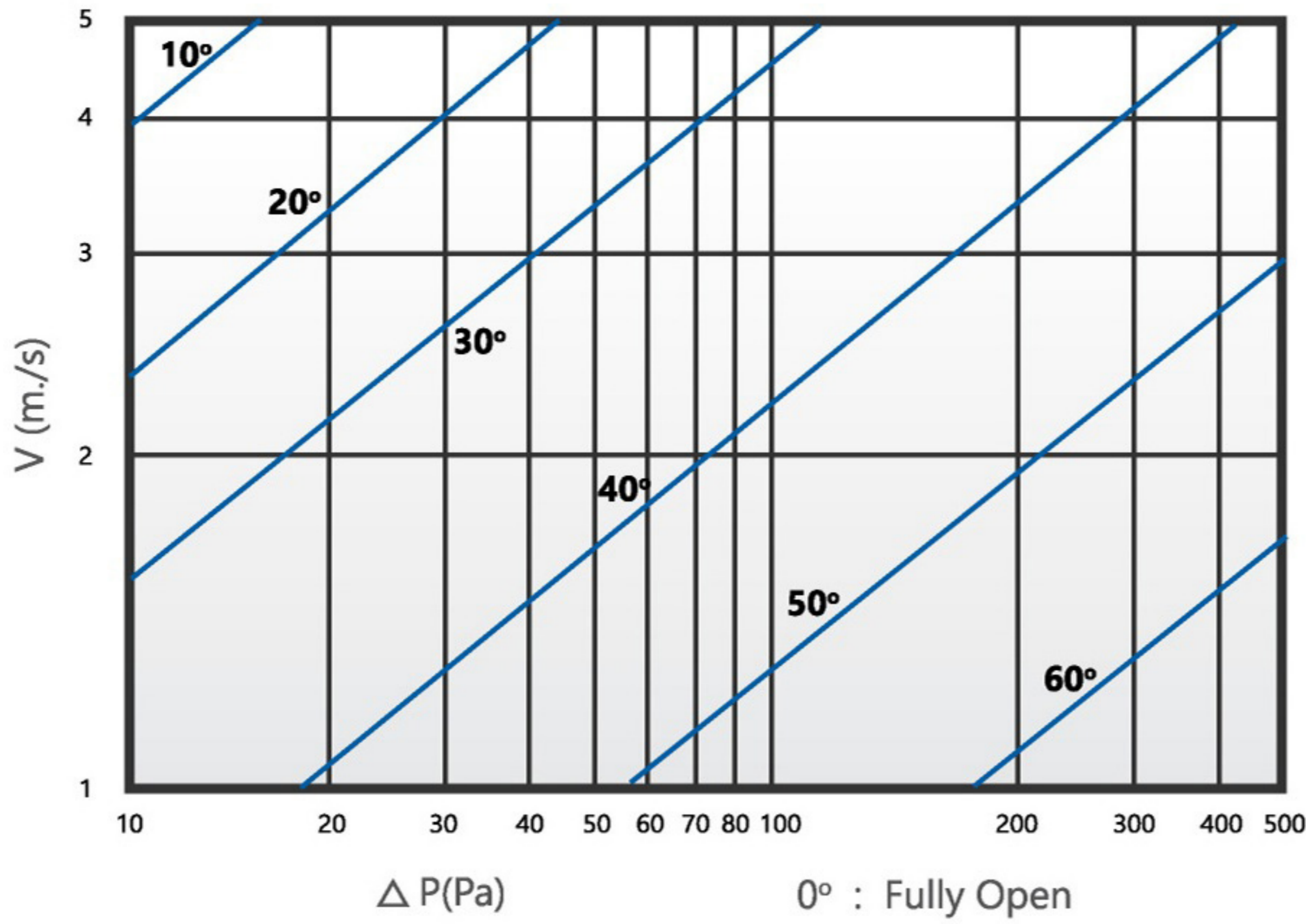


**Configuration F**  
Infront Shaft

**AERODYNAMIC PERFORMANCE**

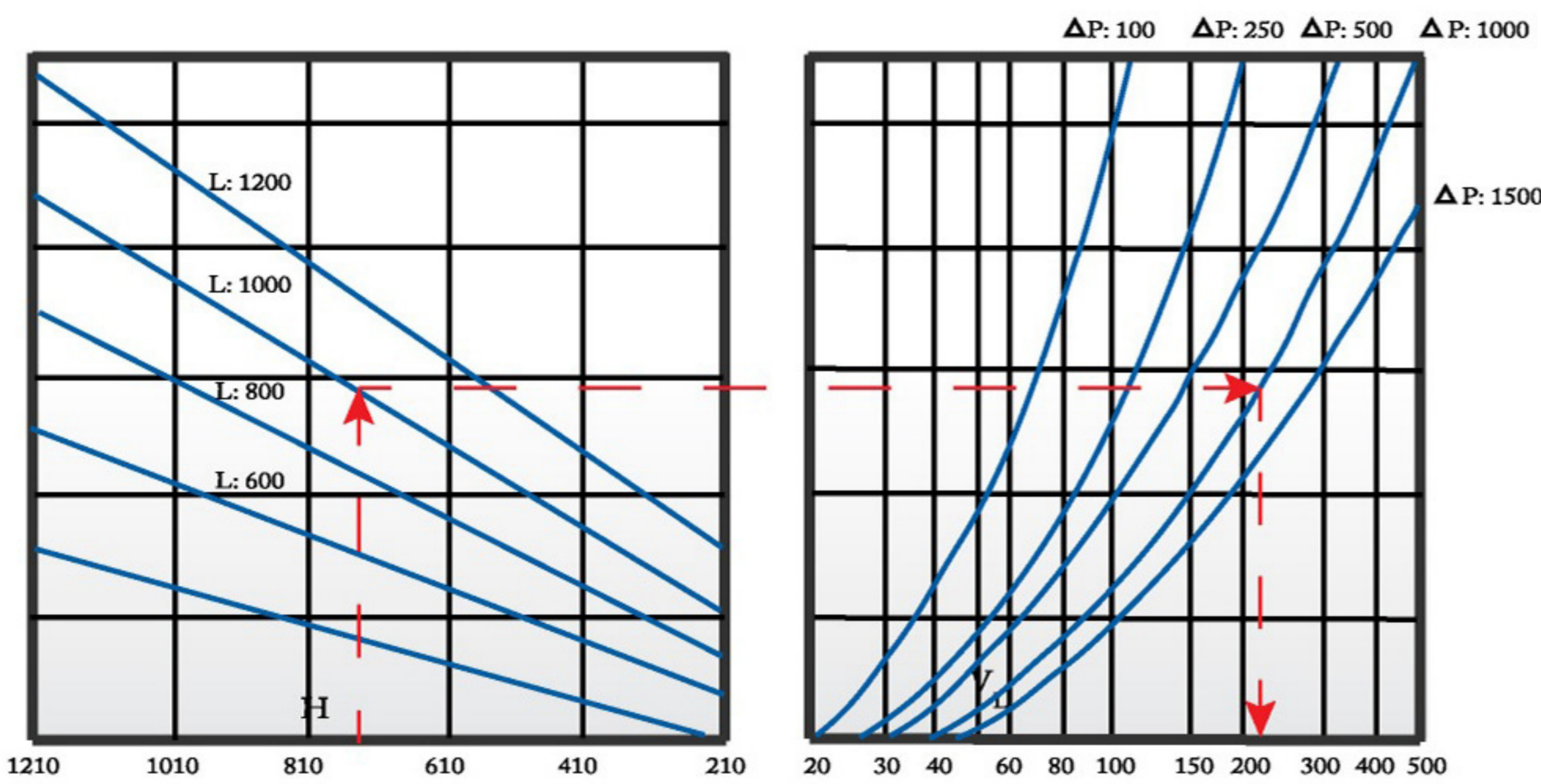
**STATIC PRESSURE DROP**

**PRESSURE DROP VS DUCT VELOCITY**

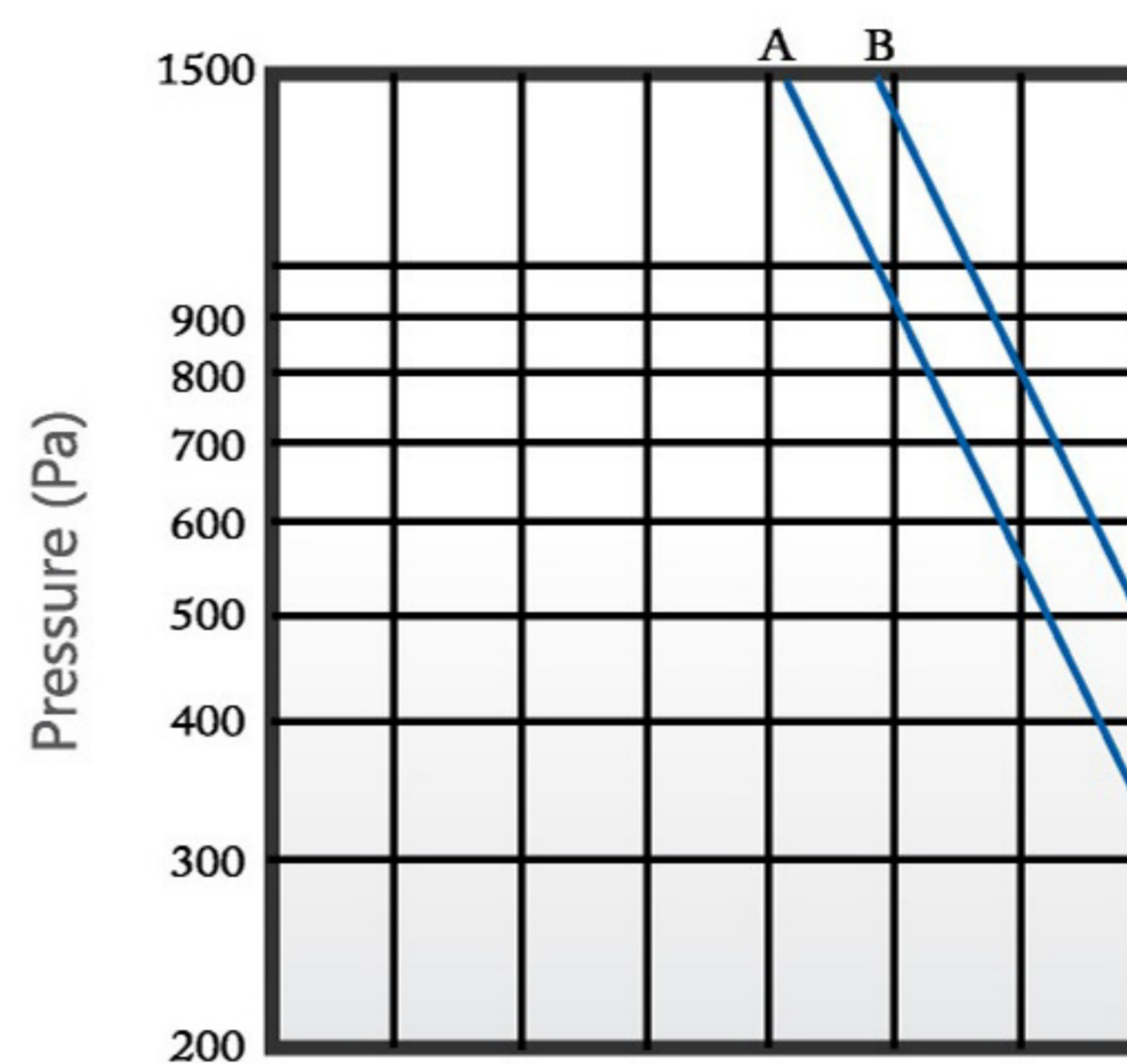


**V** Duct Velocity (m/s)  
**ΔP** Static Pressure Drop (Pa)  
 00, 100, 200, ... etc Degree Opening  
 Max static pressure drop for fully open dampers is 10 Pa

**CLOSED DAMPER LEAKAGE**



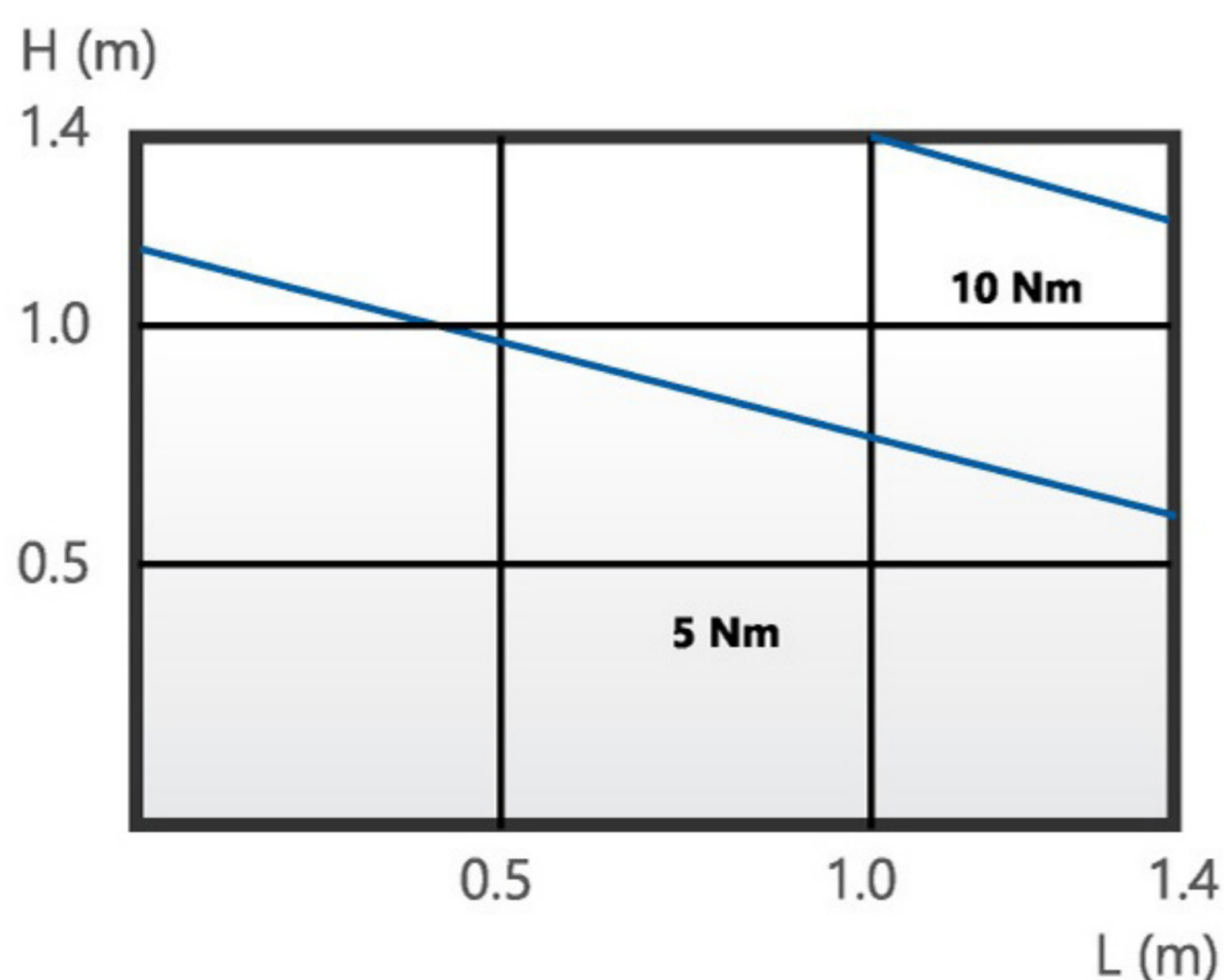
**OPERATION RANGE**



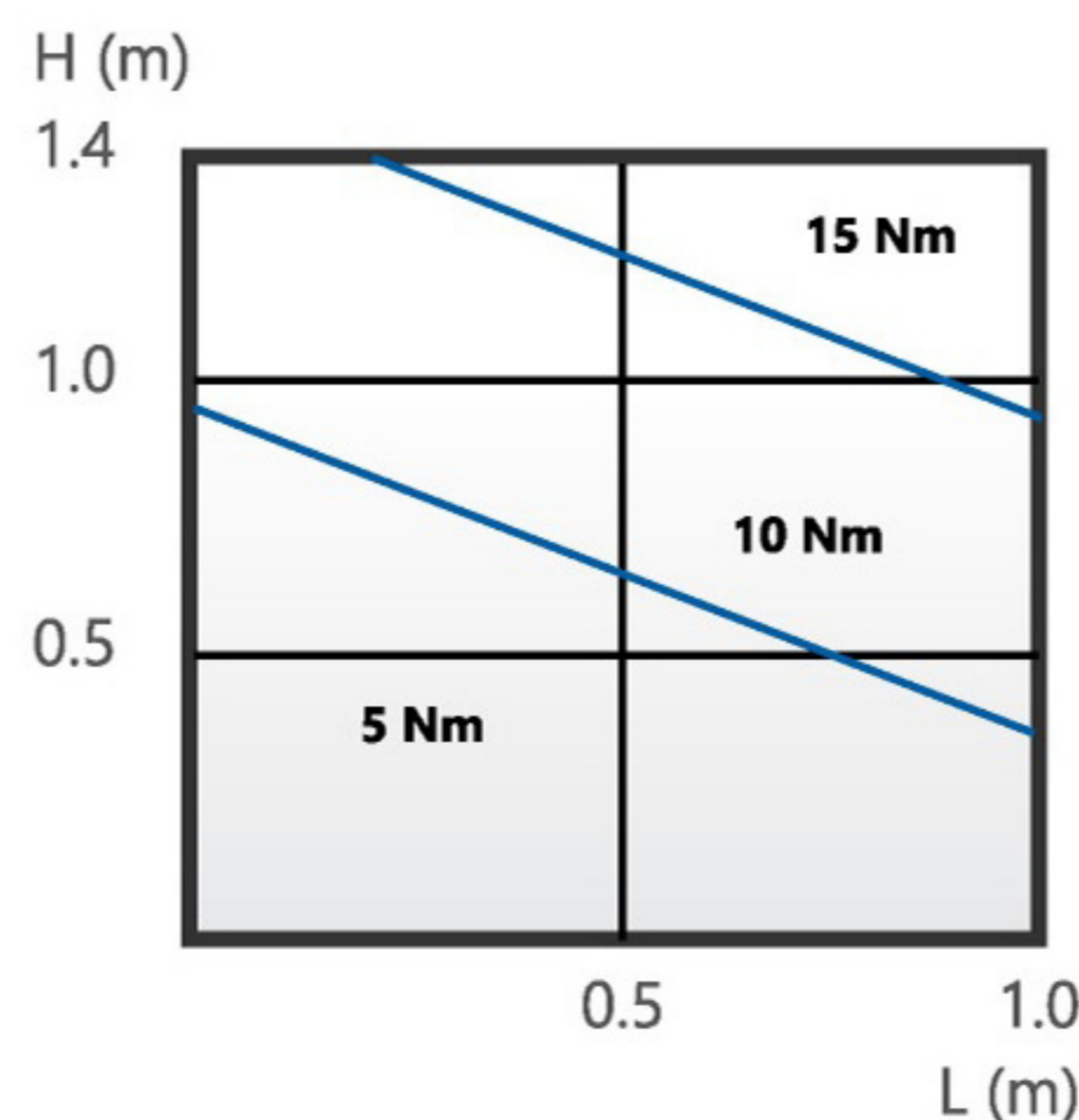
**L** Length (mm)      **VL** Volume Flowrate (cmh)      **A** Recommended operation range  
**H** Height (mm)      **ΔP** Pressure Difference (Pa)      **B** Critical operation range

**ACTUATOR TORQUE REQUIREMENTS**

**FOR PRESSURE LESS OR EQUAL TO 500 PA**



**FOR PRESSURE LESS OR EQUAL TO 1000 PA**



**H** Damper Height (m)  
**L** Damper Length (m)

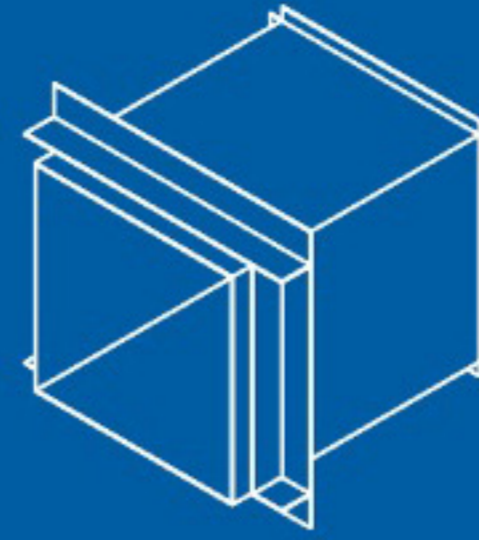
## JOINING METHODS

---

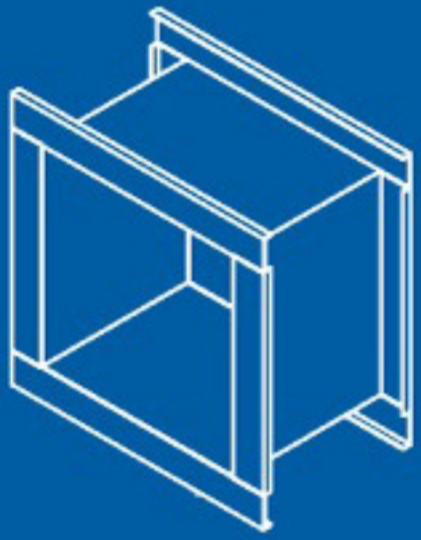
**Angle Joint**



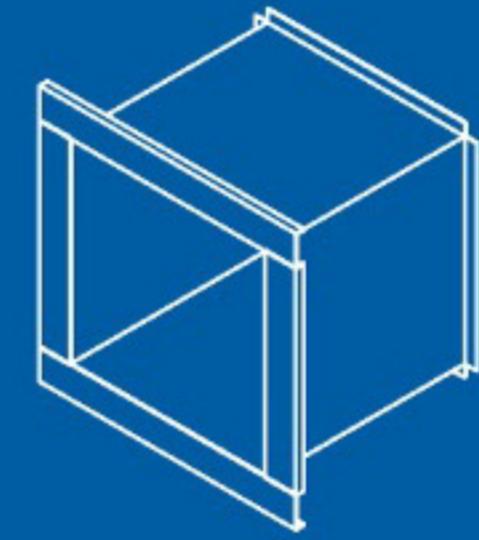
**1 Side Angle Joint  
1 Side Flat**



**TDC Joint**



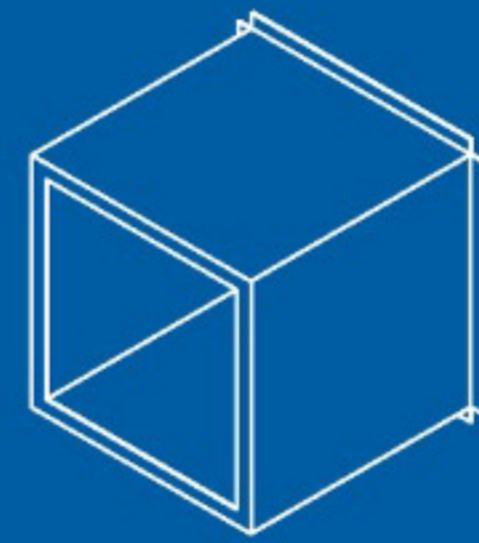
**1 Side TDC Joint  
1 Side Flat**



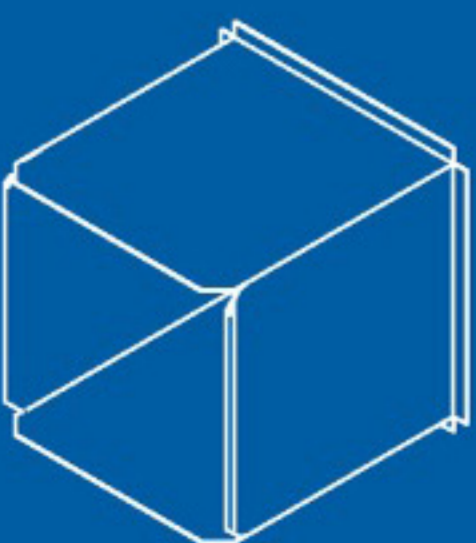
**Slot In Type**



**1 Side Grille  
1 Side Flat**



**Slip Joint**





# VOLUME CONTROL DAMPER TECHNICAL SPECIFICATION

## Casing Assembly

1. 0.7mm – 1.5mm thick casing sections. Casing section to be welded externally with welding beads to be ground flush. Multiple modular to be provided for damper larger than 1000mm width x 1000mm height. Standard wall thickness to be 150mm, unless otherwise stated.
2. Standard joining method to be in TDC joint, unless otherwise stated.
3. Material provided to be galvanized steel, unless otherwise stated.

## Damper Blade Assembly

1. 0.7mm – 1.0mm thick single skin configuration. The individual blade to be in triple V-grooves design. Blade operation to be of opposed blade action with linkage system. Parallel blade action configuration to be available upon request. 9.5mm galvanized steel shaft to be provided for each blade section.
2. Mechanical bushing to be tight-fitted into the casing channel sections of the casing assembly to support and maintain the blade shafts in the pre-determined locations.
3. Damper blade to be operated by quadrant arm, worm gear and electrical actuator are available upon request.
4. Material provided to be galvanized steel, unless otherwise stated.

## Linkage Assembly

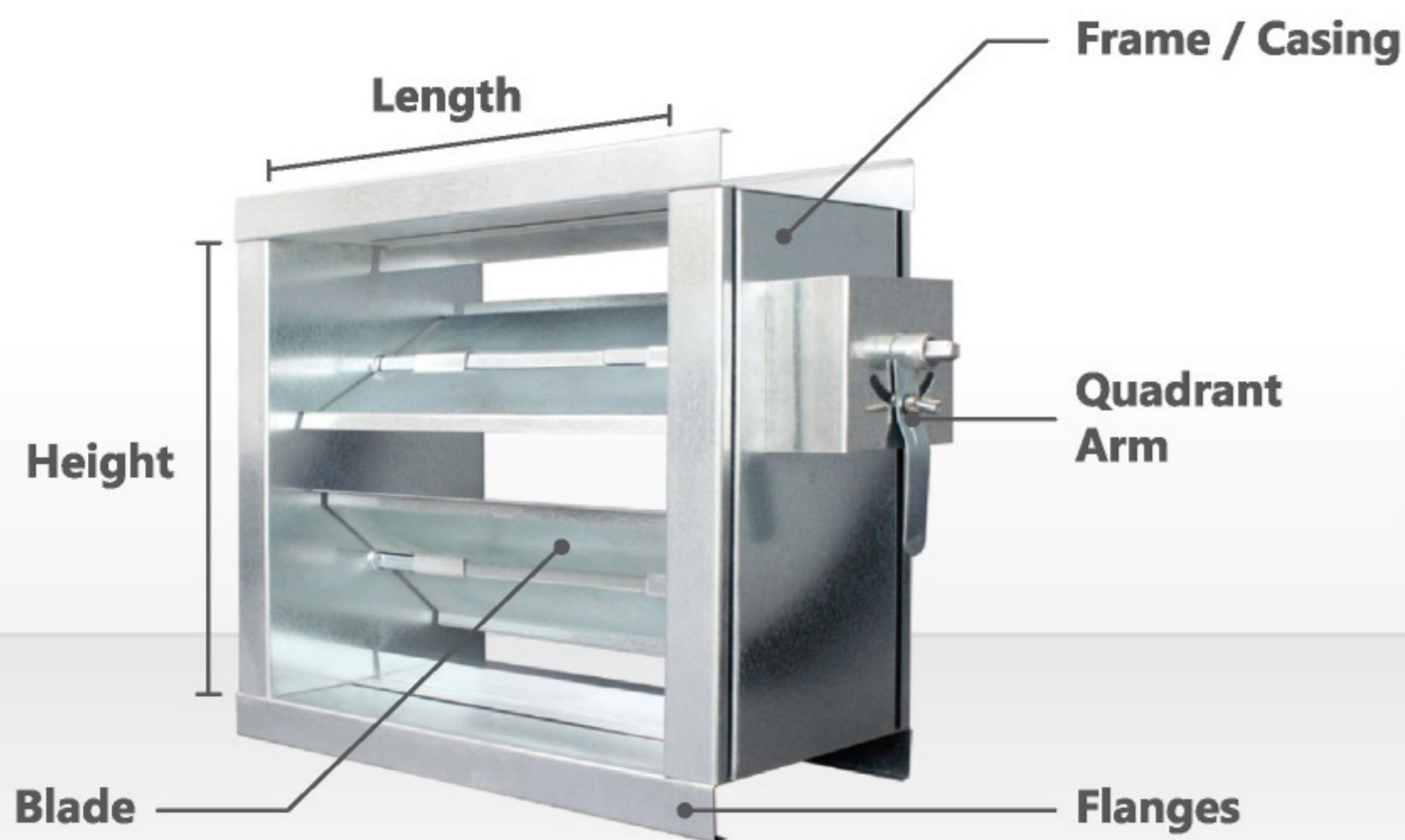
1. 15.0mm x 3.0mm thick linkage system to be welded to the driving blade shaft. Individual linkage components to be secured with pins or welding method at pre-determined geometry locations to ensure accurate blade phasing.

## Linkage Cover & Side Seals

1. 1.5mm pre-formed angles to be welded to the damper casing assembly to provide both blade stop and sealing functions.
2. Damper side seals are available upon request.
3. Actuator mounting angles to be provided when required to ensure proper actuator mounting. Construction design to be changed according to actuator type.
4. Material provided to be galvanized steel, unless otherwise stated.

## Finishing

1. Damper assembly to be in natural finish of the material.



### Notice :

**Damper size would be fabricate as exact neck size**

## AVAILABLE TYPES



**Quadrant Arm**



**Worm Gear**



**Motorized**



**VCD** | *Volume Control Damper*

**MVCD** | *Motorized Volume Control Damper*

## Products Range

Grilles	
Diffusers	
Dampers	 
Fire & Smoke Protection	
VAV	
Others	
Accessories	



**Prudent Aire Sdn Bhd** 514037-D  
 Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
 43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
 Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
 Fax : +603-9100 4868 Email : sales@prudentaire.com

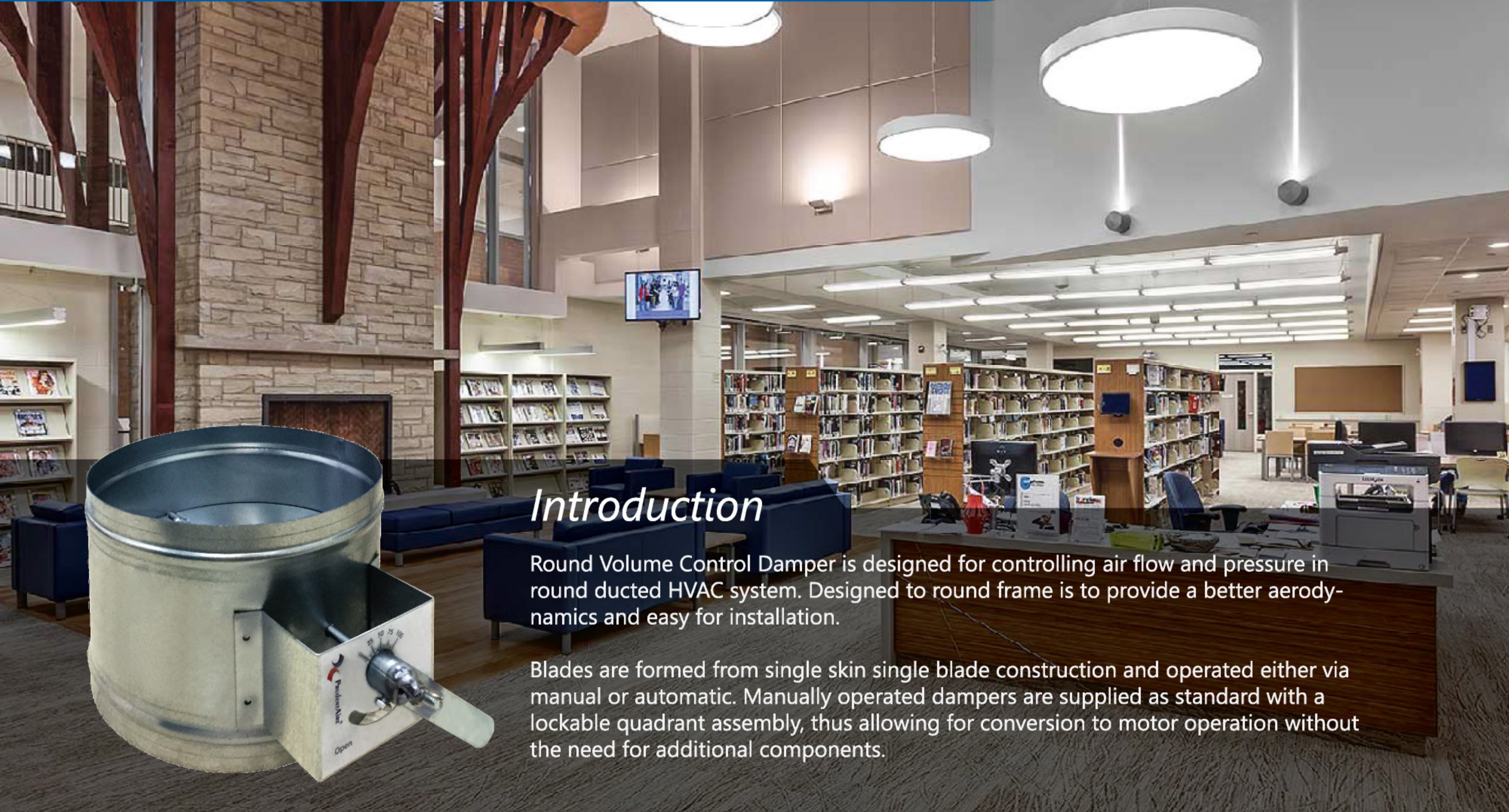
[www.prudentaire.com](http://www.prudentaire.com)



**RVCD**

*Round Volume  
Control Damper*





## Introduction

Round Volume Control Damper is designed for controlling air flow and pressure in round ducted HVAC system. Designed to round frame is to provide a better aerodynamics and easy for installation.

Blades are formed from single skin single blade construction and operated either via manual or automatic. Manually operated dampers are supplied as standard with a lockable quadrant assembly, thus allowing for conversion to motor operation without the need for additional components.

## CONSTRUCTIONS & MATERIALS

- Single skin, single blade construction
- Available in manual or motorized models
- Actuation available in following configurations:
  - i) Hand locking quadrant arm
  - ii) Bare shaft
  - iii) Factory installed actuator

### Frame Construction



Galvanized Steel  
(Size Dependant)

### Blade Construction



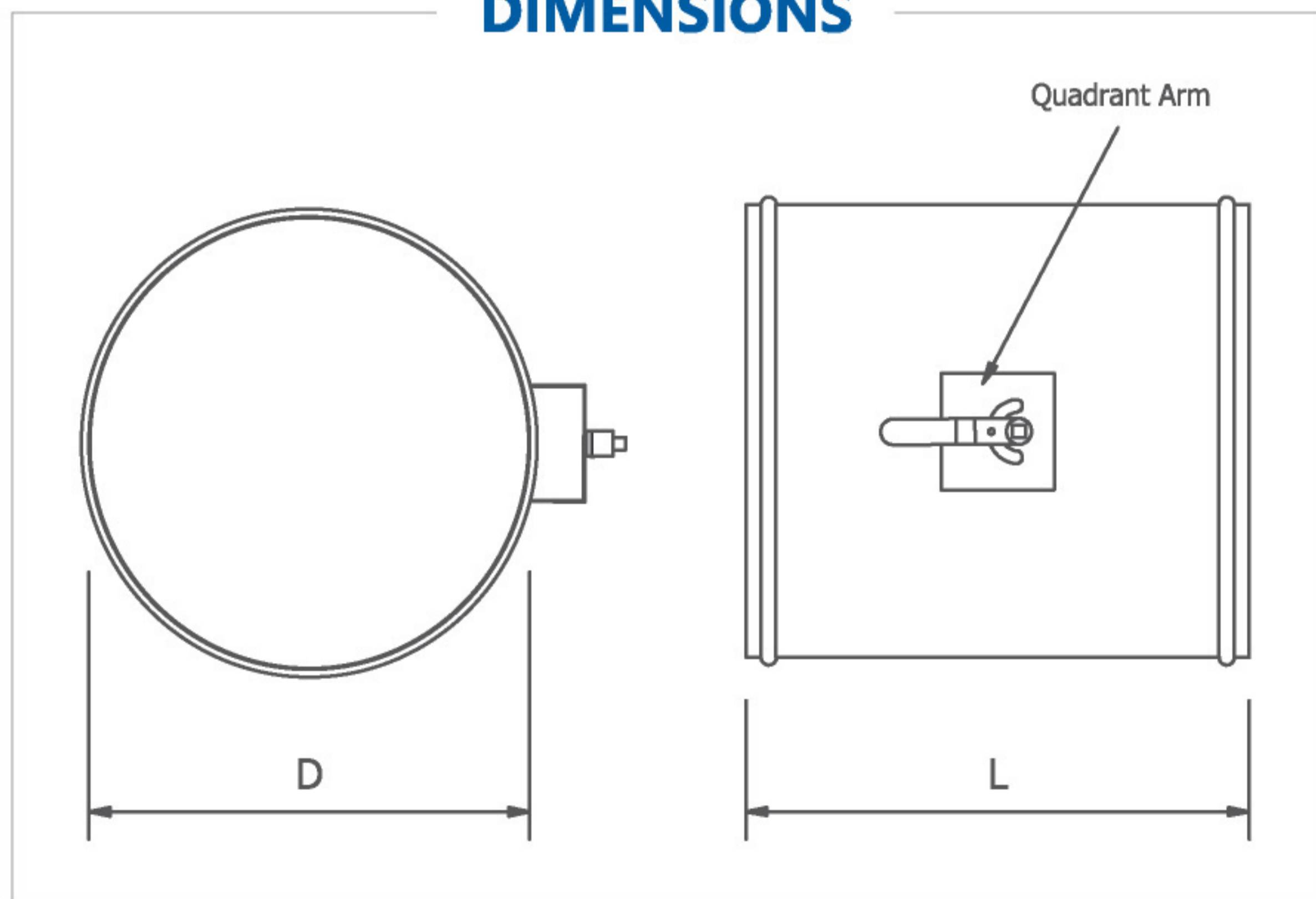
Galvanized Steel  
(Size Dependant)

### Construction Available



Stainless Steel  
Available

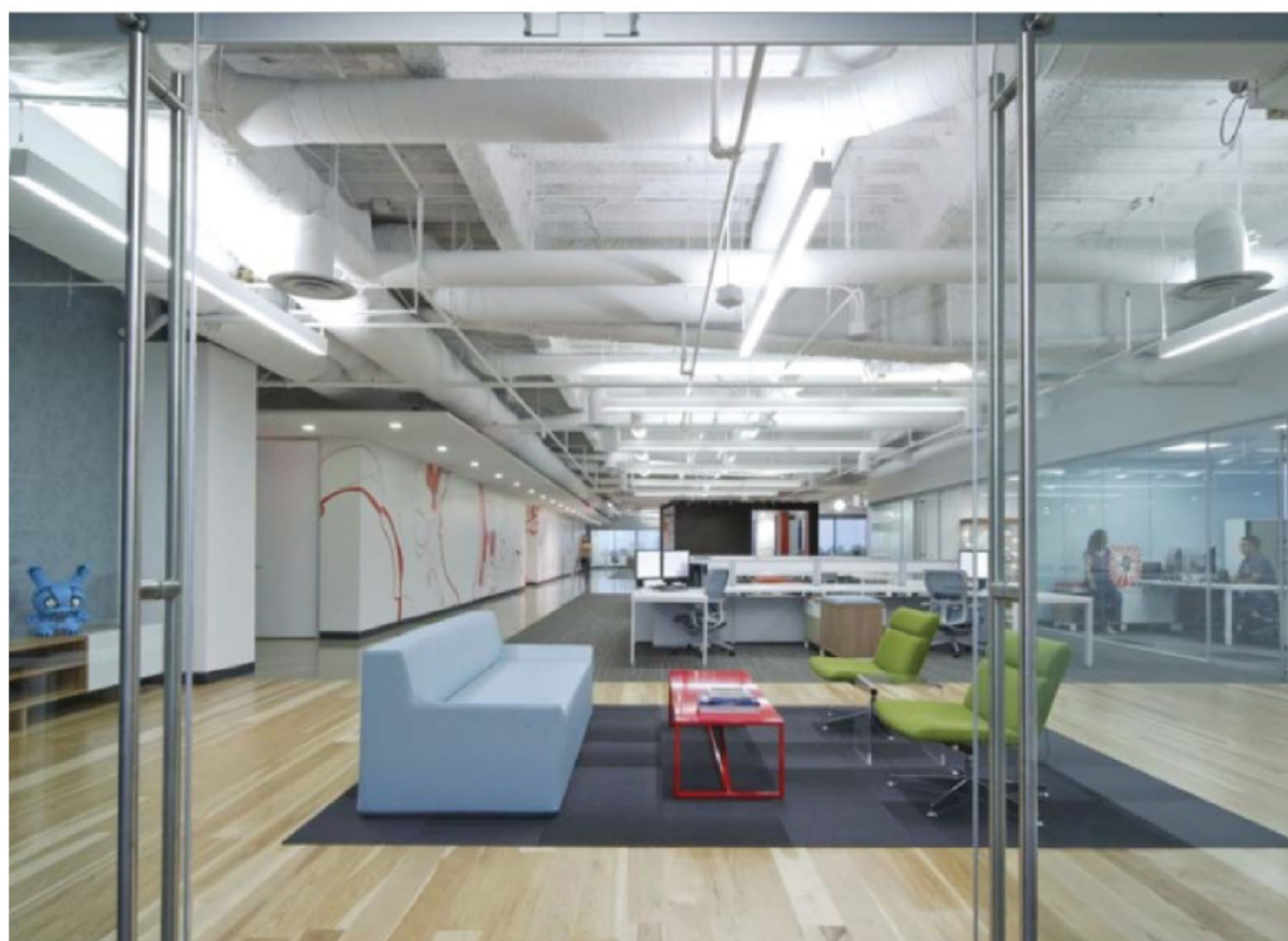
## DIMENSIONS



## STANDRAD SIZE AVAILABLE & DIMENSIONS

Size Ordering (Inch)	D mm	L mm
4	95	150
6	145	200
8	195	250
10	245	300
12	295	350
14	345	400
16	395	450

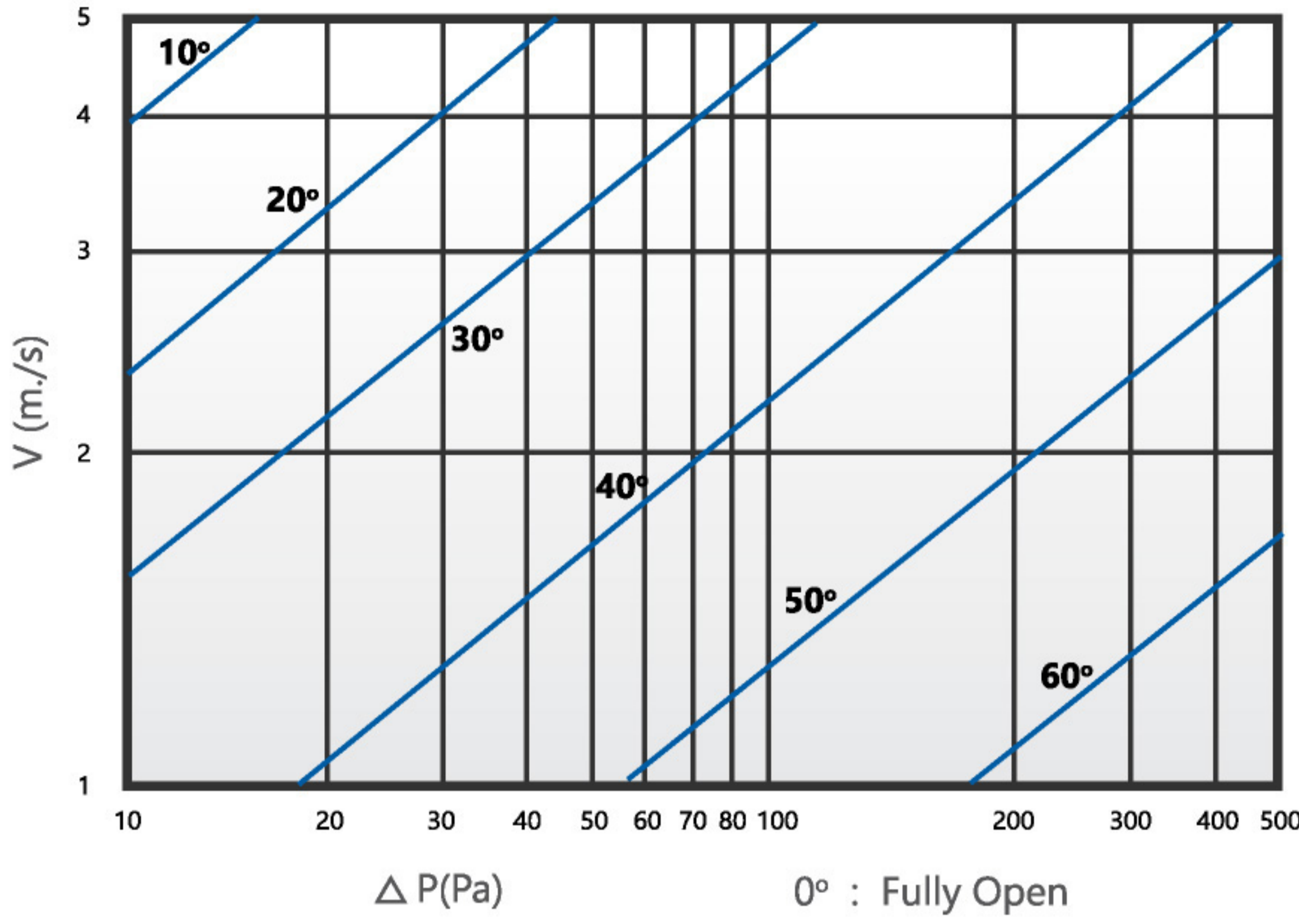
\*\* Other size and dimensions are available upon request. Maximum size can up to 1000mm diameter.



**AERODYNAMIC PERFORMANCE**

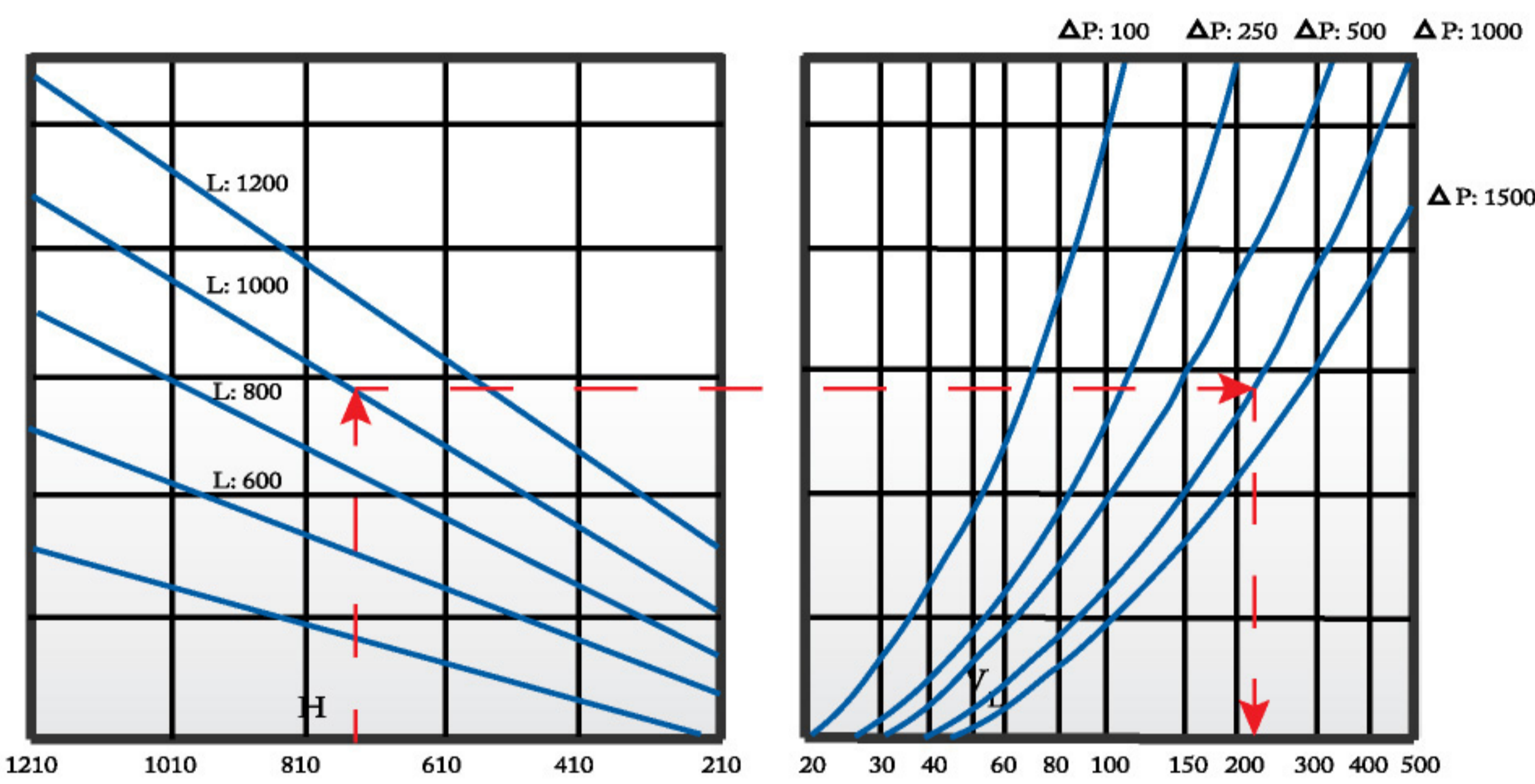
**STATIC PRESSURE DROP**

**PRESSURE DROP VS DUCT VELOCITY**

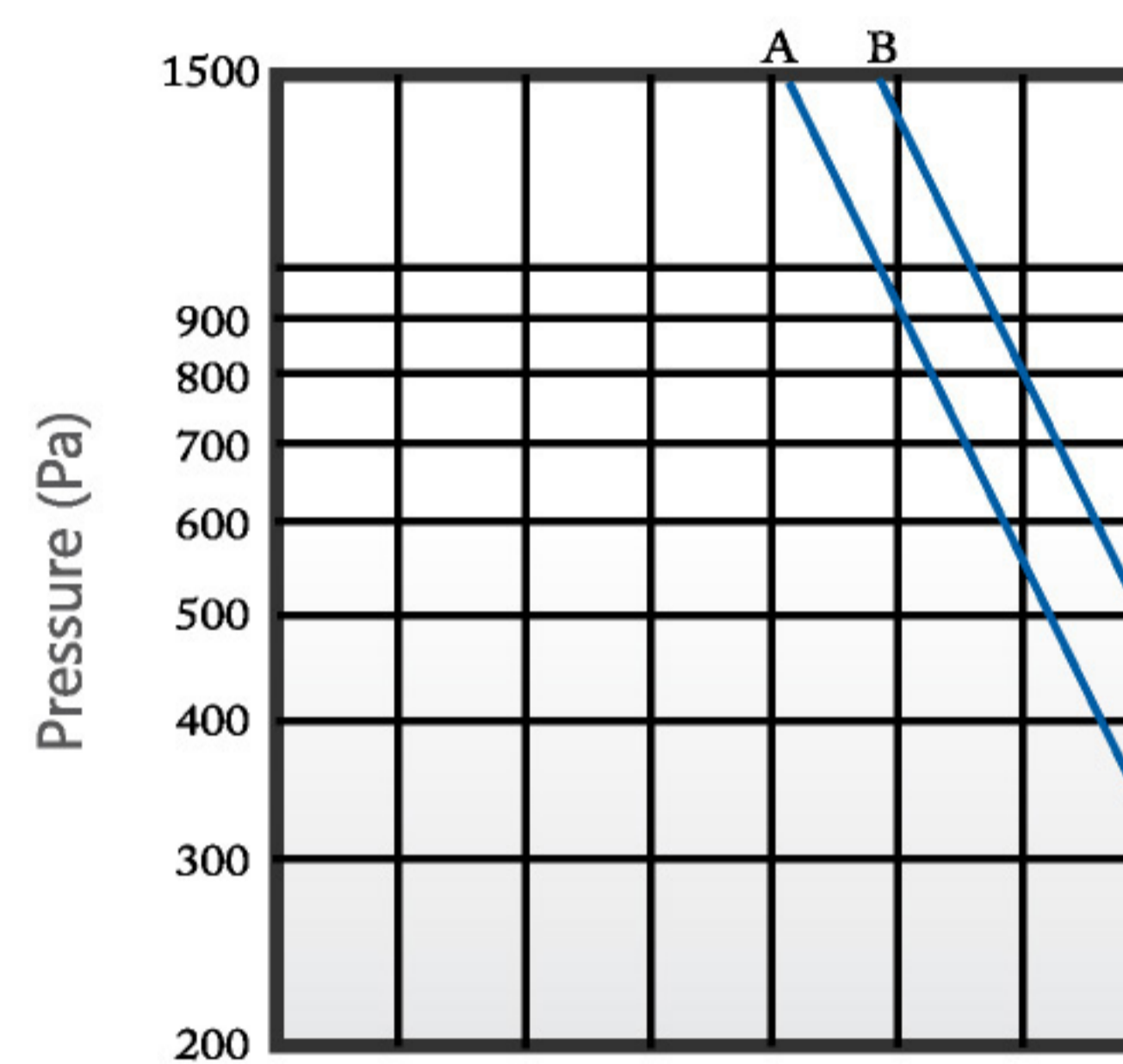


**V** Duct Velocity (m/s)  
**ΔP** Static Pressure Drop (Pa)  
 00, 100, 200, ... etc Degree Opening  
 Max static pressure drop for fully open dampers is 10 Pa

**CLOSED DAMPER LEAKAGE**



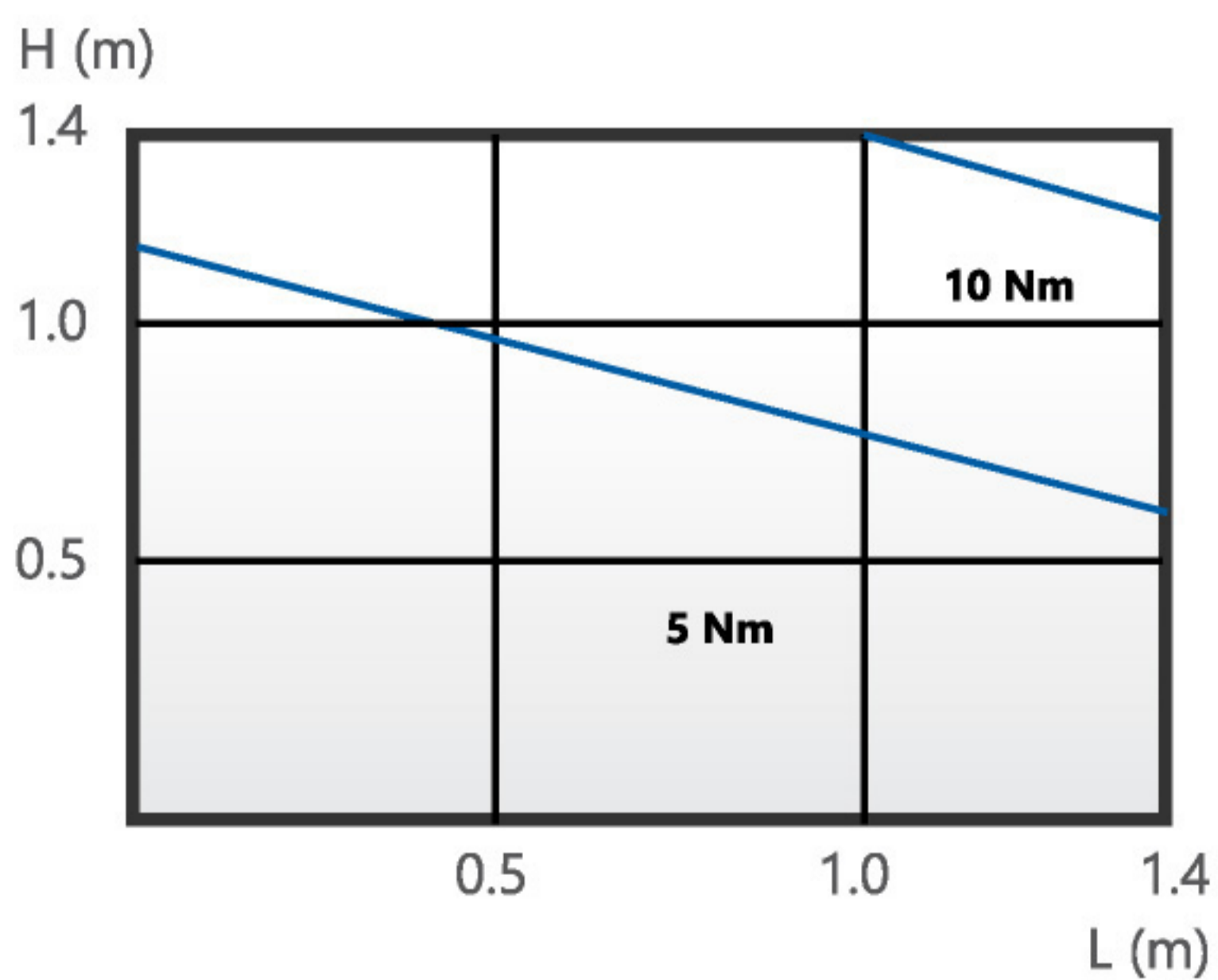
**OPERATION RANGE**



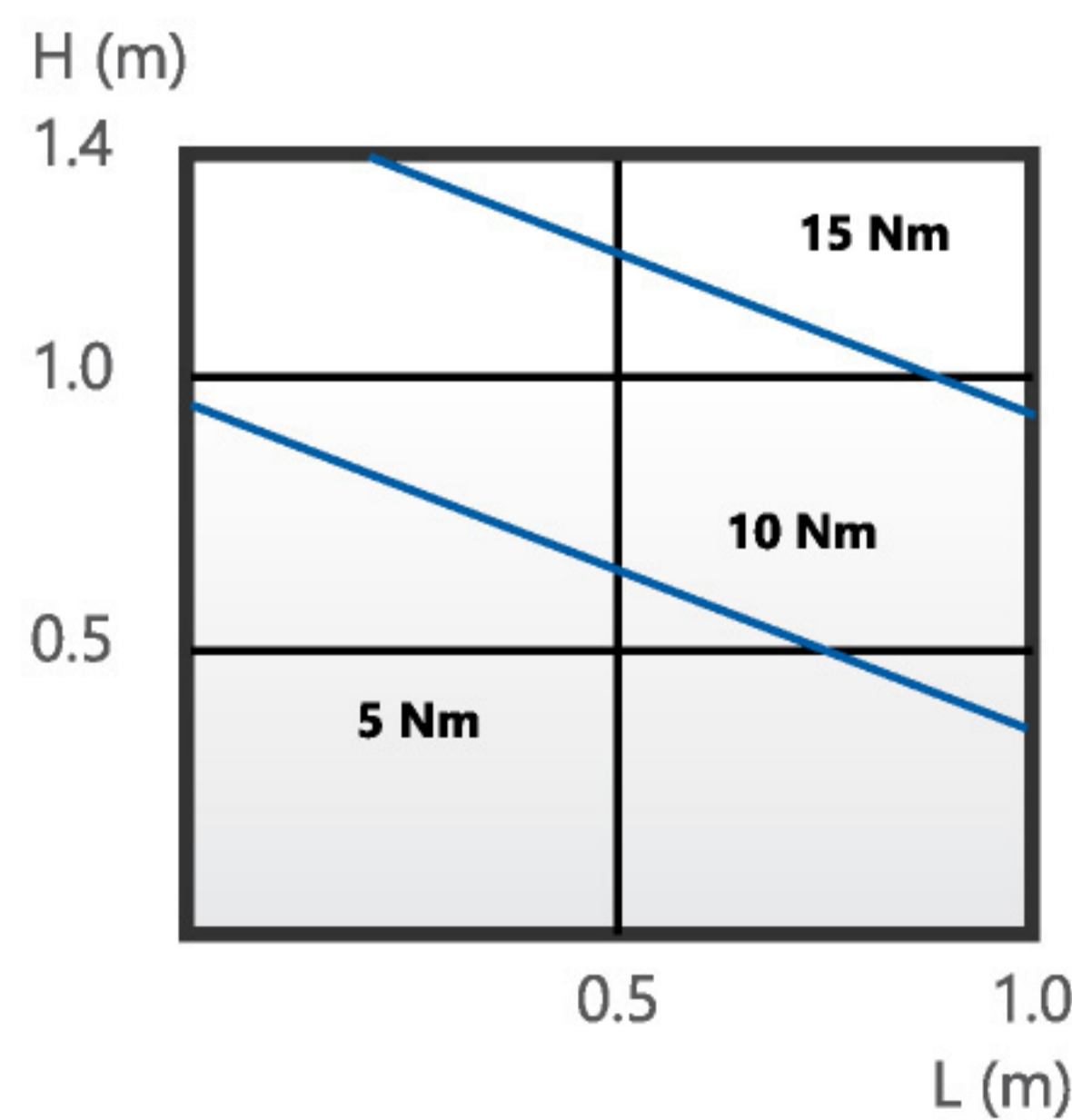
**L** Length (mm)      **VL** Volume Flowrate (cmh)  
**H** Height (mm)      **ΔP** Pressure Difference (Pa)  
**A** Recommended operation range  
**B** Critical operation range

**ACTUATOR TORQUE REQUIREMENTS**

**FOR PRESSURE LESS OR EQUAL TO 500 PA**



**FOR PRESSURE LESS OR EQUAL TO 1000 PA**

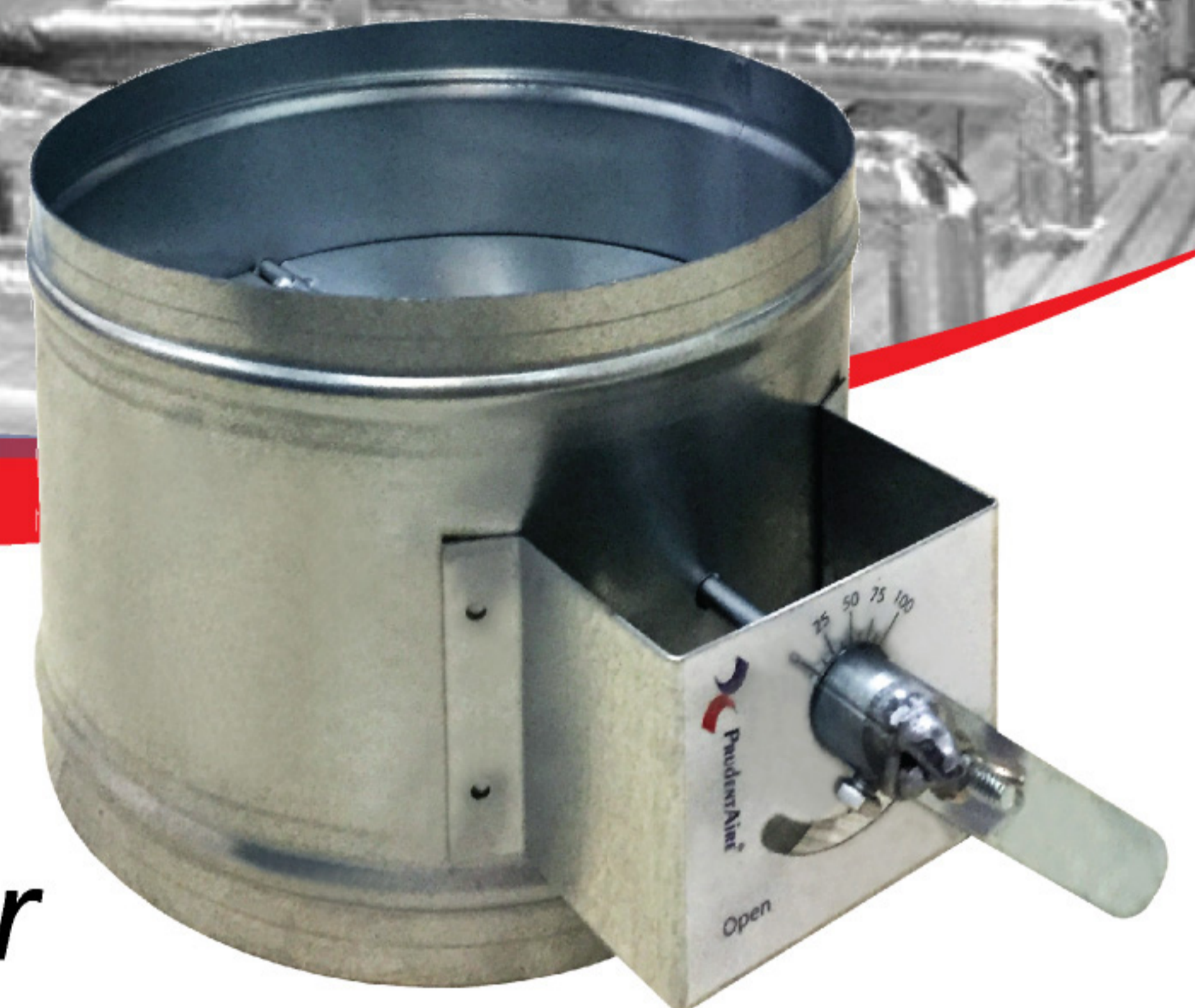


**H** Damper Height (m)  
**L** Damper Length (m)



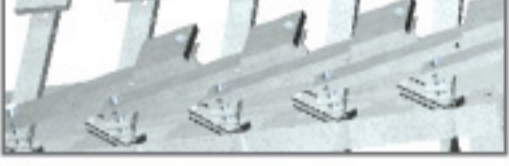






**RVCD**

*Round Volume  
Control Damper*



## Products Range

- Grilles 
- Diffusers 
- Dampers  ◀
- Fire & Smoke Protection 
- VAV 
- Others 
- Accessories 

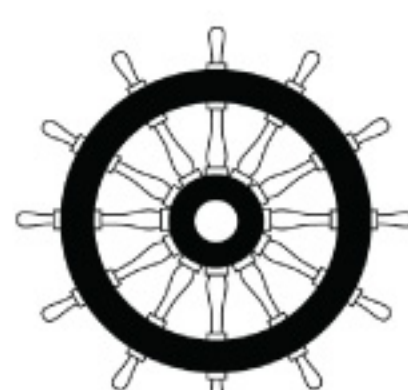


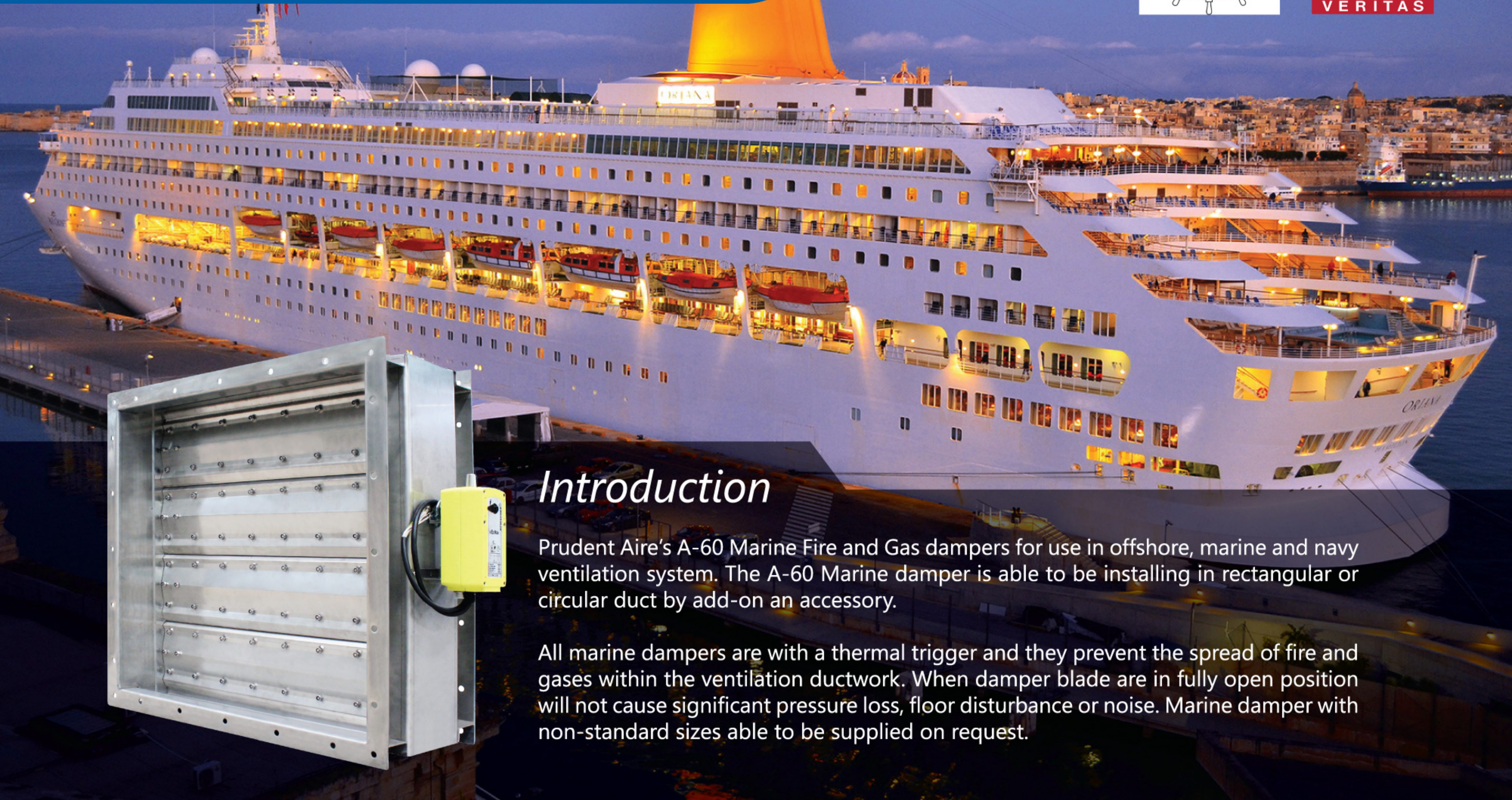
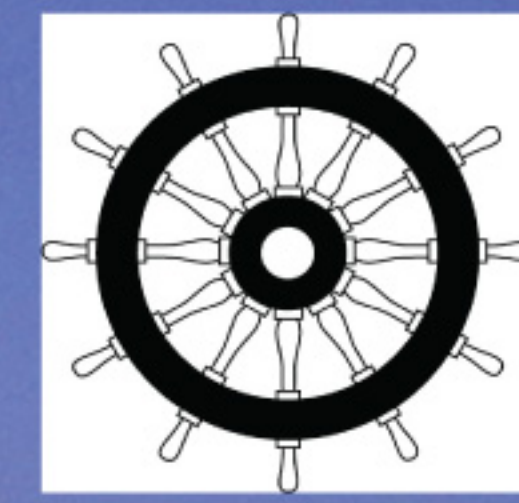
**Prudent Aire Sdn Bhd** 514037-D  
 Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
 43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
 Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
 Fax : +603-9100 4868 Email : sales@prudentaire.com

[www.prudentaire.com](http://www.prudentaire.com)



**MD** *A60 Marine  
Fire Damper*





## Introduction

Prudent Aire's A-60 Marine Fire and Gas dampers for use in offshore, marine and navy ventilation system. The A-60 Marine damper is able to be installing in rectangular or circular duct by add-on an accessory.

All marine dampers are with a thermal trigger and they prevent the spread of fire and gases within the ventilation ductwork. When damper blade are in fully open position will not cause significant pressure loss, floor disturbance or noise. Marine damper with non-standard sizes able to be supplied on request.

## CONSTRUCTIONS

- Approved by Bureau Veritas as A60 Fire Damper.
- Parallel blade closing action
- Double skin blade with tape for better air-tight conditions
- Standard nominal fuse release temperature 74°C. Other temperatures available.
- Electrical, pneumatic or spring operation system available.
- High pressure rating up to 3KPa with Min leakage & deflections

## MATERIALS

### Frame



Stainless Steel  
316L / 304

### Blades



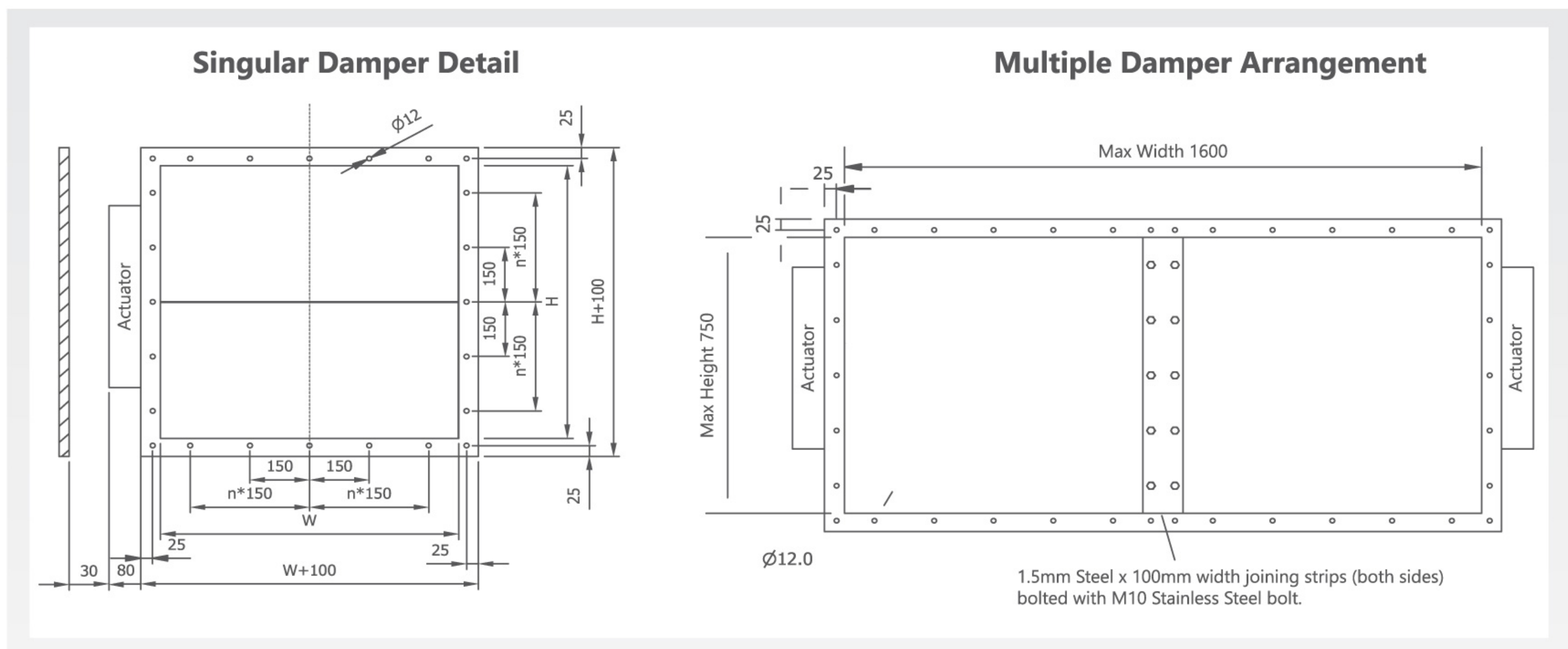
Stainless Steel  
316L / 304

### Shaft



Stainless Steel  
20mm Dia

## DIMENSIONS



Note : The maximum tested multiple size is 1600mm width x 750mm height.

When the damper are joined together to form assemblies larger than this size then approval from your local marine regulaive authority will be required.



**DAMPER SPECIFICATION**

**APPLICATION**

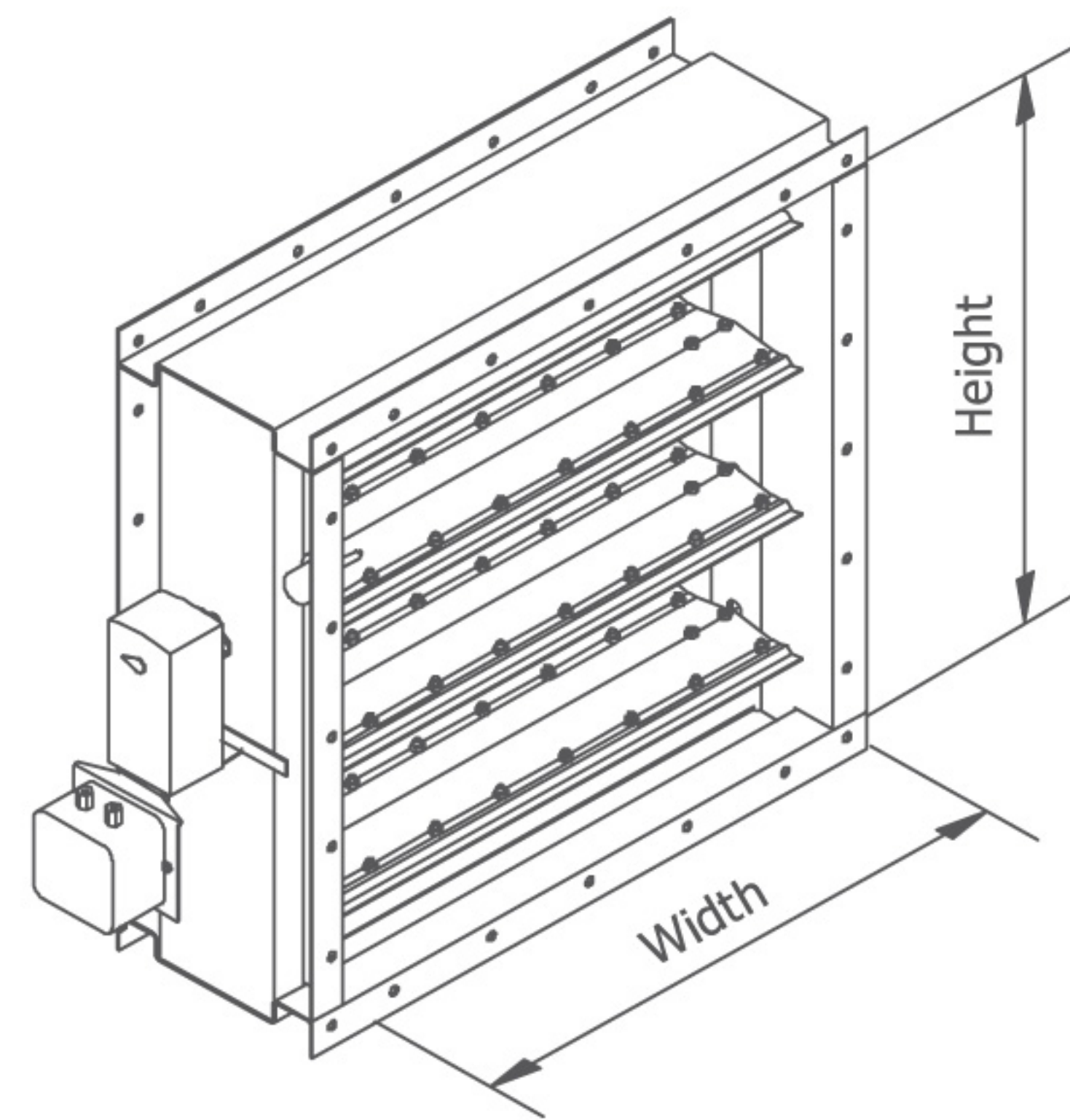
The A-60 Marine Fire Damper is tested and Bureau Veritas approved for fitting to Class A-60 Divisions (bulkheads and decks). It is constructed with aerodynamic stainless steel interlocking parallel blades and closes upon high temperature or loss of electric power connection. The A-60 is fitted with an electrical thermal release device (ExPro-TT) which includes a manual test switch that allows periodic operation of the damper for testing purposes.

**Model A-60 Marine Fire Damper meets the following requirements:**

- Tested and approved for class A-60 divisions (bulkheads and decks).
- Bureau Veritas Marine Approval to IMO Fire Test Procedures Code, Annex 1, Part 3.
- Complies to Marine Equipment Directive.

**STANDARD CONSTRUCTION**

- **Frame :**  
300 x 3mm thick stainless steel 316L with full welded construction. Pre-punched bolt holes are provided at 50mm flanges.
- **Blades :**  
Double skin of 1.5mm thick stainless steel 316L. Blades are been bolted together to form airfoil shaped and internal filled with 128kg/m<sup>3</sup> mineral fiber.
- **Bearing :**  
20mm internal diameter flanged stainless steel bearing.
- **Sideseals :**  
Roll formed from 75 x 0.3mm stainless spring steel.
- **Linkage :**  
6mm thick stainless steel linkage are been concealed in frame.
- **Electrical Thermal Release :**  
72°C standard.



**Damper Sizes**

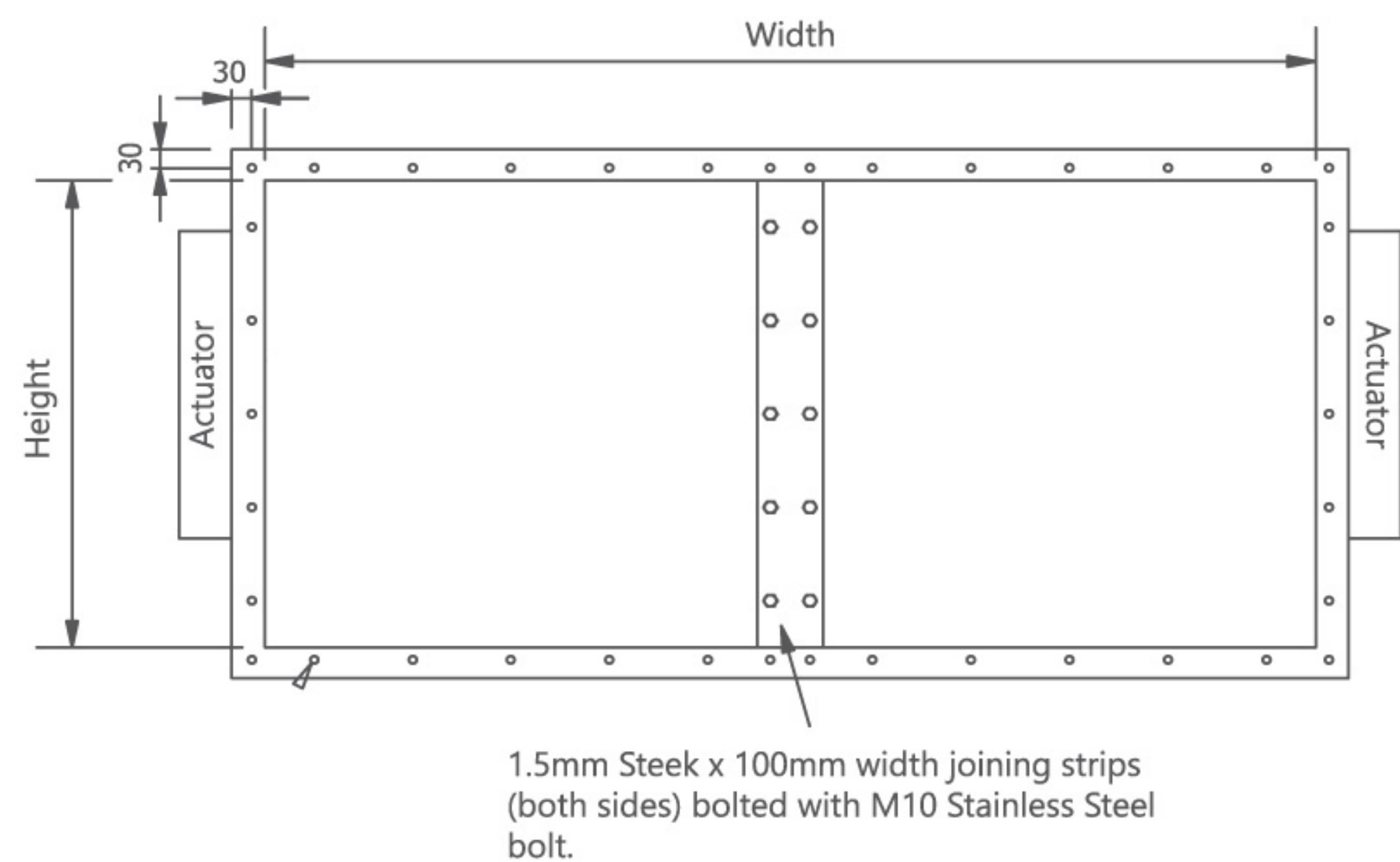
- **Minimum Size Single Section**  
Vertical or Horizontal - 200mm x 200mm
- **Maximum Size Single Section**  
Vertical or Horizontal - 750mm x 750mm
- **Maximum Size Multiple Section**  
Horizontal - 1600mm x 750mm

**Optional Construction / Features**

- 304 grade stainless steel construction
- Pneumatic actuator
- Actuator orientation
- Terminal Junction Box
- Limit Switch Box
- Manual Override Adaptor
- Adaptor with Round Spigot

**ASSEMBLY INFORMATION**

Multiple width assembled (2 x 1) have been tested and approved to a size of 1600mm width x 750mm height. Stainless steel jointing strips for fitting both side of the damper multiple assembly are supplied for site fixing by others.



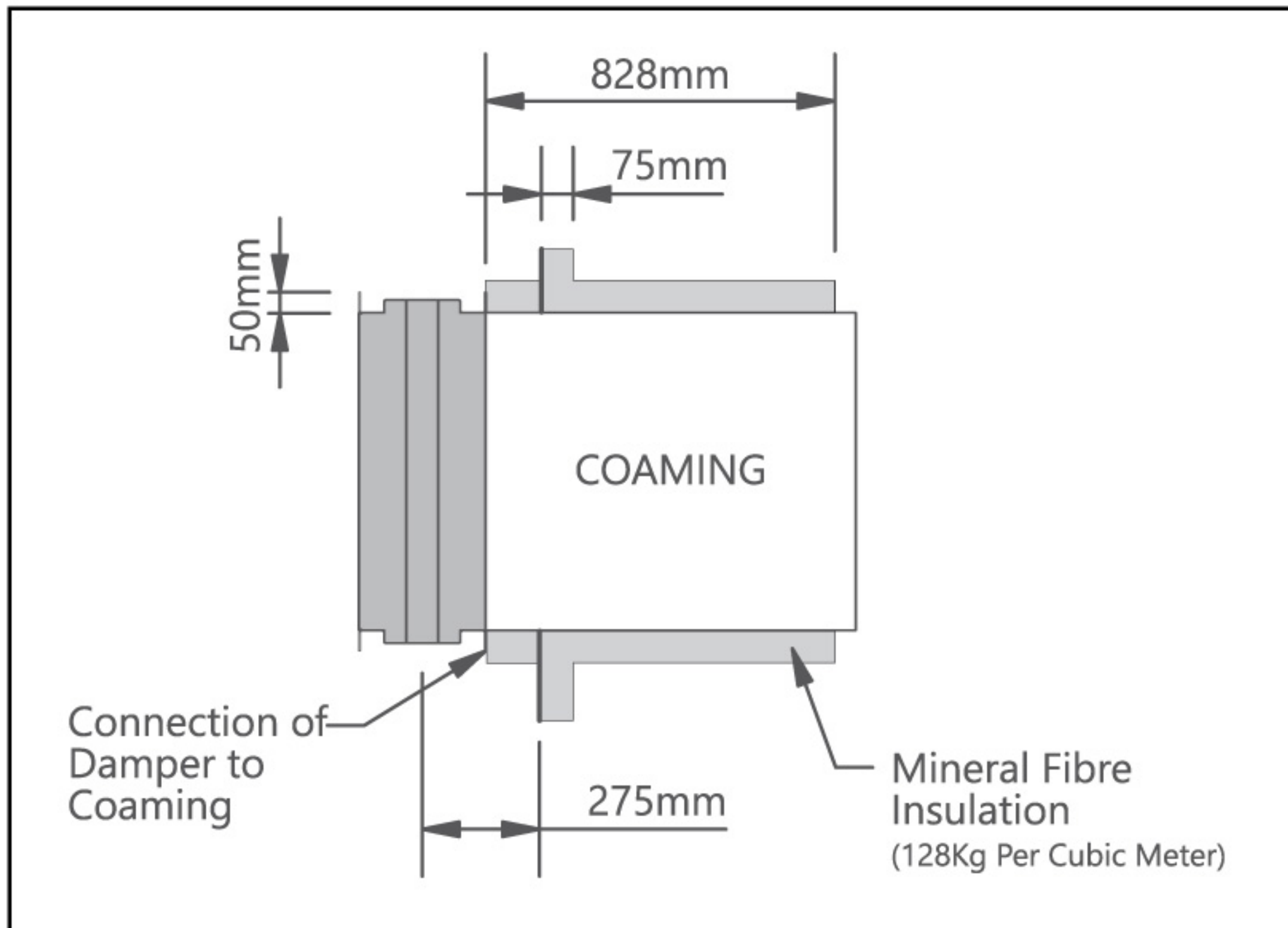
## DAMPER INSTALLATION

All installations must be carried out in accordance with the relevant Marine/Offshore Authority requirements.

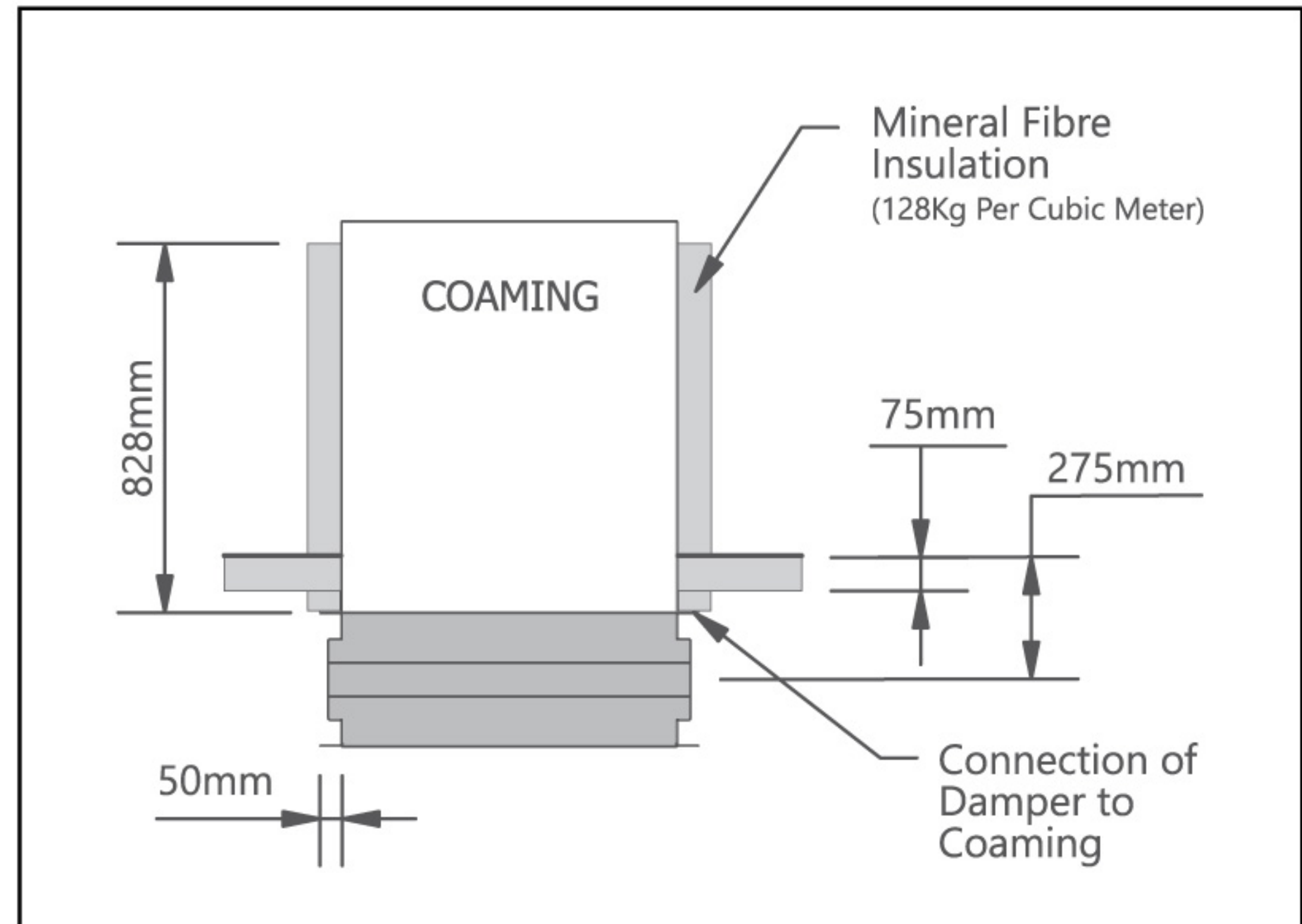
The damper should be installed in accordance with Insulation details (as shown below) that represent a typical installation. Both holes are provided as standard on the damper flanges (unless otherwise stated) at 150mm maximum centres. Matching hole positions are necessary on mating coaming/duct flanges. Apply approved fire resistant sealant/gasket to mating flanges and position damper. Bolt damper using M8 minimum diameter stainless steel bolts, at a maximum of 200mm centres.

## INSULATION DETAILS

### Bulkhead (Vertical)



### Deck (Horizontal)



**Table of Minimum Total Coaming Insulation Length** (Applies to all approval bodies)

Application	Insulation Thickness	Minimum Total Insulation Length
Vertical bulkhead 200x200 (0.04 msq)	75mm	828mm Insulation with Mineral Fibre 128Kg PER Cubic Meter
Vertical bulkhead up to 750x750 (0.5625 msq)		
Horizontal deck 200x200 (0.04 msq)		
Horizontal deck up to 750x750 (0.5625 msq)		
Horizontal deck above 0.5625 msq		

The same area/insulation criteria applies for multiple arrangements

## DAMPER WEIGHT DETAILS

### 3.0mm 316L Stainless Steel Casing, 300mm Deep

Weight (Kg) of A-60 Marine Fire Damper (Excluding Actuator)												
	200	250	300	350	400	450	500	550	600	650	700	750
200	19.5	20.3	21.2	21.9	22.7	23.5	24.3	25.2	26.1	26.9	27.7	28.5
250	20.6	21.4	22.3	23.2	24.2	25.1	26.1	27.1	27.9	28.8	29.7	30.7
300	21.7	22.7	23.7	24.8	25.9	26.9	28.1	29.2	30.2	31.4	32.6	33.7
350	22.9	24.1	25.2	26.4	27.6	28.8	29.9	31.1	32.3	33.5	34.6	35.7
400	24.1	25.4	26.7	28.1	29.6	31.1	32.3	33.6	34.8	36.2	37.5	38.8
450	25.2	26.8	28.4	30.1	31.6	33.2	34.8	36.3	37.9	39.5	41.2	42.8
500	26.2	28.1	29.9	31.7	33.5	35.3	37.1	38.9	40.7	42.5	44.3	46.2
550	27.4	29.4	31.5	33.5	35.6	37.6	39.5	41.6	43.5	45.5	47.6	49.2
600	28.5	30.7	33.1	35.2	37.5	37.7	41.9	44.2	46.4	48.6	50.9	53.1
650	29.6	32.1	34.5	36.9	39.4	41.8	44.3	46.7	49.2	51.6	54.1	56.5
700	30.7	33.4	36.1	38.7	41.3	44.1	46.7	49.3	51.9	54.6	57.3	59.9
750	31.7	34.6	37.5	40.3	43.2	46.1	48.9	51.8	54.7	57.6	60.5	63.4

Weight (Kg) Of Actuator	
Standard actuator ExMax + Pro-TT	3.5Kg
Optional Actuator Spring Return Actuator + ETR	3.0Kg

## TEST SPECIMENS PHOTO

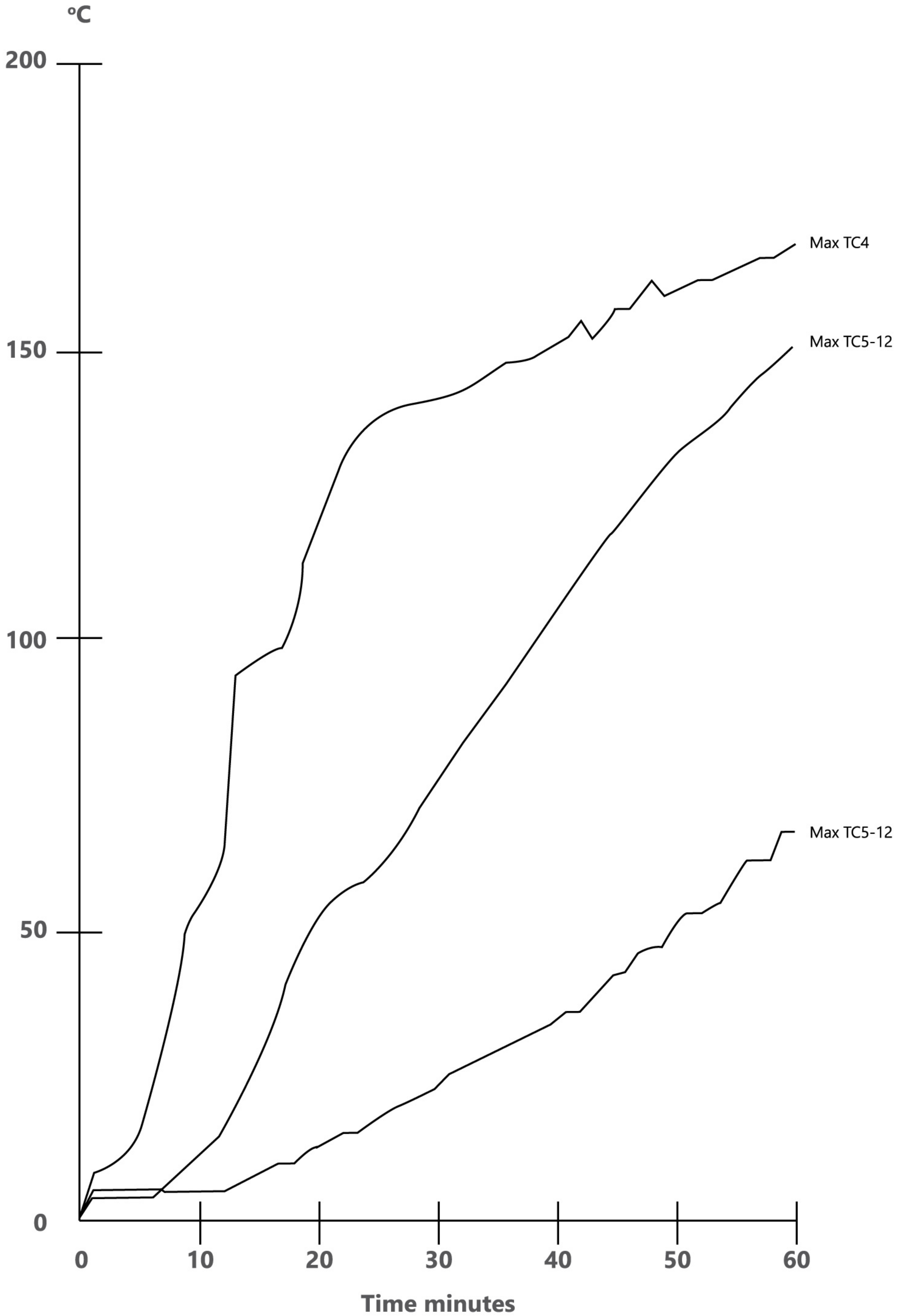
The Prudent Aire A-60 Marine Fire Damper has undergone extensive fire testing in single and multiple arrangements. The dampers were incorporated in steel bulkheads and decks and tested to the Marine Fire Resistance Test in accordance with IMO resolution MSC.307(88) for a duration of 60 minutes. Change to the originally supplied product may invalidate the certification and/or warranty.

### Test, approvals and certification

- Far East Fire Testing Center - Test accordance IMO resolution MSC.307(88)
- Bureau Veritas (BV) Group - Approval to IMO Fire Test Procedures Code for class A60 Bulkhead and Deck
- ISO 9001:2008 certification



TEST PERFORMANCE CHART



## STANDARD ELECTRICAL ACTUATOR

### ExMax 1/4 Turn Actuator

ExMax 1/4 turn actuator's are used as the standard electrical actuator for the A60 marine damper. The feature of the actuator are as below :

- Electrical, Explosion proof rotary actuators
- On-off control mode, 24...240 VAC/DC.
- 95 Deg angle of rotation include 5 deg pretension
- 8Nm with safety operation: fast spring return < 1s
- ATEX tested in according with directive 94/9/EC for zone 1, 2, 21, 22

The actuators are located outside of the duct work for ease of access and installation.

The actuator can be fitted in any one of the two orientations: Vertical or Horizontal.

The actuator are direct installed to the damper utilising a unique user friendly positive connection system.

This allows the dampers and actuator to be supplied separately, offering shipping and storage benefits.



### ExPro-TT

The thermoelectric safety trigger ExPro-TT is to activate the motorized A60 Marine Fire Damper into its safety position by spring return operation of an actuator.

Two temperature fuses Tf1 and Tf2 are part of the trigger. In case that the ambient temperature outside the duct is more than +72°C the temperature fuse Tf1 triggers. If the temperature inside the duct is more than +71°C the temperature fuse Tf2 triggers. If Tf1 or Tf2 is switching off the power, the circuit to the actuator is irreversibly cut.

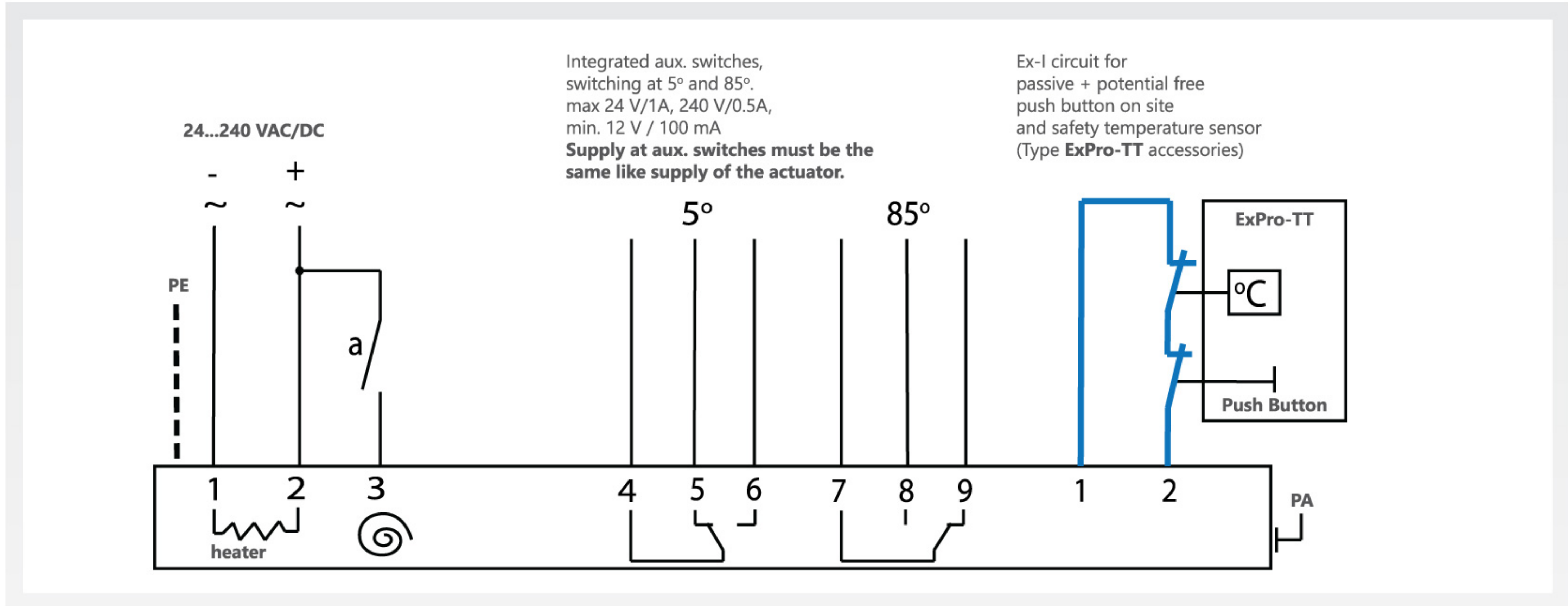
The spring return of the actuator moves the damper into its safety position.

A manual test switch allows periodic operation of the damper for testing purposes, simulating actual fail-safe release under fire conditions.

The associated electrical Actuator are available in one Universal version with 24 - 230V AC/DC supply.

**ACTUATOR APPLICATION AND WIRING**

**On-off - Spring Return + Ex-i trigger circuit**



**Power input depending on supply voltage**

The design of the on-site supply depends on the selected motor running time and selected supply voltage. Accompanying values are "about values" since there can be construction unit dispersions within electronics. The holding power is run time independently typical at ~5W. The power consumption for the heater is ~16W. In the heating phase the motor is not activate!

The initial starting supply voltage required by the actuators power supply unit is ~2.0A. The starting pulse takes about 1 sec. (please consider this while concepting the cross section of the supply line). The power factor is between 0.8 and 0.5 in dependence of motor running time. A line protection should be min. 2 AT.

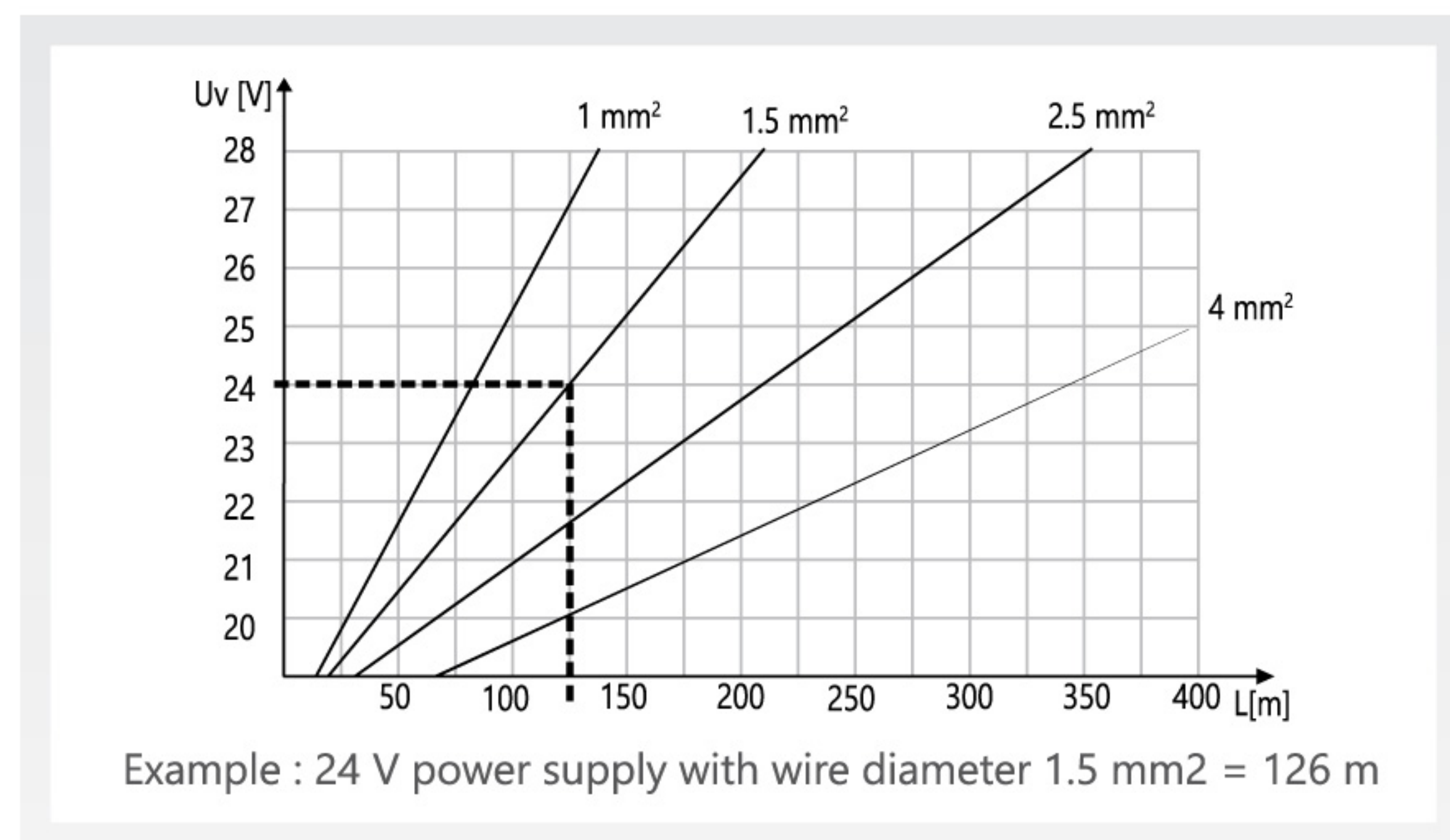
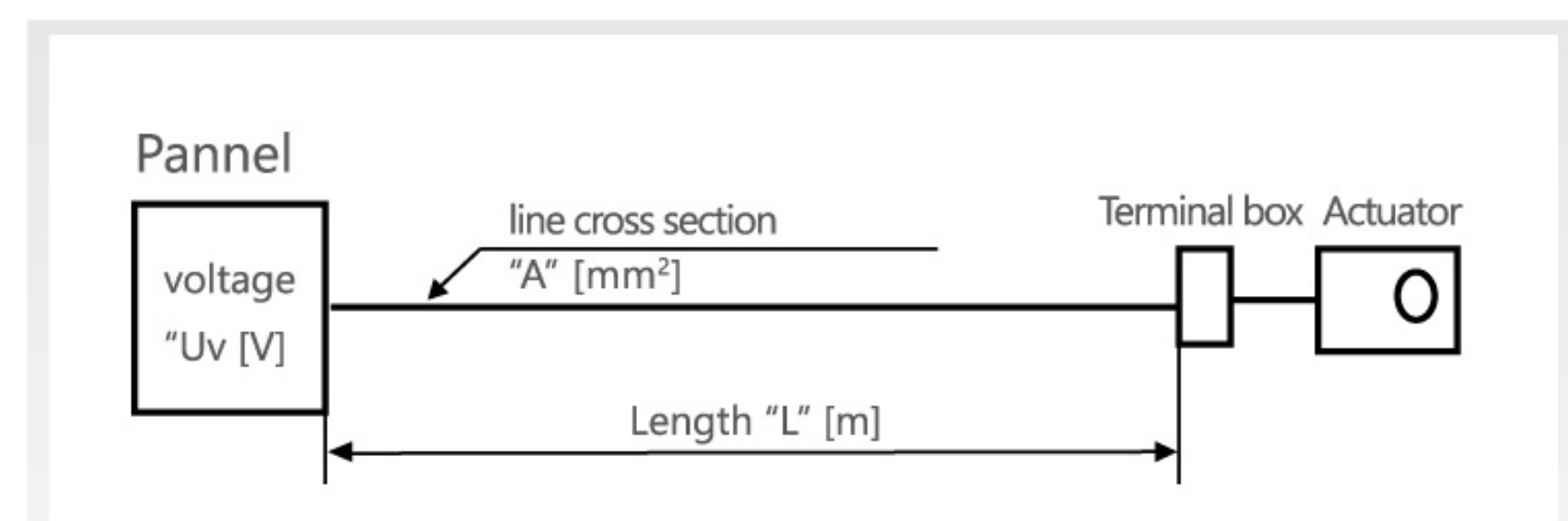
Voltage	Current	Rated current in acc. with motor running time				
		3/7.5s	15s	30s	60s	120s
24 VDC	I <sub>Nominal</sub>	4.70 A	1.30 A	0.70 A	0.60 A	0.50 A
120 VDC	I <sub>Nominal</sub>	0.75 A	0.30 A	0.25 A	0.20 A	0.17 A
240 VDC	I <sub>Nominal</sub>	0.37 A	0.15 A	0.12 A	0.10 A	0.08 A

**Cross section of the inlet line**

On long distance between voltage supply and drive, voltage drops occur due to line resistances. As a consequence with 24 VAC/DC the actuator receives a too low tension and does not start. In order to prevent this the cross section of the inlet line is to be dimensioned accordingly.

The accompanying formulas allow the calculation of the necessary line cross section respectively maximal permitted conduit length respectively utilizing the existing line cross section.

Alternatively the secondary voltage can be increased by selecting a transformer.



Required cable cross section A at existing cable length L

$$A = 0.0714 \times L : (Uv - 18V)$$

Example: L = 250 m, Uv = 30V  
 Cross section A = 1.5mm<sup>2</sup>

Maximum cable length L at existing cross section A

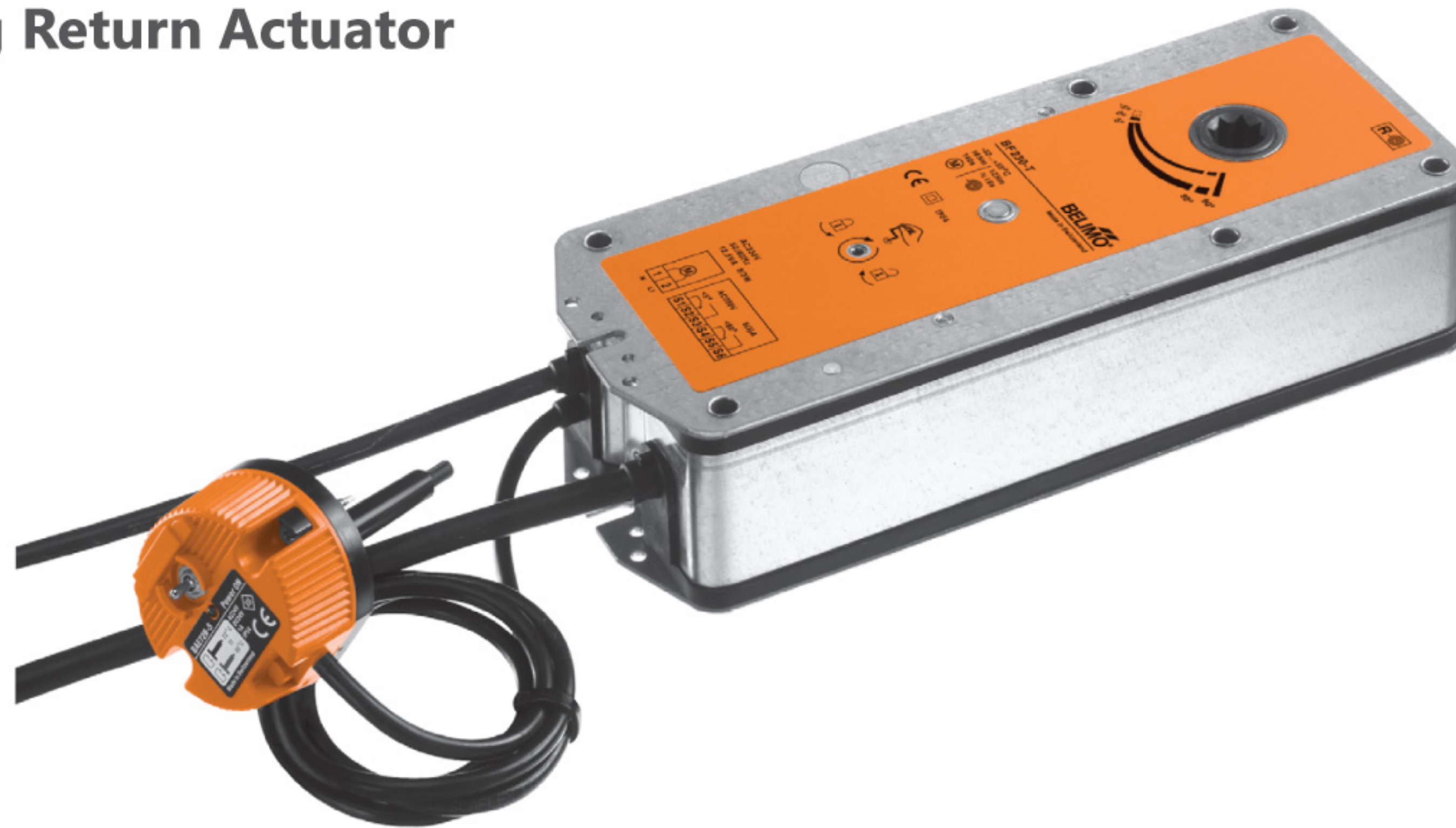
$$L = A \times (Uv - 18V) : 0.0714$$

Example: A = 1.5mm<sup>2</sup>, Uv = 24 V  
 Length of cable L = 126mm

For calculation following characteristics are essential  
 Uv = supply voltage [V]  
 A = line cross section [mm<sup>2</sup>]  
 L = conduit length [m]  
 Factor 0.0714 = drive specific factor [Vmm<sup>2</sup>/m]  
 (based on the electrical conductivity of electrolytic copper with a coefficient of 56 m/Ω mm<sup>2</sup>)

**OPTIONAL ELECTRICAL ACTUATOR**

**Optional Spring Return Actuator**



Spring return actuator combined with thermo-electric tripping device, BF230-T are available as an optional electrical actuator. This optional choice will give a more economic price. The features are as below:

- Electrical, IP54 rated rotary actuator
- On-off control mode, 240 VAC, 50/60 Hz
- 95 Deg angle of rotation, include 5 deg pretension
- 12Nm with safety operation
- Fast spring return with 16s
- 2x1 SPDT auxiliary switch cable available

The spring return actuator are located outside of the ductwork for ease of access and installation. Actuator fitted to dampers up to 400mm high, can be fitted in two orientations, vertical or horizontal.

The actuator are direct installed to the damper utilising a unique user friendly positive connection system. This allows the damper and actuators to be supplied separately, offering shipping and storage benefits.



**Electrical Thermal Release (ETR)**

Fail-safe is by means of a unique and patented Electrical Thermal Release (ETR) which operates at 72 DegC, or if power supply is interrupted. The ETR incorporates a safety feature, that ensures the fail-safe status of the damper if the ETR is not fitted on to the ductwork. Additional a green LED lamp is built into the ETR housing. This gives the user a simple and clear visual check that the actuator is receiving power, the ETR is correctly fitted, and the thermal fuse is intact.

A manual test switch allows periodic operation of the damper for testing purpose, simulating actual fail-safe release under fire conditions.

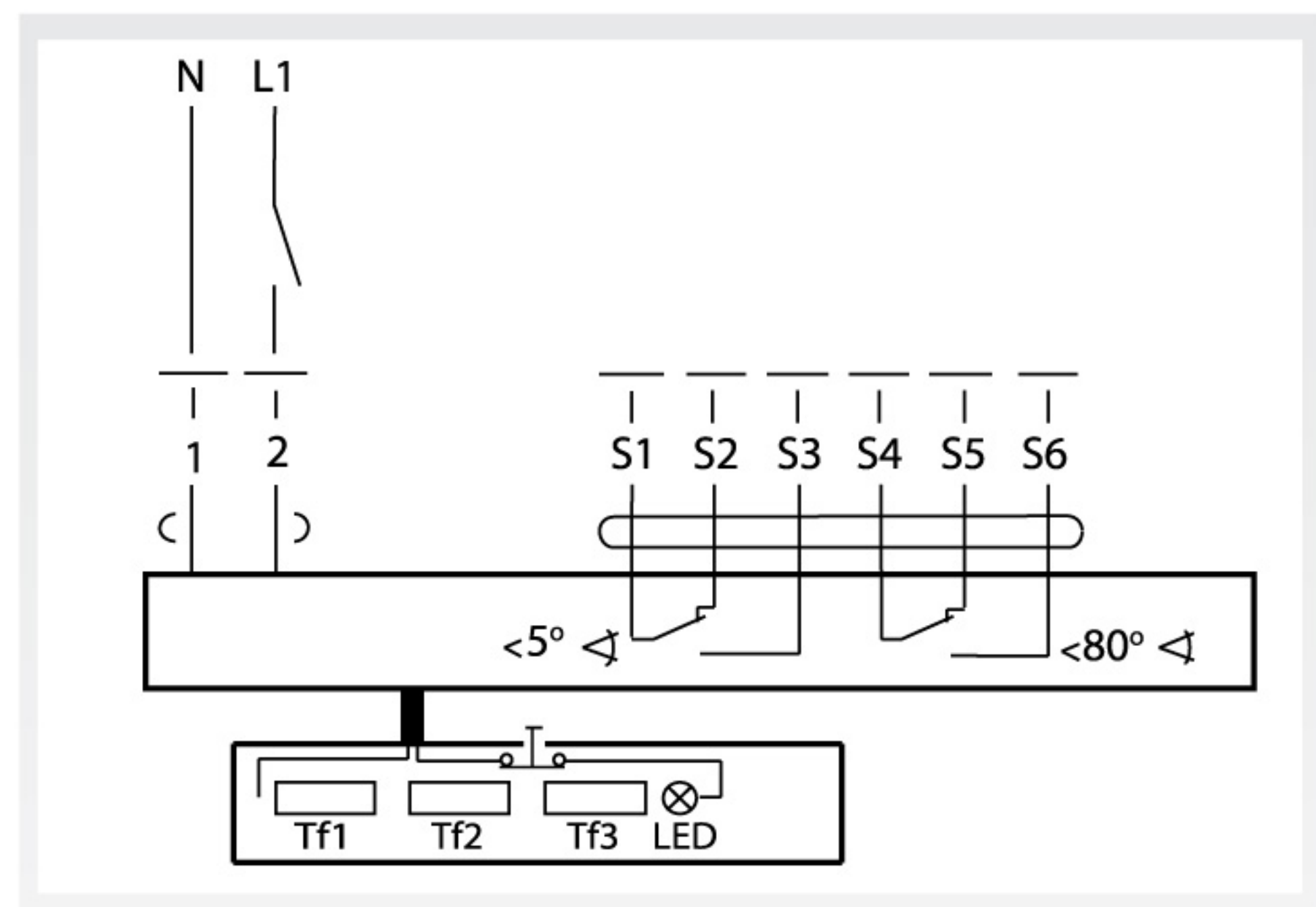
**Wiring Diagram**

Voltage : 230 VAC

- Supply On - Damper motor Open
- Supply off - Damper spring off
- ETR Operates - Damper spring off

End Switches - 2 x SPDT

To isolate from main power supply, the system must incorporate a device, which disconnects the phase conductor, with at least 3mm contact gap.



## TERMINAL JUNCTION BOX

Terminal Junction Box is a device to connect the current from power supply to the electrical actuator. The main purpose to have a terminal junction box is to minimise the spark expose to the surrounding when during short circuit happend at the connection.

Below have two optional terminal junction box are available:



### Stainless Steel Terminal Junction Box

Stainless Steel Terminal Junction Box are approved according to international standards such as: EN62208 and EN60079-0/7 (ATEX). Below are the features :

- Mirror-polished or electropolished stainless steel 1.4404 (316L), 1.5mm
- High-temperature-resistant seal as standard - extended temperature range of -60°C to +100°C.
- Approved according to ATEX, IECEx
- Flexible options for fastening the internal mounting rail
- IP66 protection
- Secure, permanent function of the seal is ensured by seal compression protection
- Earthing stud in the cover and base of the enclosure

## EX-Box

ExMax actuators are delivered with 1m cable. In case of cable connection inside hazardous areas a certificated Ex-e terminal box is required. Terminal Boxes type EXBox are specially designed for ExMax actuators for installation in hazardous areas zone 1, 2, 21 and 22.

Below are the features for the EXBox:

- Powder-coated aluminium housing
- Certification according ATEX
- Certification according IECEx
- IP66 protection in according with EN 60529
- Stainless steel housing are available
- Earthing stud in the cover and base of the enclosure





ACCESSORIES



**Limit Switch Box**

Limit switch box indicator offers clear location of the current damper blade opening position by 2 mechanical switches.

The operating position of the switches can be easily changed by adjusting the high resolution spline cams manually and independently without the need of additional tools ( cam closed-up, cam open-down)

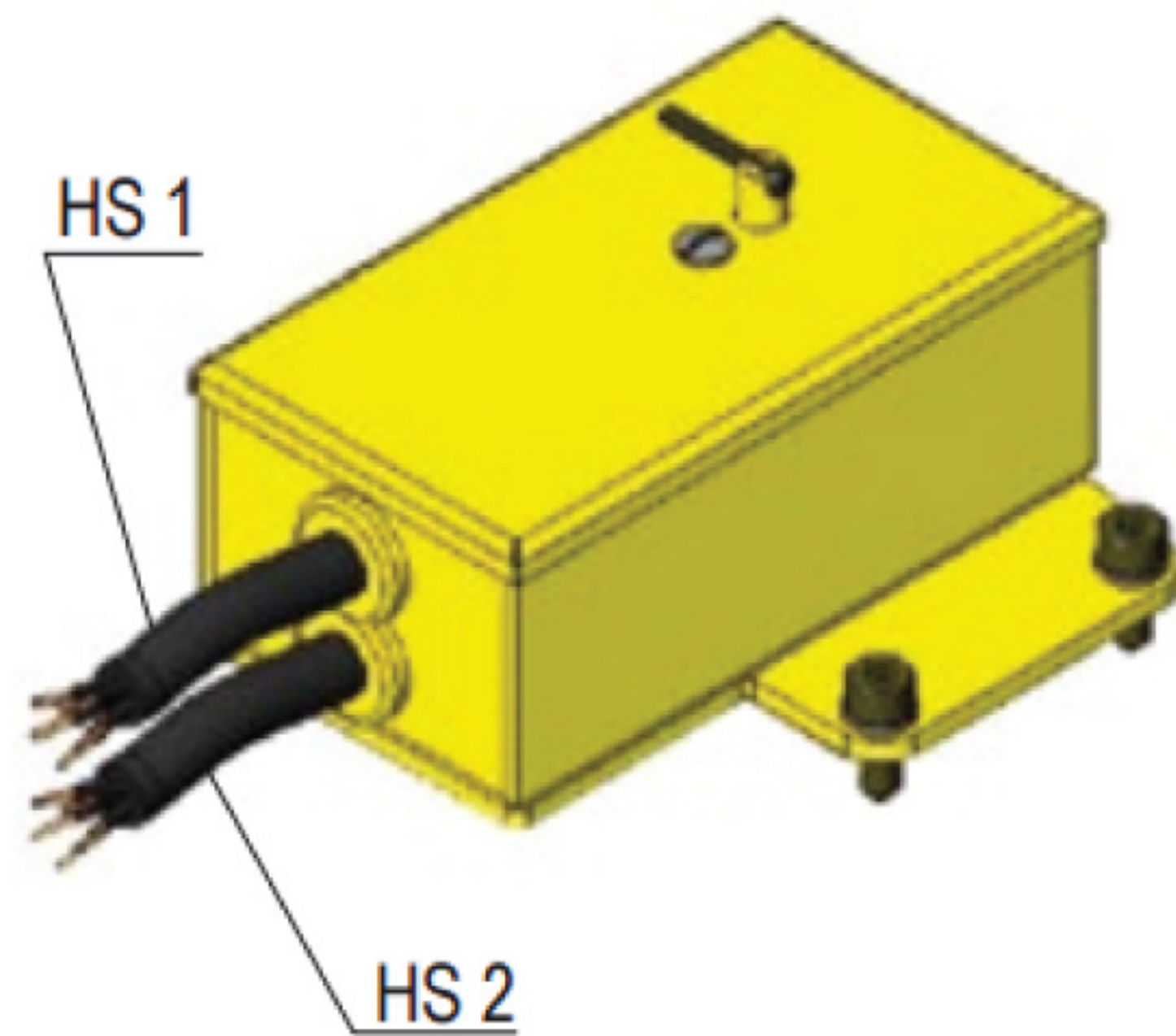
This limit switch box are equipped with 2 standard conduit entries with 1/2" diameter and 1 terminal strip with 8 point.

**ExSwitch**

ExSwitch are adaptable auxiliary switches for use in hazardous areas for end and interim position indication.

ExSwitch have 2 potential free contacts installed in a housing which can be fitted directly to ExMax actuators. Contacts are adjustable. adjustment during operation is possible.

ExSwitch is a explosion proof limit switch, been tested under ATEX, and have IP66 protection for switch.



**Manual Override Adaptor**

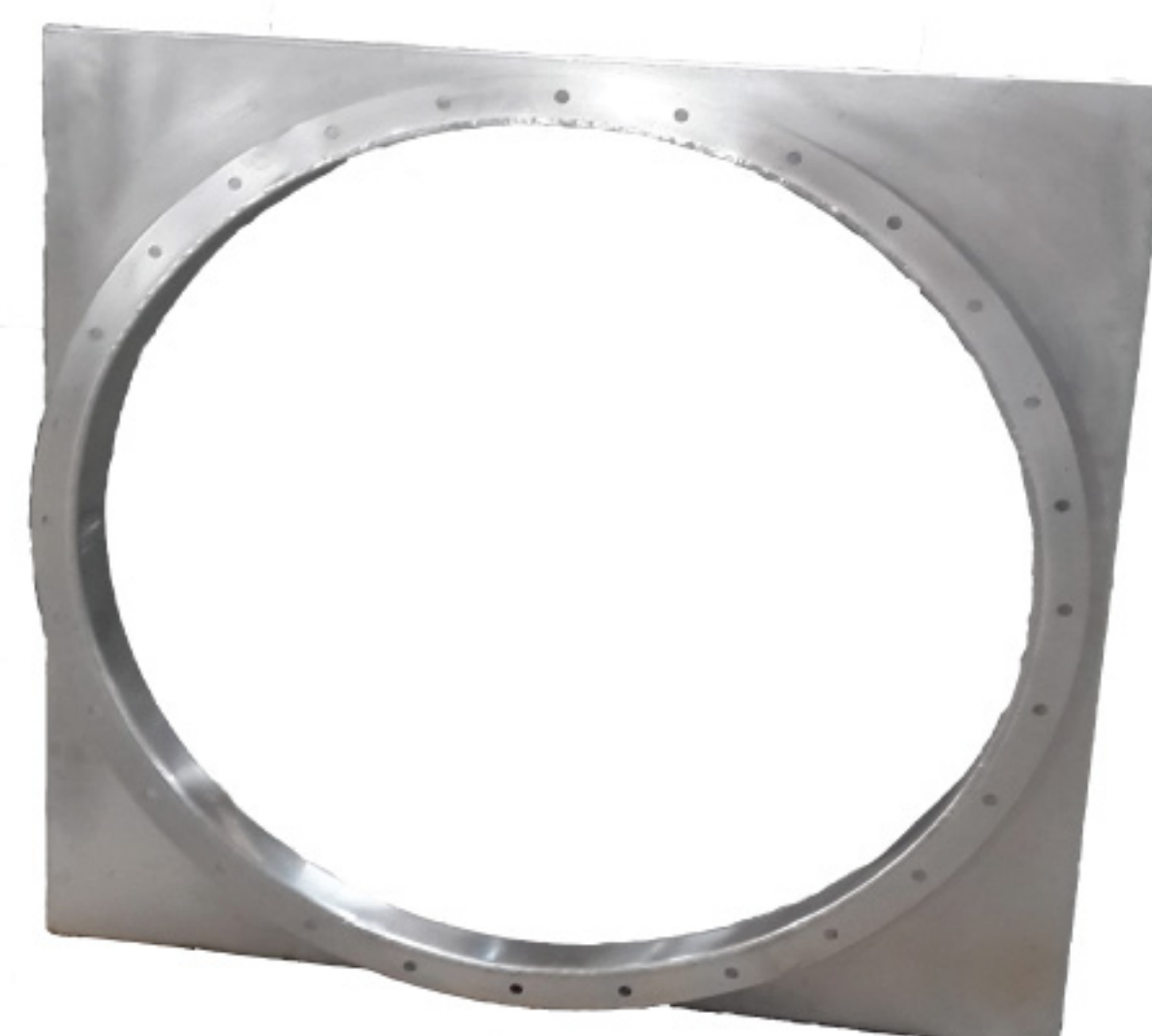
Manual override adaptor can bring the actuator into required position with the hand wheel. The adaptor will be install at the front of the ...Max actuator only. Either limit switch box or manual override adaptor are able to install at an actuator.

**Adaptor with Round Spigot**

Adaptor c/w round spigot are available as an accessory. The main function for the round spigot is to easy the installation work for the round duct. Flange at the round spigot are pre-drille with M10 holes with equally spaced. The number of holes are as below table:

Damper Diameter	No. of Holes
200 - 250	4 off
200 - 250	8 off
200 - 250	12 off

Custom holes are available upon request Material are in Stainless Steel 316L.



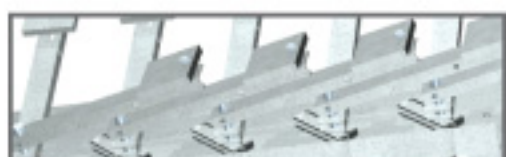








# MD | A60 Marine Fire Damper



## Products Range

- Grilles 
- Diffusers 
- Dampers  ◀
- Fire & Smoke Protection 
- VAV 
- Others 
- Accessories 



**Prudent Aire Sdn Bhd** 514037-D  
 Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
 43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
 Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
 Fax : +603-9100 4868 Email : sales@prudentaire.com

[www.prudentaire.com](http://www.prudentaire.com)



**MSPD** *Motorized Smoke Protection Damper*





## Introduction

Prudent Aire's smoke damper defined as "a device installed in ducts and air transfer opening of an air distribution or smoke control system designed to resist the passage of air and smoke. Primary function to prevent the passage of smoke through the heating, ventilation, and air conditioning system, or from one side of a fire-rated separation to the other.

Smoke damper and their actuators shall be qualified in accordance with UL555S to an elevated temperature of 177°C & 250°C. Leakage rating - Class II

## CONSTRUCTIONS & MATERIALS

- Leakage rating Class II
- Parallel blade closing action
- High pressure rating of up to 3kPa with Min leakage and deflections
- UL certified blade seal at blade edge to minimised leakage
- Shaft : 9.5mm GI square shaft
- Smoke damper and their actuators shall be qualified in accordance with UL555S

Casing



Galvanised Steel

Blade



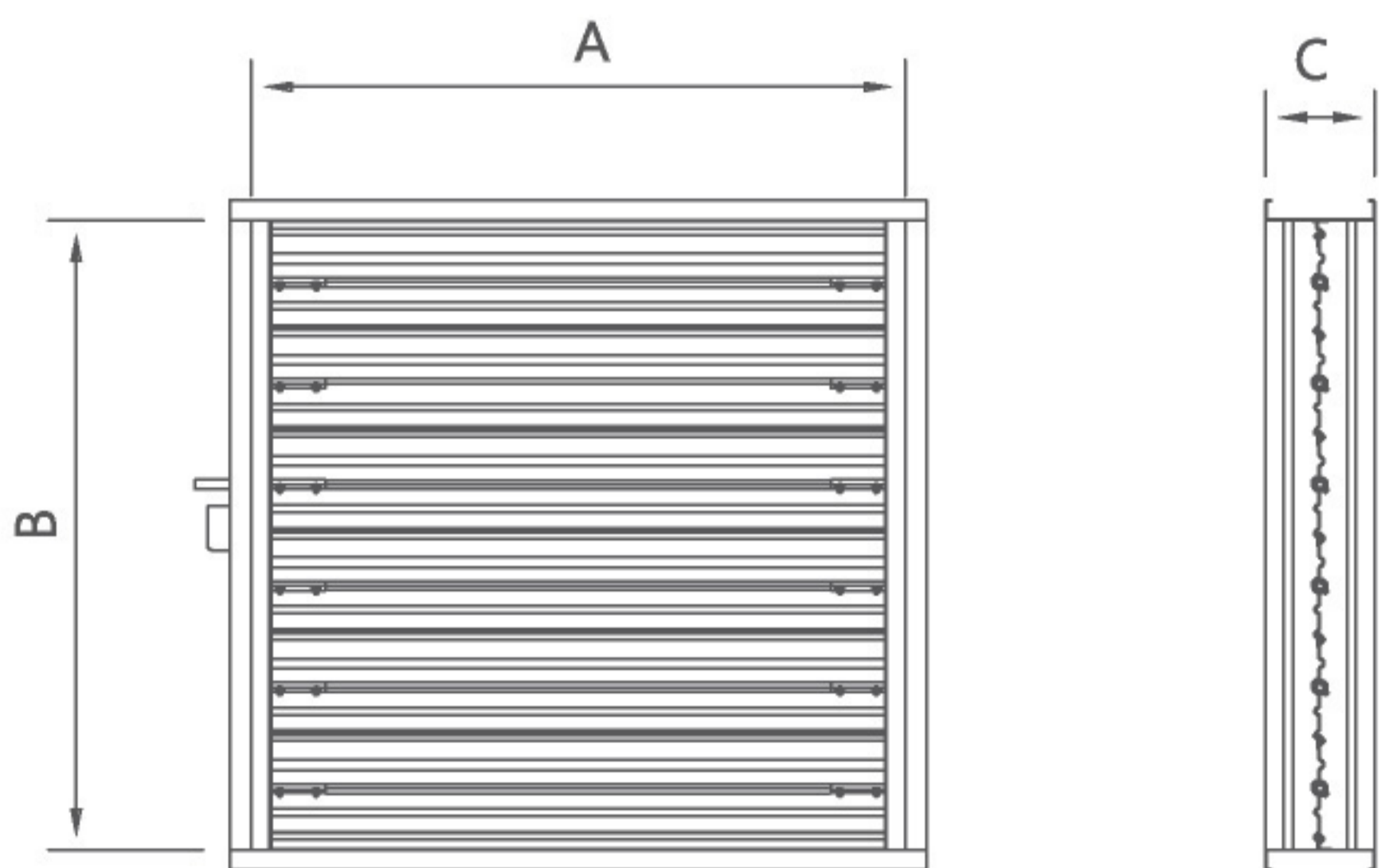
Galvanised Steel

Casing & Blade



Stainless Steel (Available)

## DIMENSIONS



	A (mm)	C (mm)	D (mm)	Flanges (mm)
Min	150	150	150	Customizable
Max	1000	900	150	Customizable

## FUNCTION DESCRIPTION

### Operational

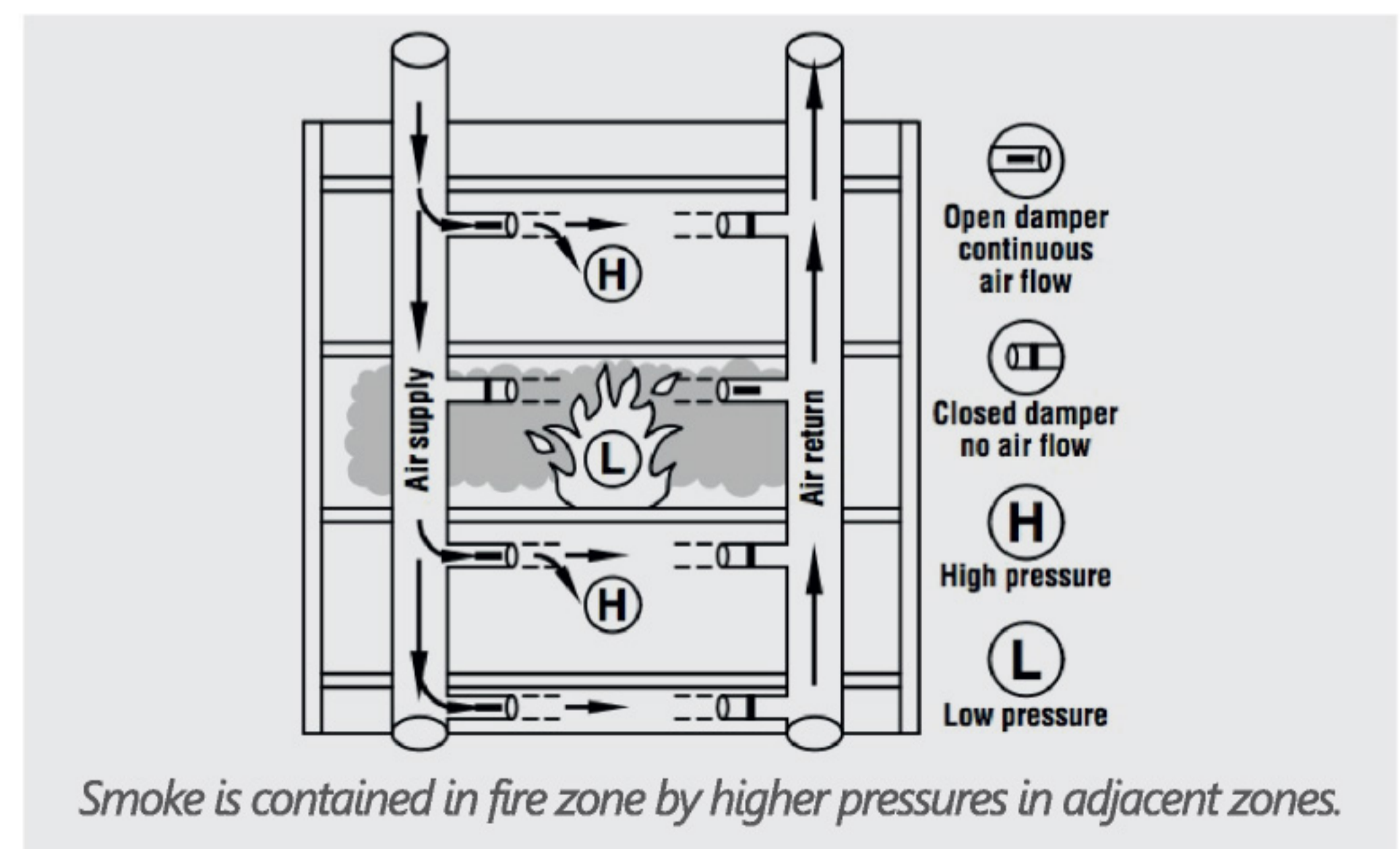
Either a factory-installed electric or a pneumatic actuator, they are ultimately controlled by smoke detectors and/or fire alarms. The smoke dampers serve two general applications of 'passive smoke control system' and 'engineered smoke control system'

As a part of the 'passive smoke control system', the dampers close upon detection of smoke and prevent the circulation of air and smoke through a duct, transfer, or ventilation opening.

As part of an 'engineered smoke control system' designed to control smoke migration using walls and floors as barriers to create pressure differences. Pressurizing the areas surrounding the fire results in prevention of smoke spread into other areas.

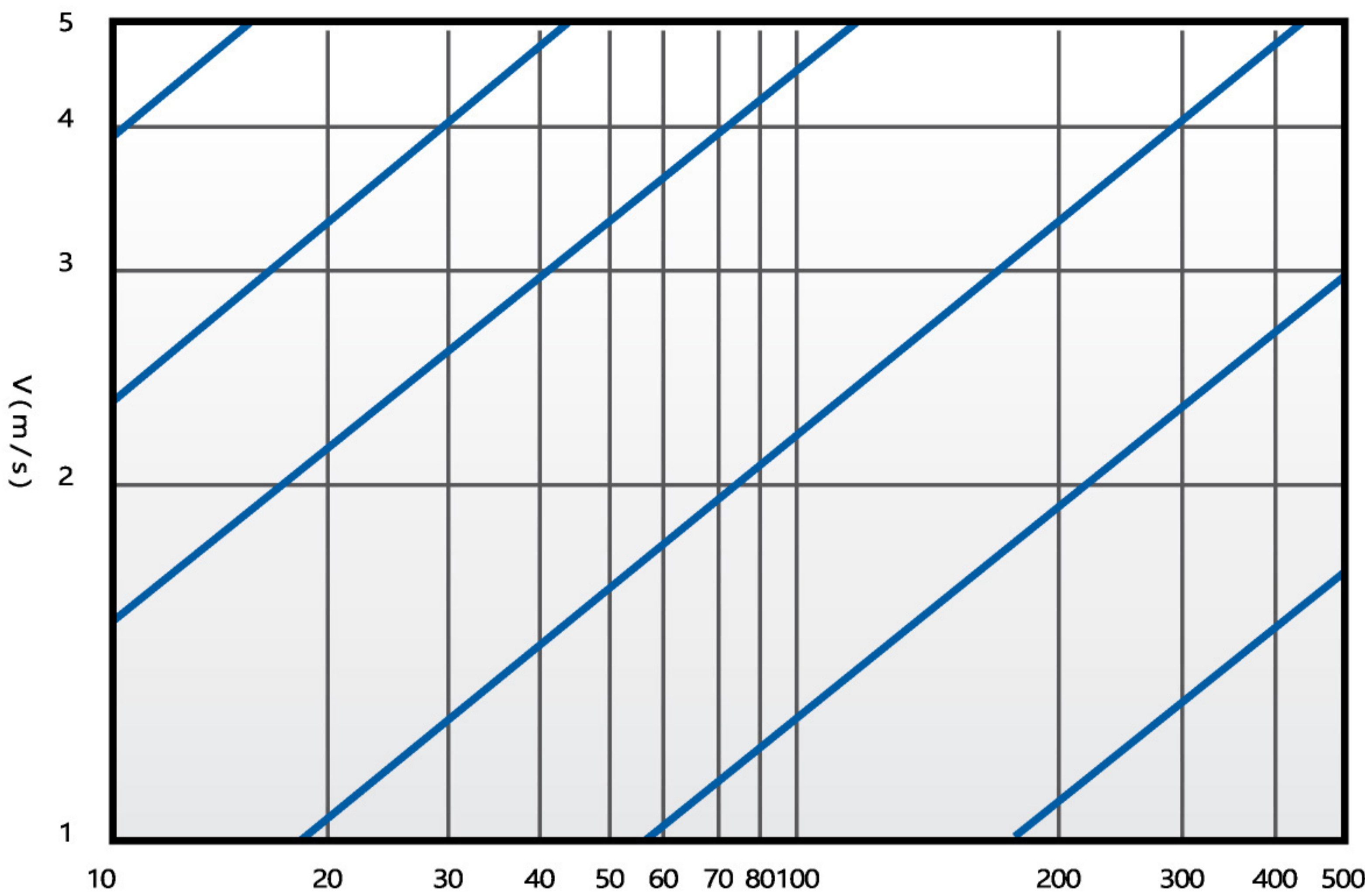
### Damper Blade Design

Damper blade designed to optimize allowable width, thus minimizing the required number of obstructing blade per damper and yet maintain the structural integrity with minimum deflections under high pressure differential of up to 3 kPa. UL certified blade seal are installed at blade edge to provide a much better air-tight conditions in a closed position.



AERODYNAMIC PERFORMANCE

Pressure Drop VS Duct Velocity



V = Duct Velocity (m/s)  
 ΔP = Static Pressure Drop (Pa)  
 0°, 10°, 20°, ... etc = Degree Opening  
 Max static pressure drop for fully open dampers is 10 Pa

CONSTRUCTION & MATERIALS SPECS

Casing Assembly

- 1.5mm thickness casing sections. Casing sections to be welded externally with welding beads to be ground flush. A 1.5mm materials thickness center million to be provided for larger dimensions of damper. Fire retardant sealant to be applied to the casing joints to minimize possible smoke leakage. if any.
- Material provided to be galvanized steel, unless otherwise stated.

Damper Blade Assembly

- 1.5mm thickness single skin configuration. The individual blade to be in triple v-grooves design, complete with UL certified rubber blade seal to minimised leakage. Blade operation to be of parallel blade action with linkage system that ensures fail-safe closing action to form the required smoke barrier. Opposed blade action configuration to be available upon request. 9.5mm galvanised steel shaft to be provided for each blade section.
- Mechanical bushing to be tight-fitted into the casing channel sections of the casing assembly to support and maintain the blade shafts in the pre-determined locations.
- Material provided to be galvanized steel, unless otherwise stated.

Linkage Assembly

- 15.0mm x 3.0mm thick linkage system to be welded to the driving blade shaft. Individual linkage components to be secured with pins or welding method at pre-determined geometry locations to ensure accurate blade phasing.

Linkage Cover & Side Seals

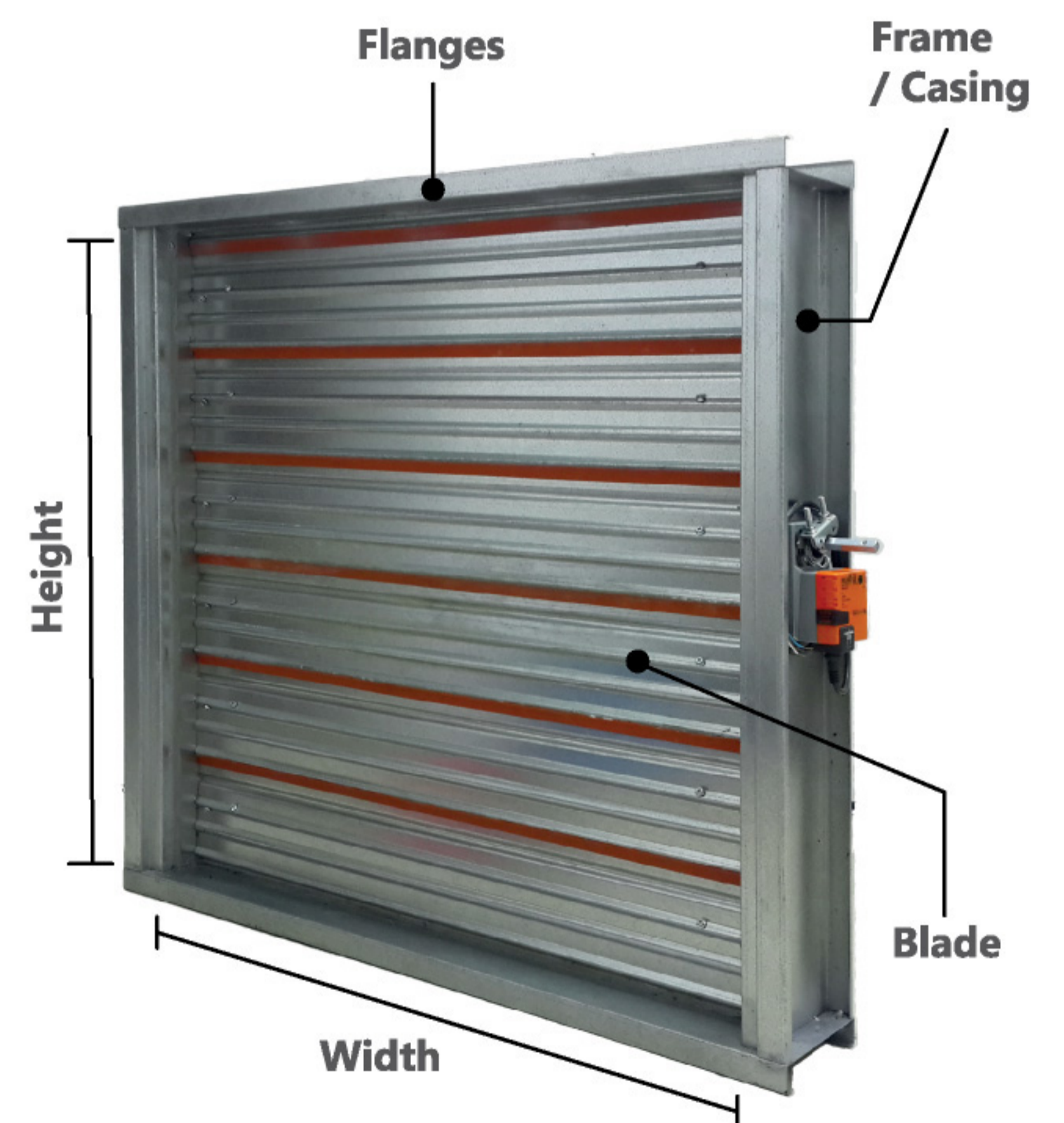
- 1.5mm pre-formed angles to be welded to the damper casing assembly to provide both blade stop and sealing fuctions.
- Actuator mounting angles to be provided when required to ensure proper actuator mounting. Construction design to be changed according to actuator type.
- Material provided to be galvanized steel, unless otherwise stated.

Finishing

- Damper assembly to be in natural finish of the material.

Performance

- Dampers shall be classified as Smoke Damper in accordance with the latest version of UL555S. The leakage rating in accordance with UL555s shall be Leakage Class II or above.
- In-house testing demonstration to be provided by the manufacturer upon request.
- Our smoke damper tested in UL certified laboratory in USA.



Notice :

Damper size would be fabricate as exact neck size



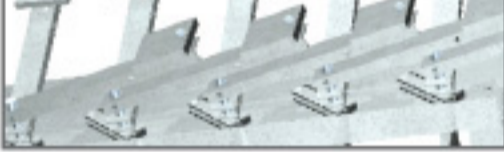



**MSPD**

*Motorized Smoke  
Protection Damper*



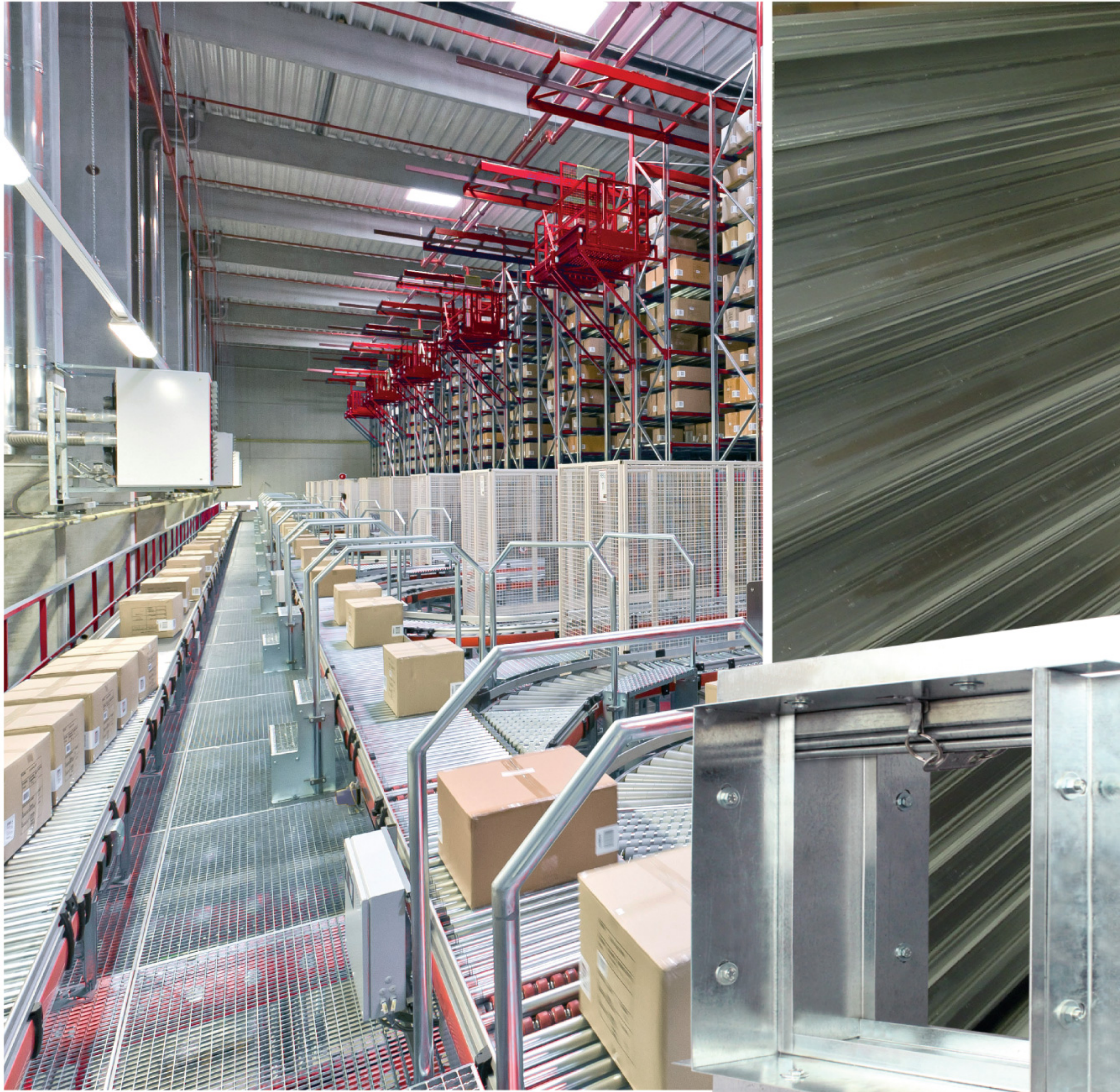
## Products Range

- Grilles 
- Diffusers 
- Dampers 
- Fire & Smoke Protection  ◀
- VAV 
- Others 
- Accessories 



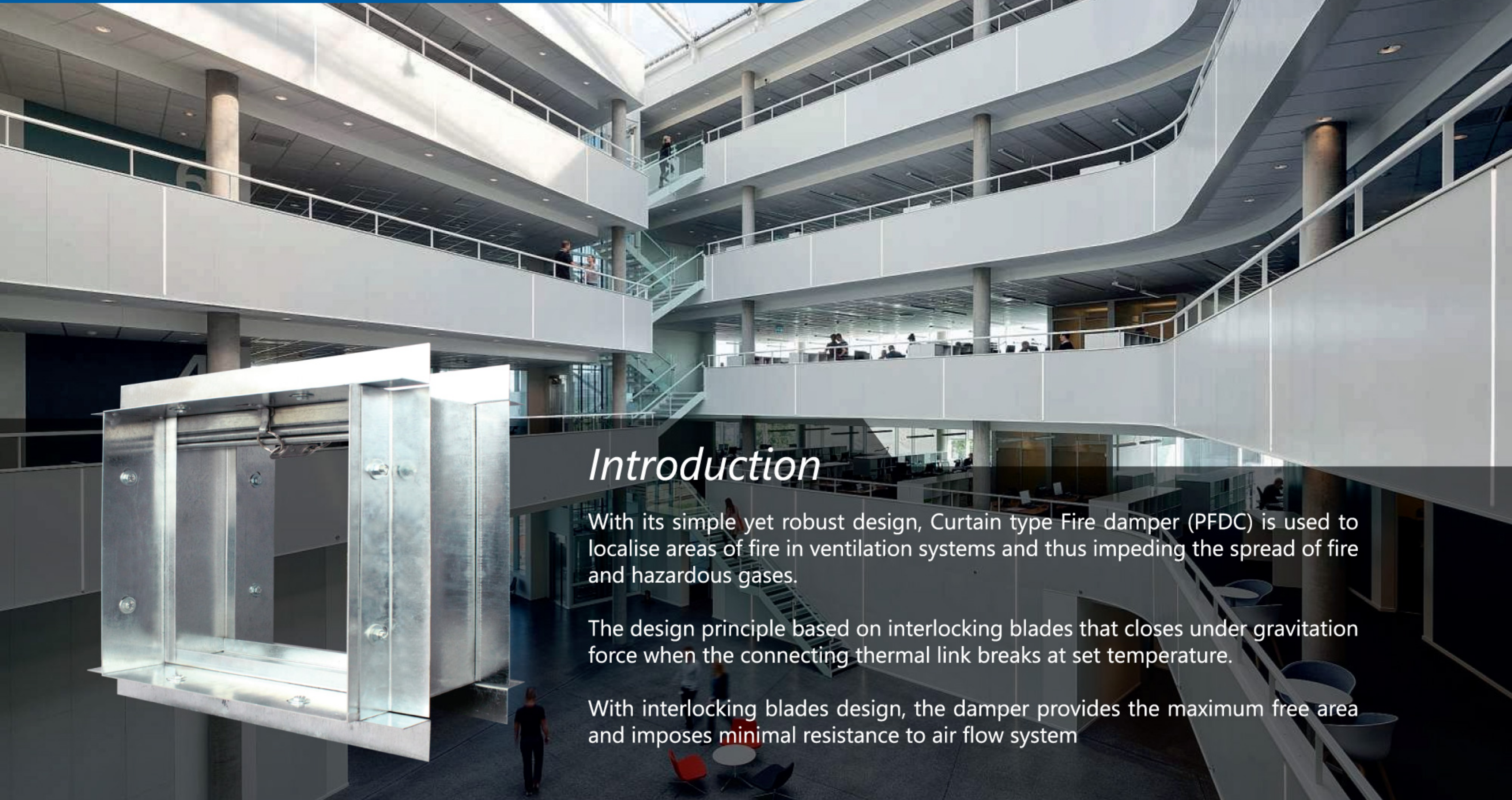
**Prudent Aire Sdn Bhd** 514037-D  
 Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
 43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
 Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
 Fax : +603-9100 4868 Email : sales@prudentaire.com

[www.prudentaire.com](http://www.prudentaire.com)



## *Curtain Type Fire Damper*





### Introduction

With its simple yet robust design, Curtain type Fire damper (PFDC) is used to localise areas of fire in ventilation systems and thus impeding the spread of fire and hazardous gases.

The design principle based on interlocking blades that closes under gravitation force when the connecting thermal link breaks at set temperature.

With interlocking blades design, the damper provides the maximum free area and imposes minimal resistance to air flow system

### CONSTRUCTIONS & MATERIALS

- In-airstream, static rated fire damper
- Minimal resistance to air flow system
- Fire integrity rating of 4 hours
- UL33 compliance thermal link rating of 74°C
- SS 333:1996 standard compliance
- BS 476: part 20 : 1987 standard compliance

Frame Construction



Galvanized Steel

Blade Construction



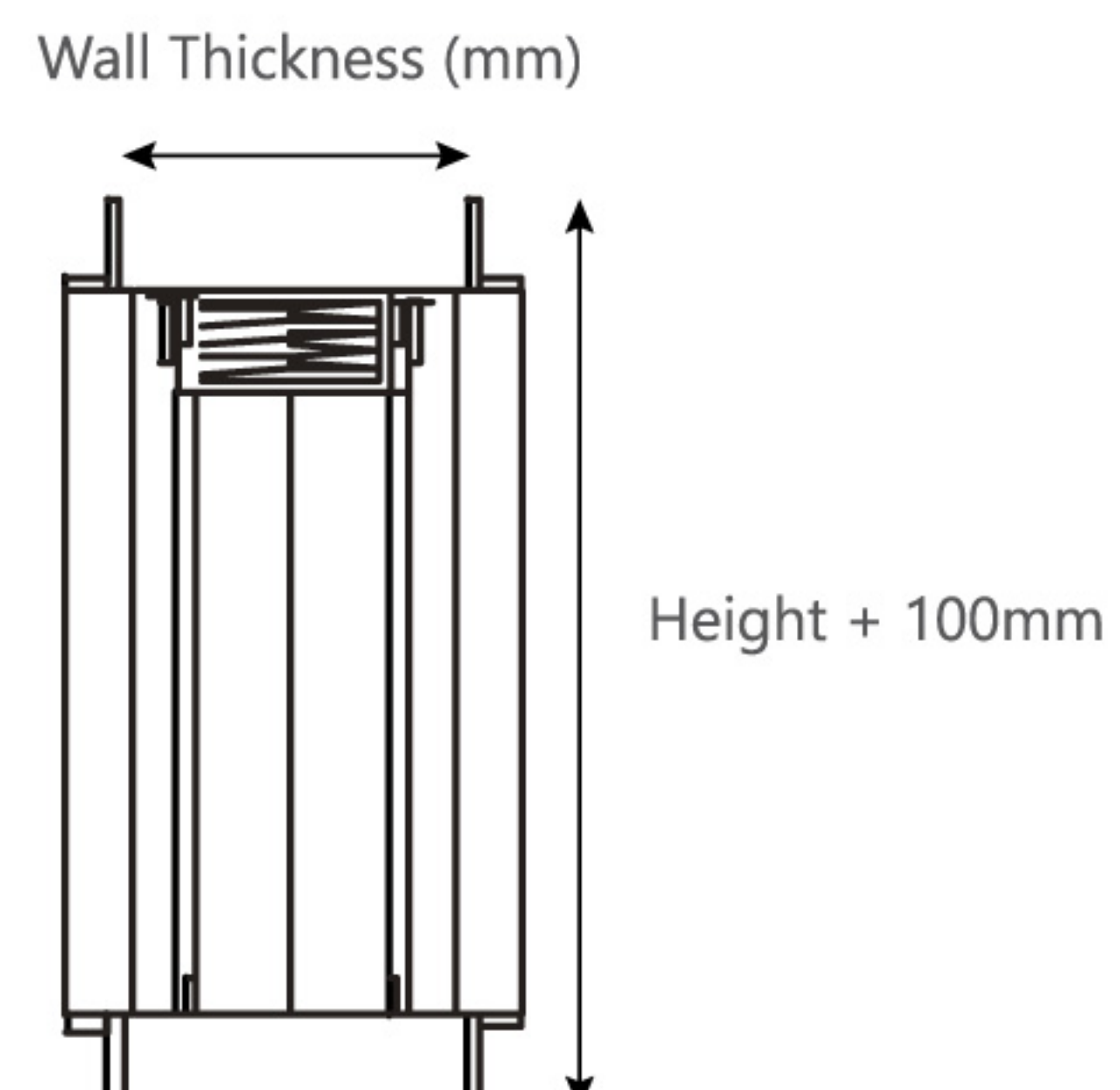
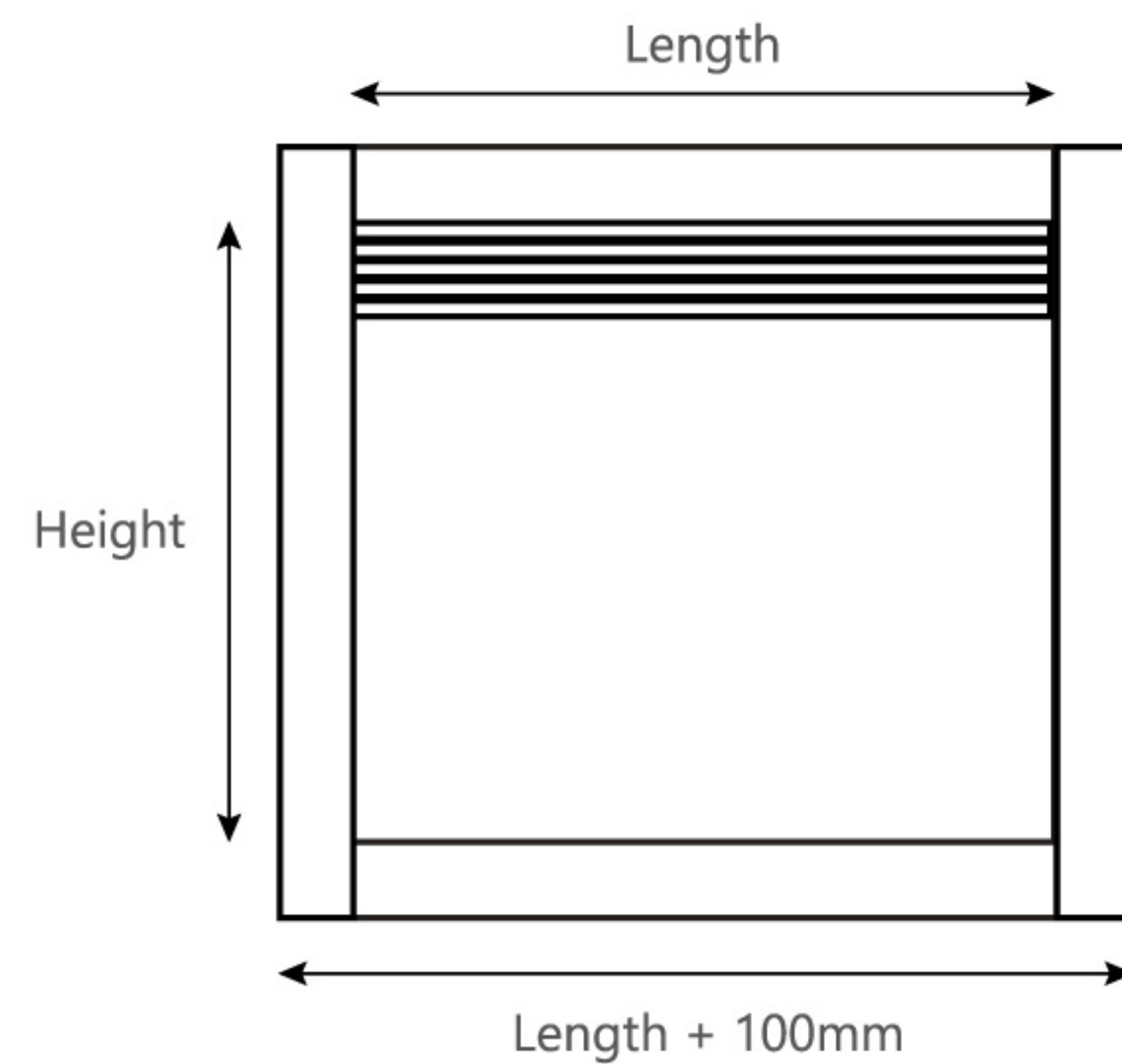
Galvanized Steel

Flange Construction



Galvanized Steel

### DIMENSIONS





**TESTING COMPLIANCE**

- Fire Resistance Test(Branz, 4 Hr rating)
- Multiple Curtain Fire Dampers Modules Assessment (Branz, 3000mm x 3000mm maximum allowable size)
- Stress Assessment On Exposed Fixing Bolts (Branz, Stress within allowable limits)
- Closing Reliability Test (Tuv Sud, Show no evidence of undue wear or damage)
- Closed Leakage Test (VIPAC, Leakage Flow Rate within allowable limits)

**AERODYNAMIC PERFORMANCE**

**Damper Free Area**

- Single module damper configuration
- Free area approximate accuracy +/- 5%

		Length (mm)						
		V	150	300	400	500	600	700
Height (mm)	150	0.013	0.028	0.039	0.049	0.060	0.070	0.081
	300	0.028	0.065	0.088	0.112	0.137	0.161	0.185
	400	0.036	0.087	0.122	0.156	0.191	0.226	0.260
	500	0.049	0.113	0.156	0.200	0.243	0.286	0.330
	600	0.061	0.139	0.191	0.243	0.295	0.347	0.400
	700	0.075	0.165	0.226	0.286	0.347	0.409	0.470
	800	0.088	0.191	0.260	0.330	0.400	0.470	0.541
	900	0.100	0.217	0.295	0.374	0.453	0.532	0.611
	1000	0.113	0.243	0.330	0.417	0.505	0.594	0.682
	1100	0.126	0.269	0.365	0.461	0.558	0.656	0.754
	1200	0.139	0.205	0.400	0.505	0.611	0.718	0.825

**Pressure Drop Estimator**

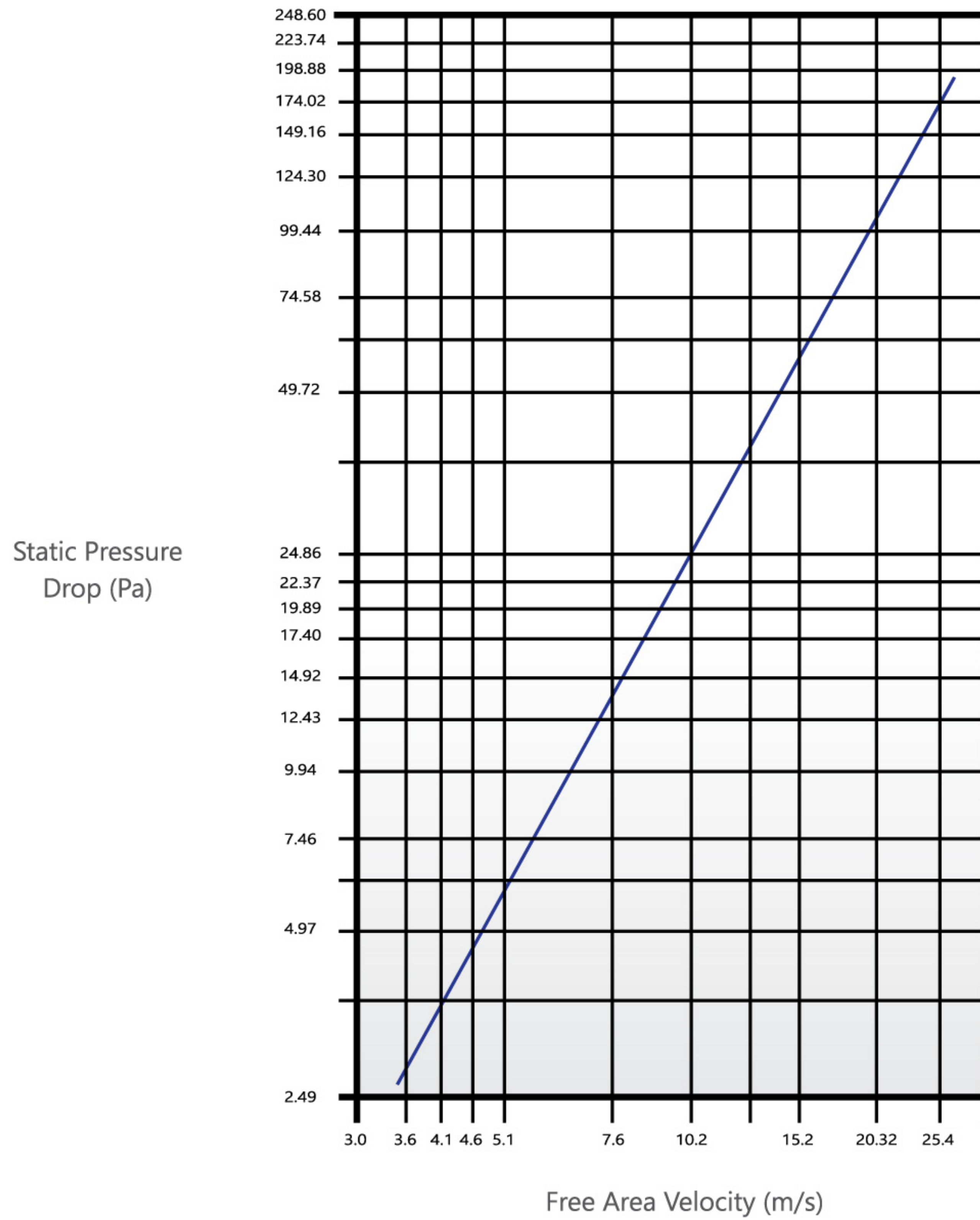
To estimate the pressure drop across open damper :

- i) Calculate free area velocity as shown below
- ii) Find velocity on curve (Free Area Velocity VS Static Pressure Drop Graph)
- iii) Read across for static pressure drop

$$\text{Free Area Velocity (m/s)} = \frac{\text{(Volume Flowrate, m}^3\text{/s)}}{\text{(Free Area, m}^2\text{)}}$$

AERODYNAMIC PERFORMANCE CONTD'

Free Area Velocity VS Static Pressure Drop



Closed Damper Leakage

Information Accuracy:

- i) Damper Size : 1200mm x 1200mm
- ii) Pressure Drop : +/- 5% or 1.0 Pa whichever is greater
- iii) Airflow : +/- 5%

STATIC PRESSURE DROP ACROSS DAMPER (PA)	LEAKAGE FLOW RATE (L/S)
250	154
500	230
750	283
1000	335
1250	381



**IBU PEJABAT,  
JABATAN BOMBA DAN PENYELAMAT,  
MALAYSIA,  
Headquarters,  
Fire and Rescue Department, Malaysia,  
d/a Tingkat 2, Balai Bomba dan Penyelamat, Cyberjaya,  
Persiaran APEC,  
63000 Cyberjaya,  
SELANGOR DARUL KEBAHSAHABAN.**

Telefon : 603-8318 5444  
Facsimile : 603-8319 5244  
Homepage : [www.bomba.gov.my](http://www.bomba.gov.my)  
Email : [pro@bomba.gov.my](mailto:pro@bomba.gov.my)

**PEMBAHARUAN**

NO. RUJUKAN : JPBM:BKK/005/19/33/40 ( || )  
NO. SIRI : AK/FD/530/2009 (P2)

TARIKH : 14/03/2011

**SIJIL PERAKUAN BAHAN 2011/2012  
ALAT KELENGKAPAN**

**FIRE DAMPER (4 JAM)**



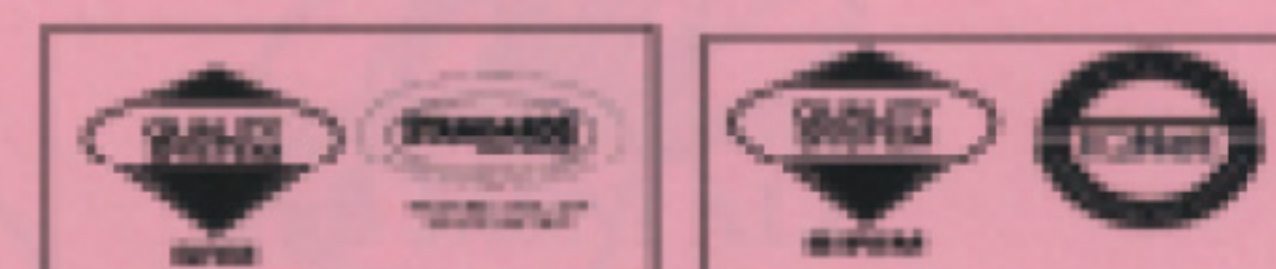
Jabatan ini memperakui **ALAT KELENGKAPAN** tersebut di atas berdasarkan Piawaian dan Laporan ujiannya, dan Pihak Arkitek atau Jurutera Profesional bagi projek berkaitan adalah bertanggungjawab menentukan kesahihan **ALAT KELENGKAPAN** dipasang mengikut Laporan Piawaian ujiannya (Rujuk pada 1.5 dan 1.6)

- 1.1 Nama & Alamat Pengedar : **PRUDENT AIRE MARKETING SDN BHD  
LOT 1849B, KG BARU BALAKONG,  
43300 SERI KEMBANGAN,  
SELANGOR DE.**
- 1.2 Nama & Alamat Pengeluar : **--SDA--**
- 1.3 Jenis Alat Kelengkapan : **FIRE DAMPER C/W FUSIBLE LINK (74°C)**
- 1.4 Tempoh Sah Perakuan : **30/03/2011 HINGGA 29/03/2012**
- 1.5 No. Laporan ujian/Tarikh : **BRANZ FAR3294 (11/03/2009), FR3896 (03/09/2008) &  
SIRIM 2009FE0345 (28/12/2009)**
- 1.6 Piawaian : **SS 333:1996 & BS 476:PART 20:1987**
- 1.7 Spesifikasi/Jenama : **MODEL: PFD-S**
- 1.8 Skim SIRIM : **----**
- 1.9 Had Kegunaan : **PEMASANGAN PERLU MEMATUHI SPESIFIKASI UJIAN DAN  
UBBL 1984.**

2. Lain-lain (nyatakan) : Sila kemukakan Borang **C1/ C2/ C3** (diisi oleh pihak berkenaan) ke Jabatan Bomba dan Penyelamat Negeri dimana projek dijalankan dan Ibu Pejabat Bomba dan Penyelamat, Malaysia apabila selesainya tiap tiap projek tersebut.

2.1 Syarat-syarat Perakuan Bomba dan Penyelamat ini yang mesti dipatuhi seperti di **Lampiran A1 dan A2**. Spesifikasi **ALAT KELENGKAPAN** ini adalah seperti dalam Laporan ujian (di para 1.5 di atas)

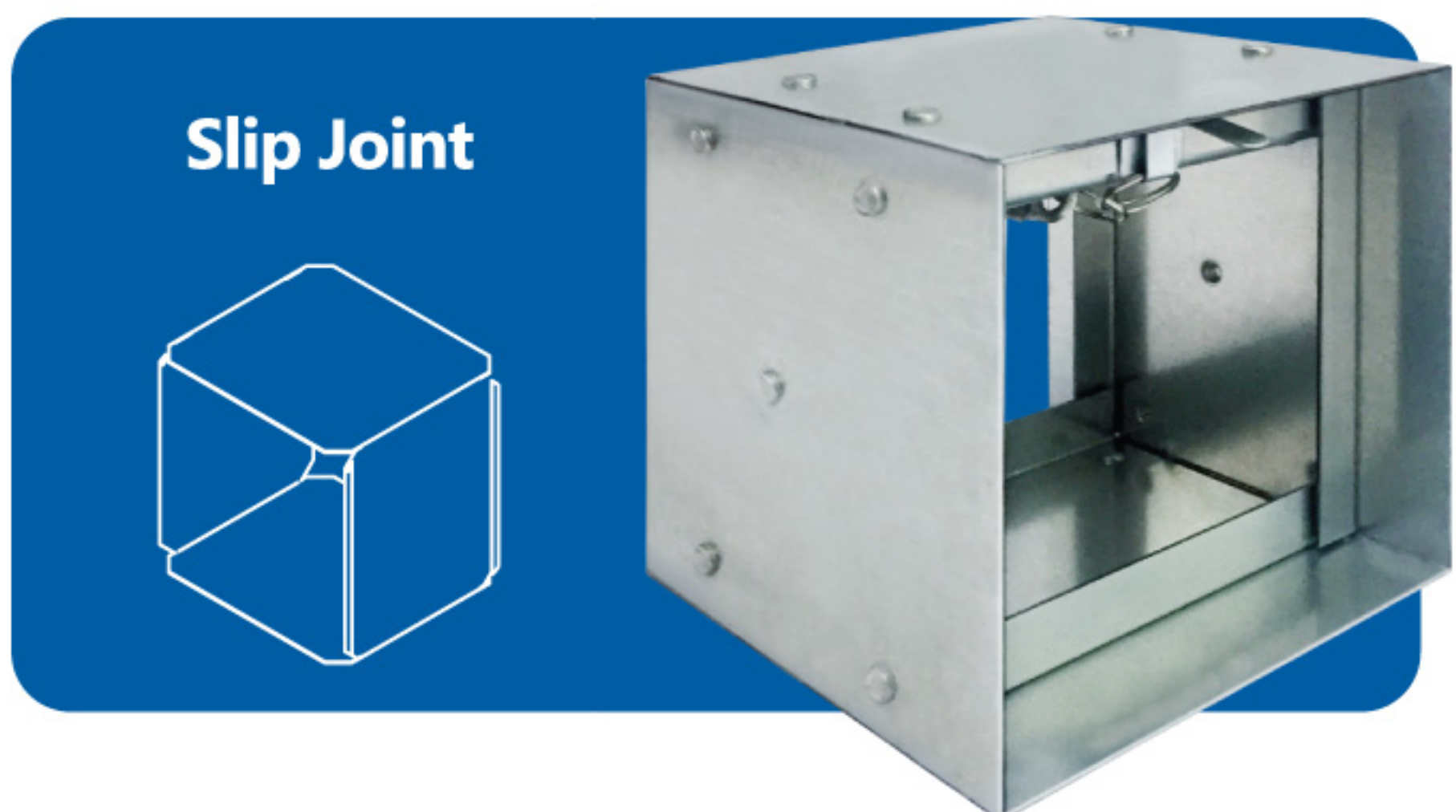
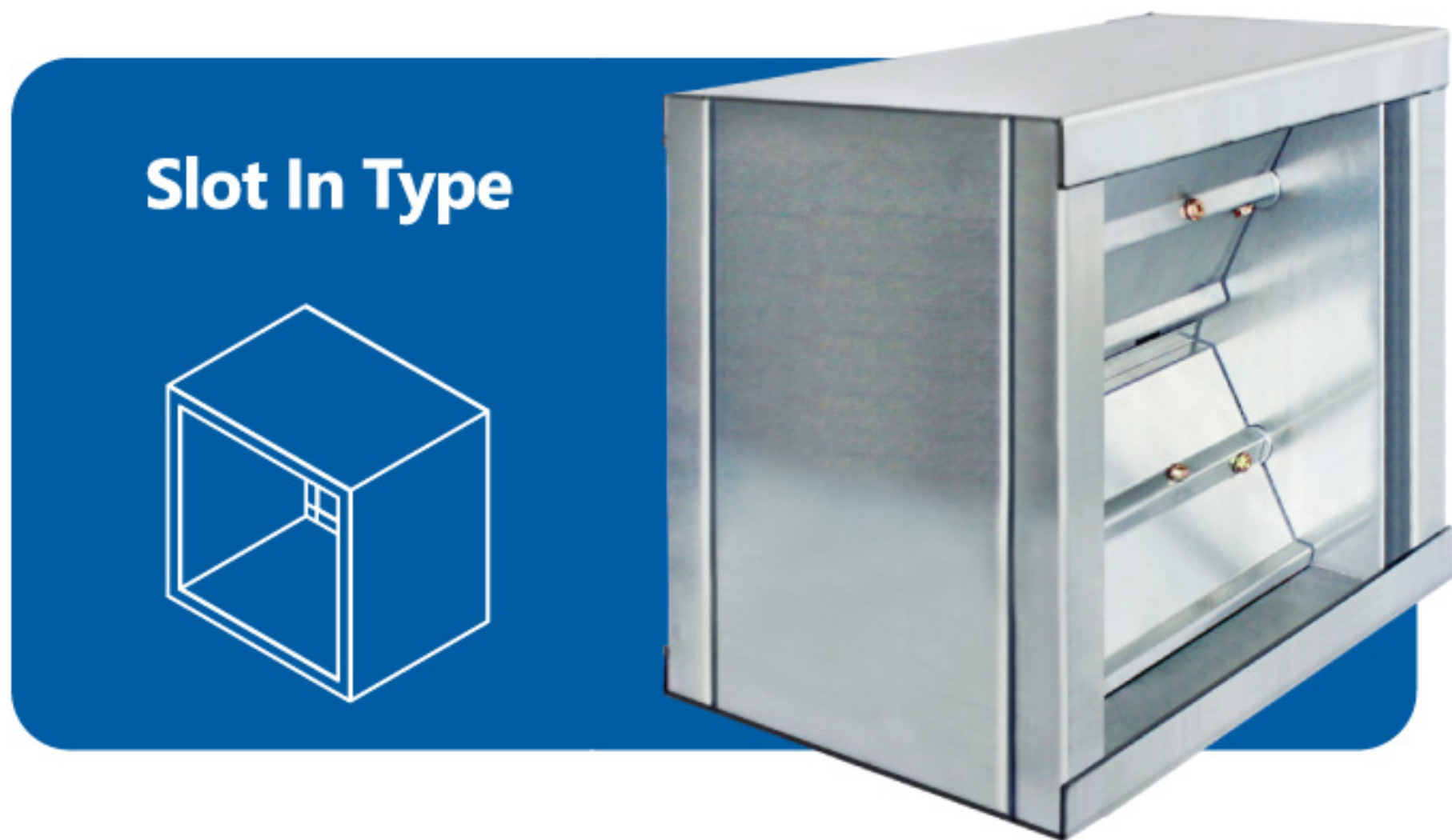
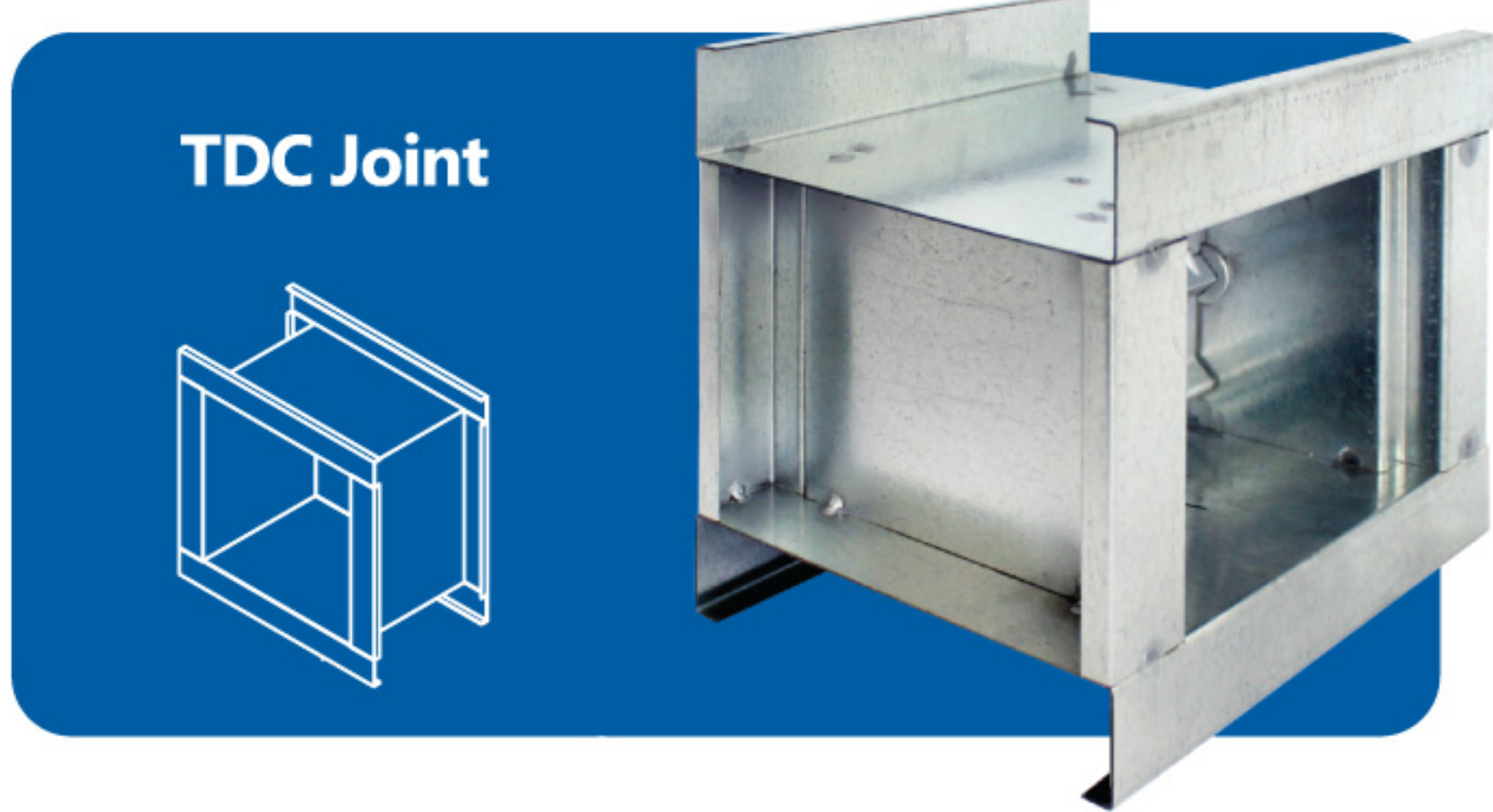
**(DATO' RUSMANI BIN MUHAMAD)**  
Penolong Ketua Pengarah,  
Bahagian Keselamatan Kebakaran,  
b.p. Ketua Pengarah  
Jabatan Bomba dan Penyelamat,  
Malaysia.



**CERTIFIED TO ISO 9001 : 2008  
CERT. NO : AR 5037**

# JOINING METHODS

---












**Notice :**

**Damper size would be fabricate as exact neck size**



# FD<sub>c</sub> | *Curtain Type Fire Damper*

## Products Range

- Grilles 
- Diffusers 
- Dampers 
- Fire & Smoke Protection  ◀
- VAV 
- Others 
- Accessories 



**Prudent Aire Sdn Bhd** 514037-D  
 Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
 43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
 Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
 Fax : +603-9100 4868 Email : sales@prudentaire.com

[www.prudentaire.com](http://www.prudentaire.com)



**FD<sub>L</sub>** *Louvre Type Fire Damper*

**MFD<sub>L</sub>** *Motorized Fire Damper*



# FD<sub>L</sub>

# MFD<sub>L</sub>

## Introduction

With its parallel blade operation closing system, Louvre type fire damper (PFDL) is used to localise areas of fire in ventilation systems and thus impeding the spread of fire and hazardous gases. Available in both standard and motorized configurations.

For spring-loaded configuration, it automatically closes by spring force when the fuselink breaks at 74°C. The activated blades are held in place with both the spring force and the blade return catch.

For motorised configuration, it can be closed either remotely or by a local temp trip device; or both.

## CONSTRUCTIONS & MATERIALS

- In-airstream, static rated fire damper
- Fire integrity rating of 2 hours
- UL33 compliance thermal link rating of 74°C
- BS 476: part 20 : 1987 standard compliance
- MS 555: Part 1 : 2003 standard compliance
- Available in both floor and wall mounted configurations
- Triple V-Groove Blade
- Bolts : M6 x 25mm

### Frame Construction

GI  
1.5mm

Galvanized Steel

### Blade Construction

GI  
1.2mm

Galvanized Steel

### Flange Construction

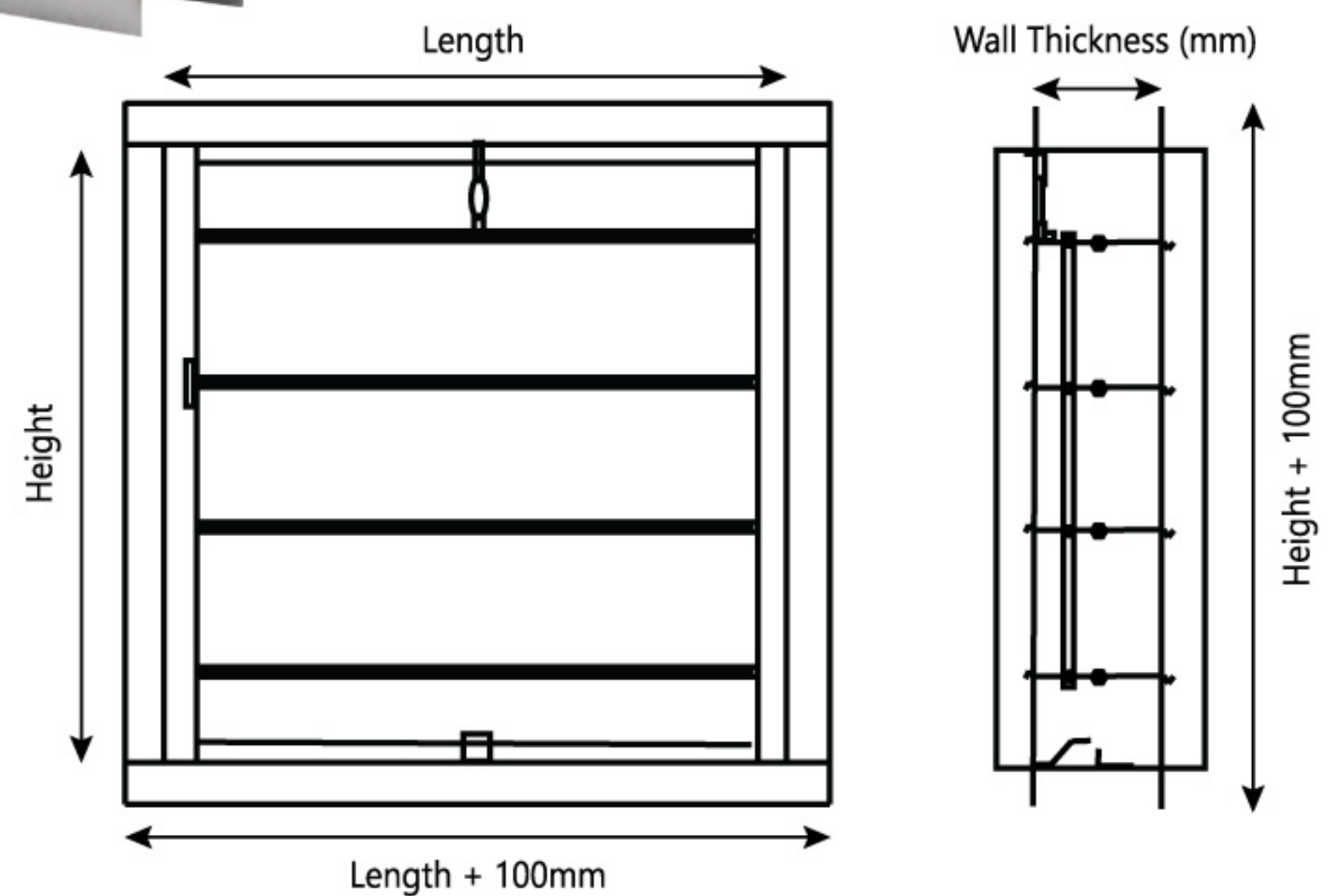
GI  
1.2mm

Galvanized Steel



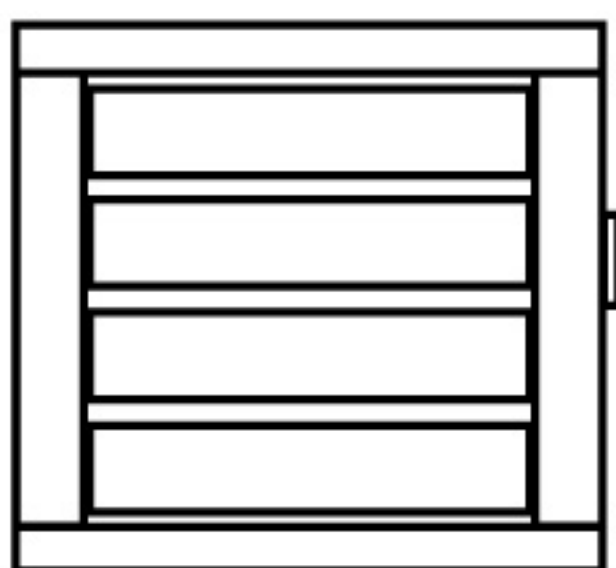
### FD<sub>L</sub>

## LOUVRE TYPE FIRE DAMPER

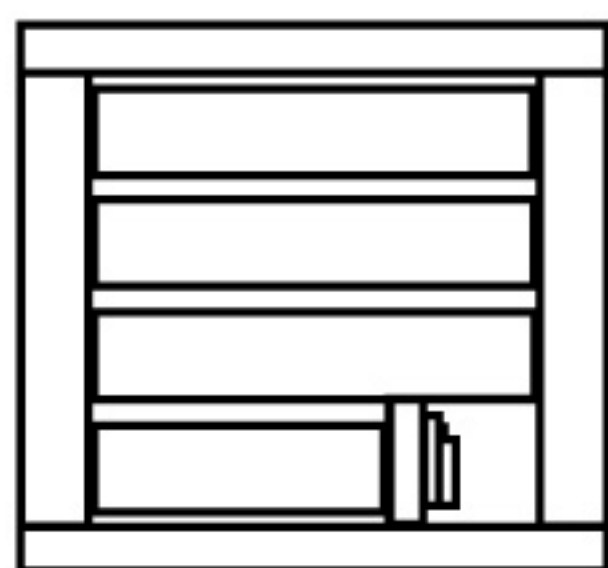


### MFD<sub>L</sub>

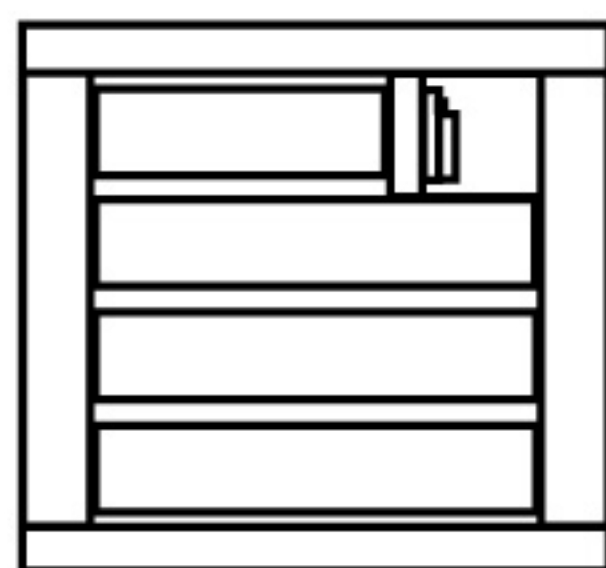
## MOTORIZED FIRE DAMPER - ACTUATOR LOCATION



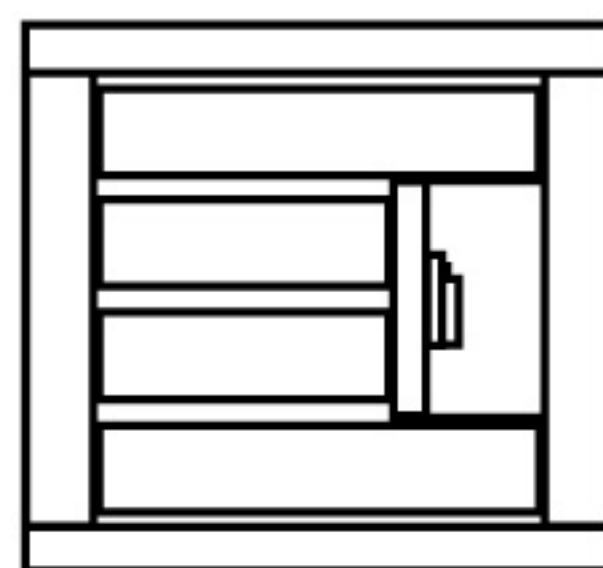
Configuration A  
Shaft Outside



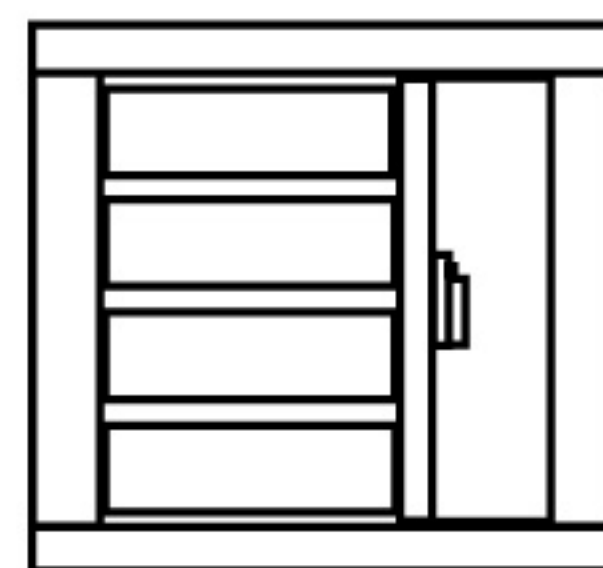
Configuration B  
Inside Bottom



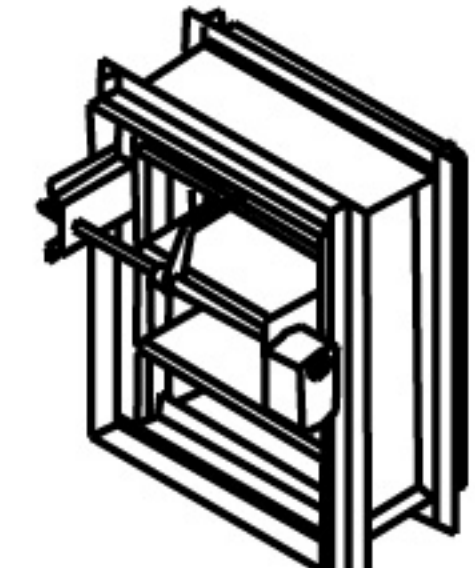
Configuration C  
Inside Top



Configuration D  
Inside Middle



Configuration E  
Compartment



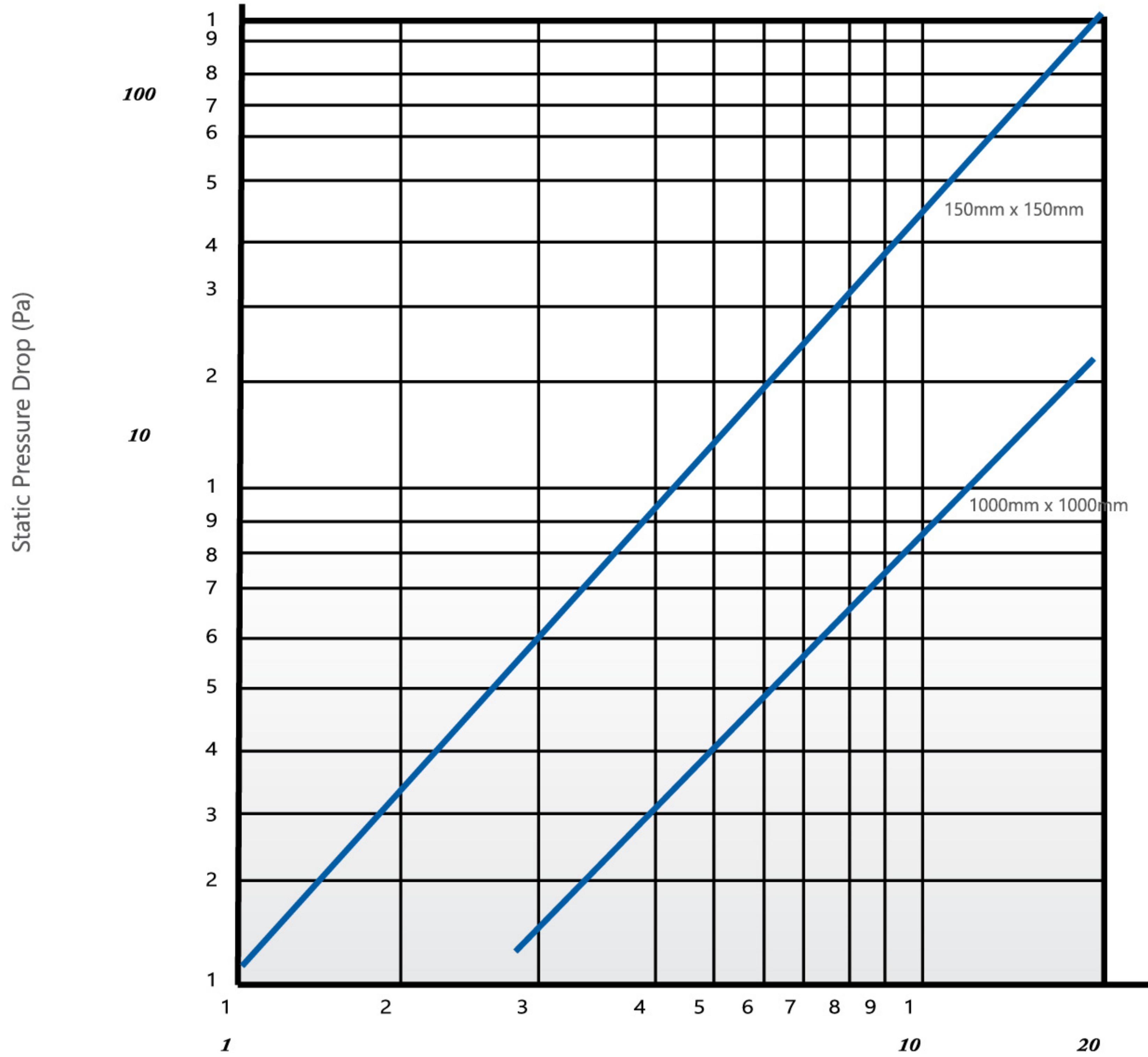
Configuration F  
Infront Shaft



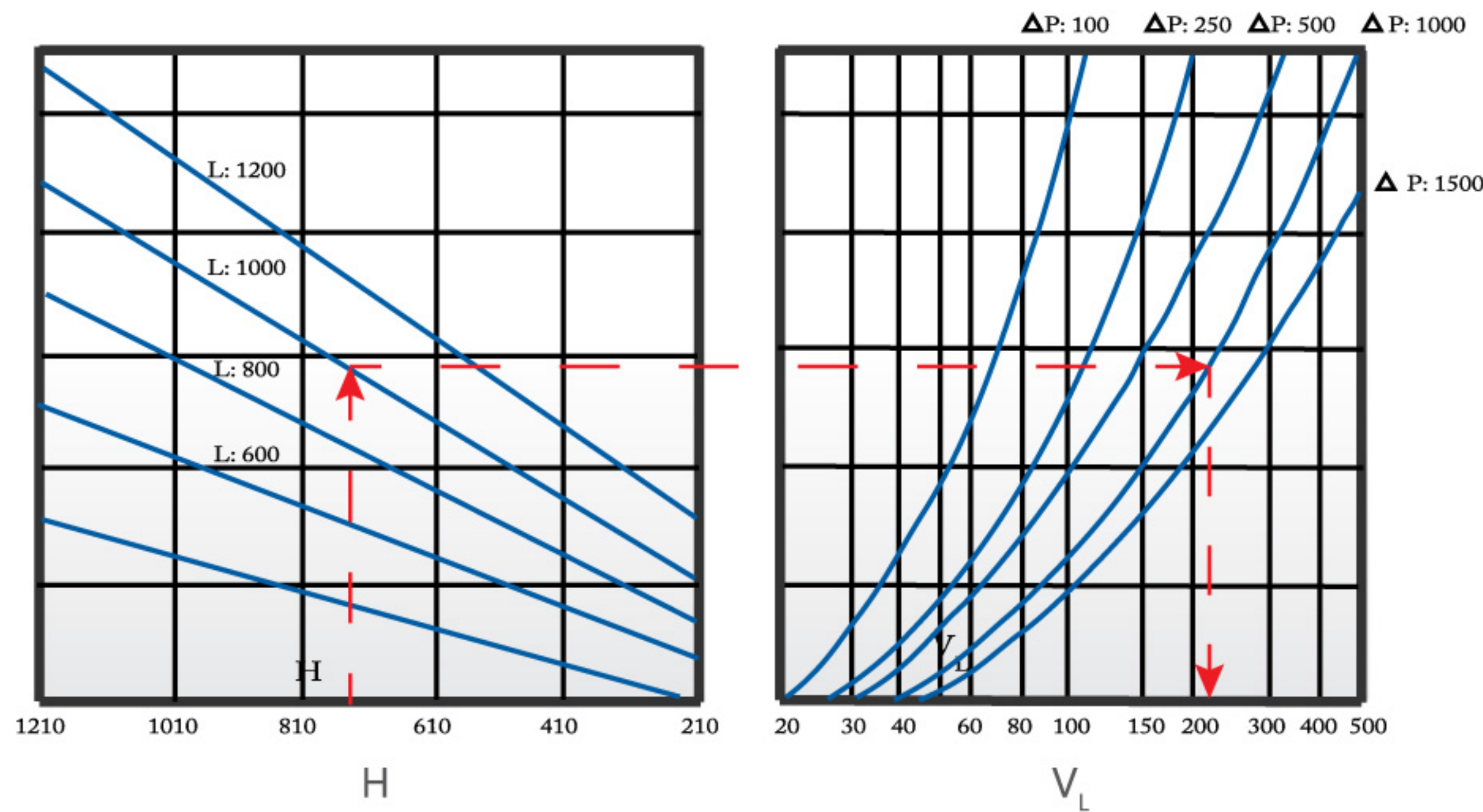
AERODYNAMIC PERFORMANCE

Fire Resistance Test ( Branz, 2 Hr Rating)

DUCT VELOCITY VS STATIC PRESSURE DROP (PA)

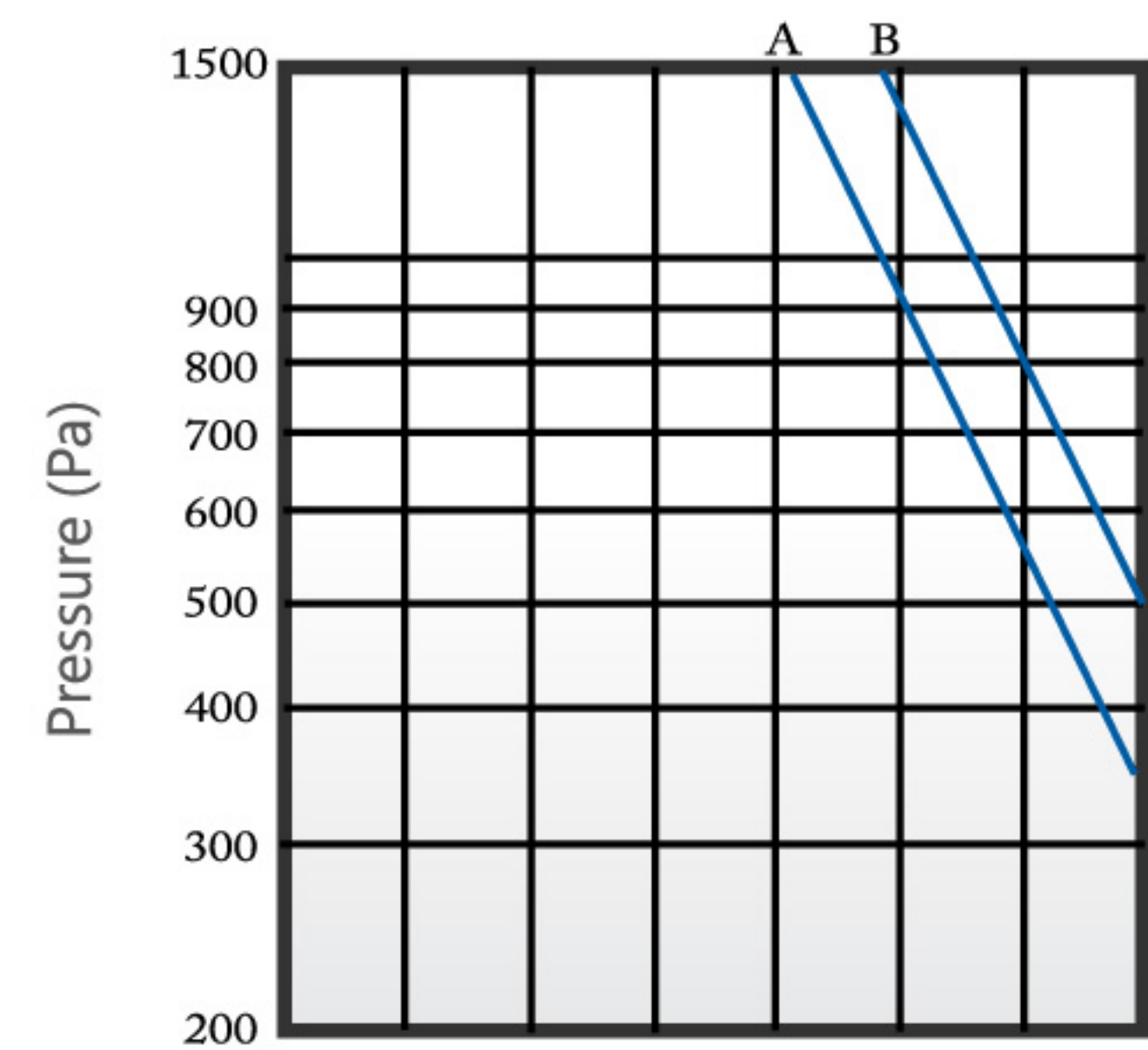


CLOSED DAMPER LEAKAGE



- L Length (mm)
- H Height (mm)
- V<sub>L</sub> Volume Flowrate (cmh)
- ΔP Pressure Difference (Pa)

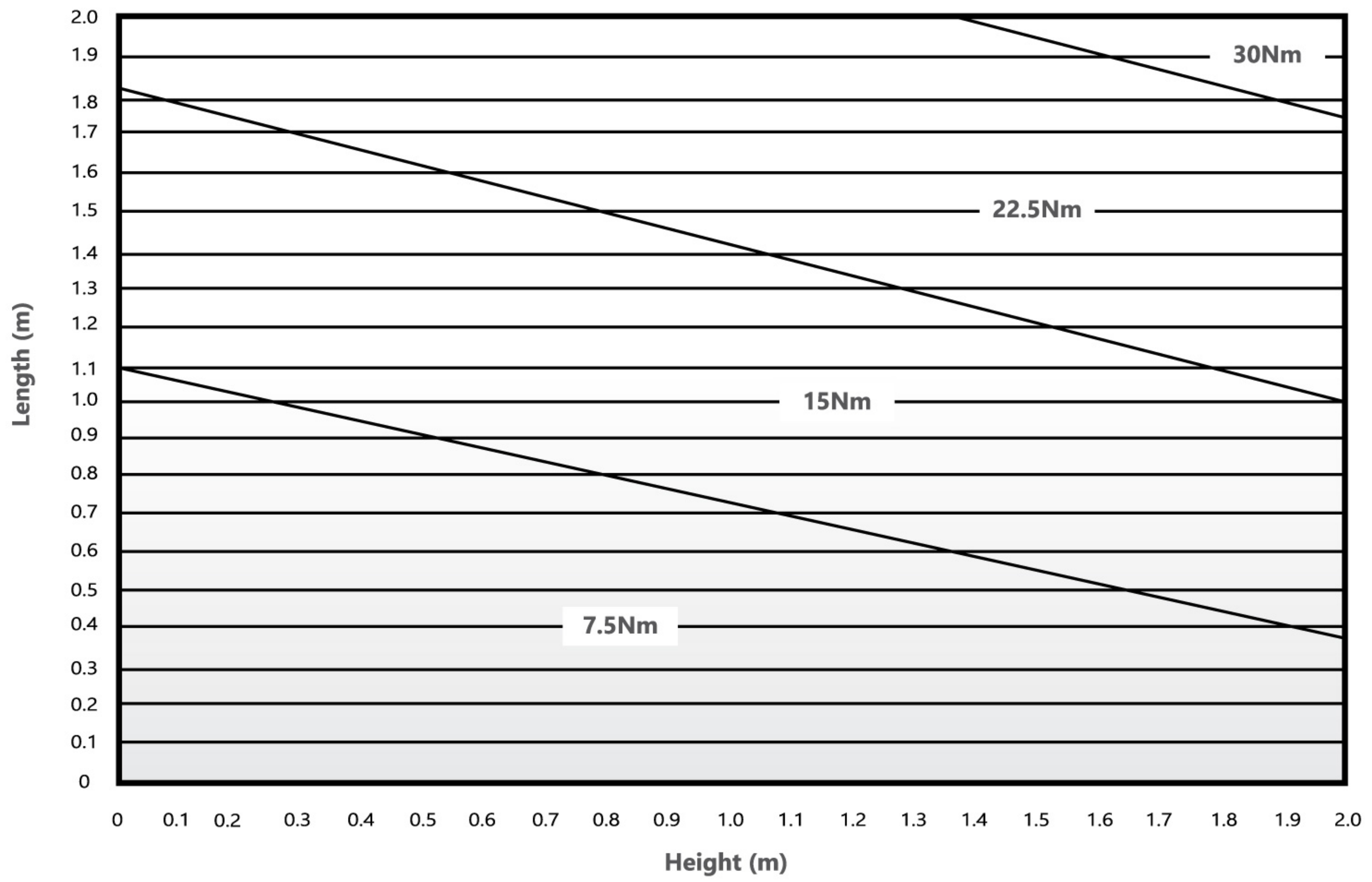
OPERATION RANGE



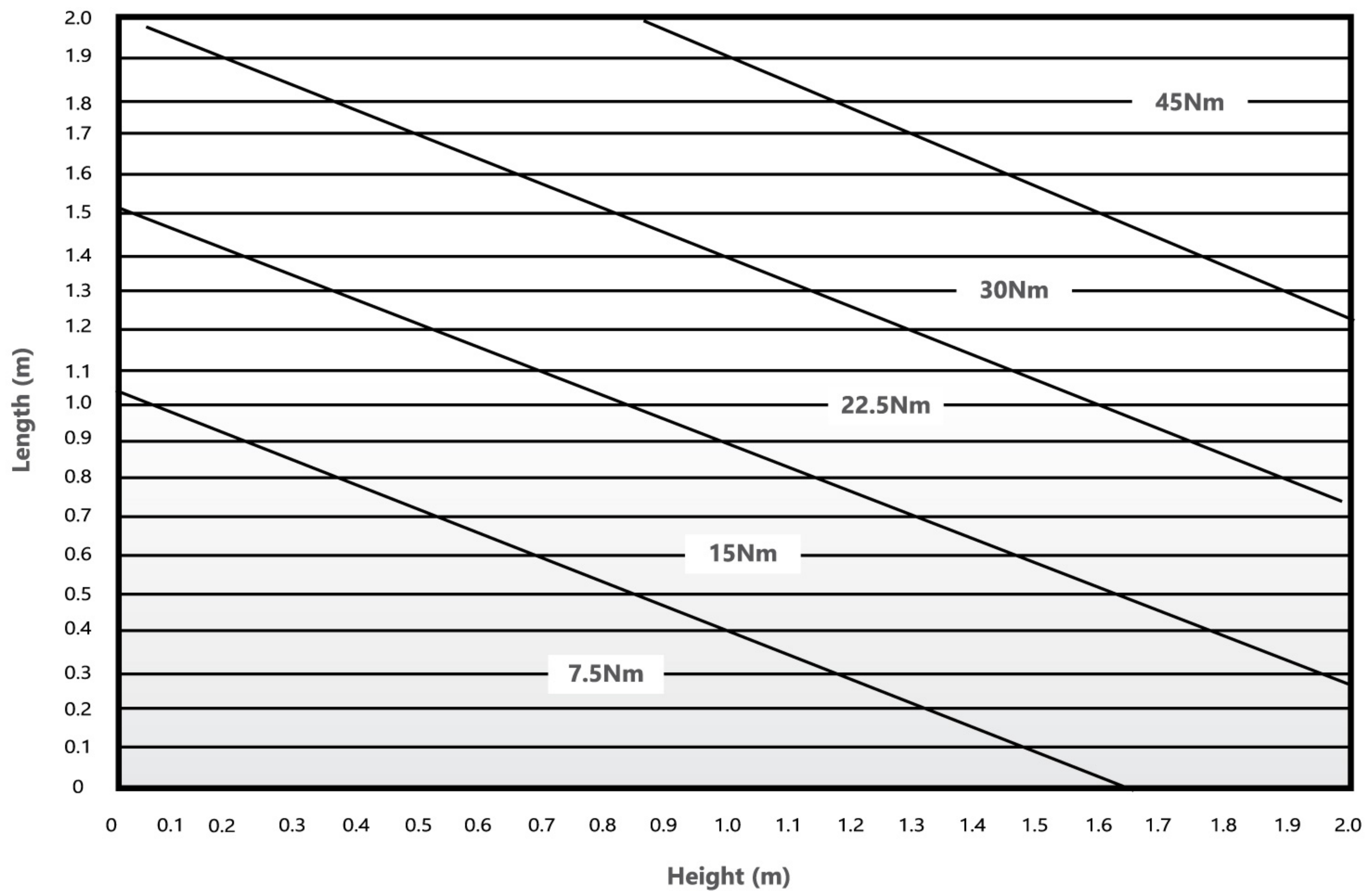
- A Recommended operation range
- B Critical operation range

## ACTUATOR TORQUE REQUIREMENTS

For Pressure Less or Equal to 500 Pa



For Pressure Less or Equal to 1000 Pa





**IBU PEJABAT,  
JABATAN BOMBA DAN PENYELAMAT,  
MALAYSIA,**  
Headquarters,  
Fire and Rescue Department, Malaysia,  
d/a Tingkat 2, Balai Bomba dan Penyelamat,  
Cyberjaya  
Persiaran APEC  
63000 Cyberjaya,  
SELANGOR DARUL EHSAN.

Telefon : 603-8318 5444  
Facsimile : 603-8319 5244  
Homepage : [www.bomba.gov.my](http://www.bomba.gov.my)  
Email : [pro@bomba.gov.my](mailto:pro@bomba.gov.my)

**PEMBAHARUAN**

NO. RUJUKAN : **JPBM:BKK/005/19/33/38 ( 4 )**

TARIKH : **27 /05/2011**

NO. SIRI : **AK/FP/452/2007 (P4)**

**SIJIL PERAKUAN BAHAN 2011/2012  
ALAT KELENGKAPAN**

**FIRE DAMPER**



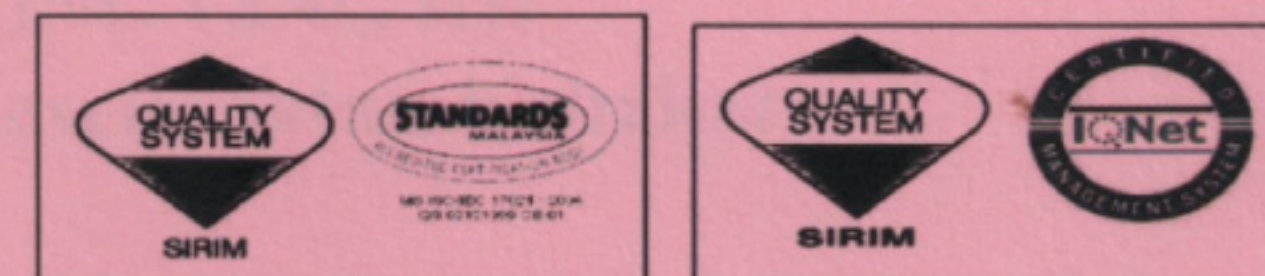
Jabatan ini memperakui **ALAT KELENGKAPAN** tersebut di atas berdasarkan Piawaian dan Laporan ujiannya, dan Pihak Arkitek atau Jurutera Profesional bagi projek berkaitan adalah bertanggungjawab menentukan kesahihan **ALAT KELENGKAPAN** dipasang mengikut Laporan Piawaian ujiannya (Rujuk pada **1.6** dan **1.7**)

- 1.1 Nama & Alamat Pengedar : **PRUDENT AIRE MARKETING SDN. BHD.  
LOT. 1849B, KG. BARU BALAKONG,  
43300 SERI KEMBANGAN,  
SELANGOR DARUL EHSAN.**
- 1.2 Nama & Alamat Pengeluar : **-----SDA-----**
- 1.3 Tahap Rintangan Api : **----**
- 1.4 Jenis Alat Kelengkapan : **FIRE DAMPER (2 JAM)  
(INTEGRITI 129 MINIT)**
- 1.5 Tempoh Sah Perakuan : **22/05/2011 HINGGA 21/05/2012**
- 1.6 No. Laporan Ujian / Tarikh : **BRANZ NO. FP3543 (09/10/2006) – Sila kemukakan  
Laporan Ujian / Assessment yang terkini pada  
pembaharuan akan datang. Sijil tidak akan  
diperbaharui tanpa dokumen tersebut.**
- 1.7 Piawaian : **BS 476 : PART 20 : 1987**
- 1.8 Spesifikasi / Jenama : **MODEL : PFD - S**
- 1.9 Had Kegunaan : **PERLU MEMATUHI UBBL 1984 DAN SEPERTIMANA  
SPESIFIKASI UJIAN.**

2. Lain-lain (nyatakan) : Sila kemukakan **Borang C1/ C2/ C3** (diisi oleh pihak berkenaan) ke Jabatan Bomba dan Penyelamat Negeri dimana projek dijalankan dan Ibu Pejabat Bomba dan Penyelamat, Malaysia apabila selesainya tiap-tiap projek tersebut.

2.1 Syarat – syarat Perakuan Bomba dan Penyelamat ini yang mesti dipatuhi seperti di **Lampiran A1 dan A2**. Spesifikasi **ALAT KELENGKAPAN** ini adalah seperti dalam Laporan ujian (di para 1.6 di atas)

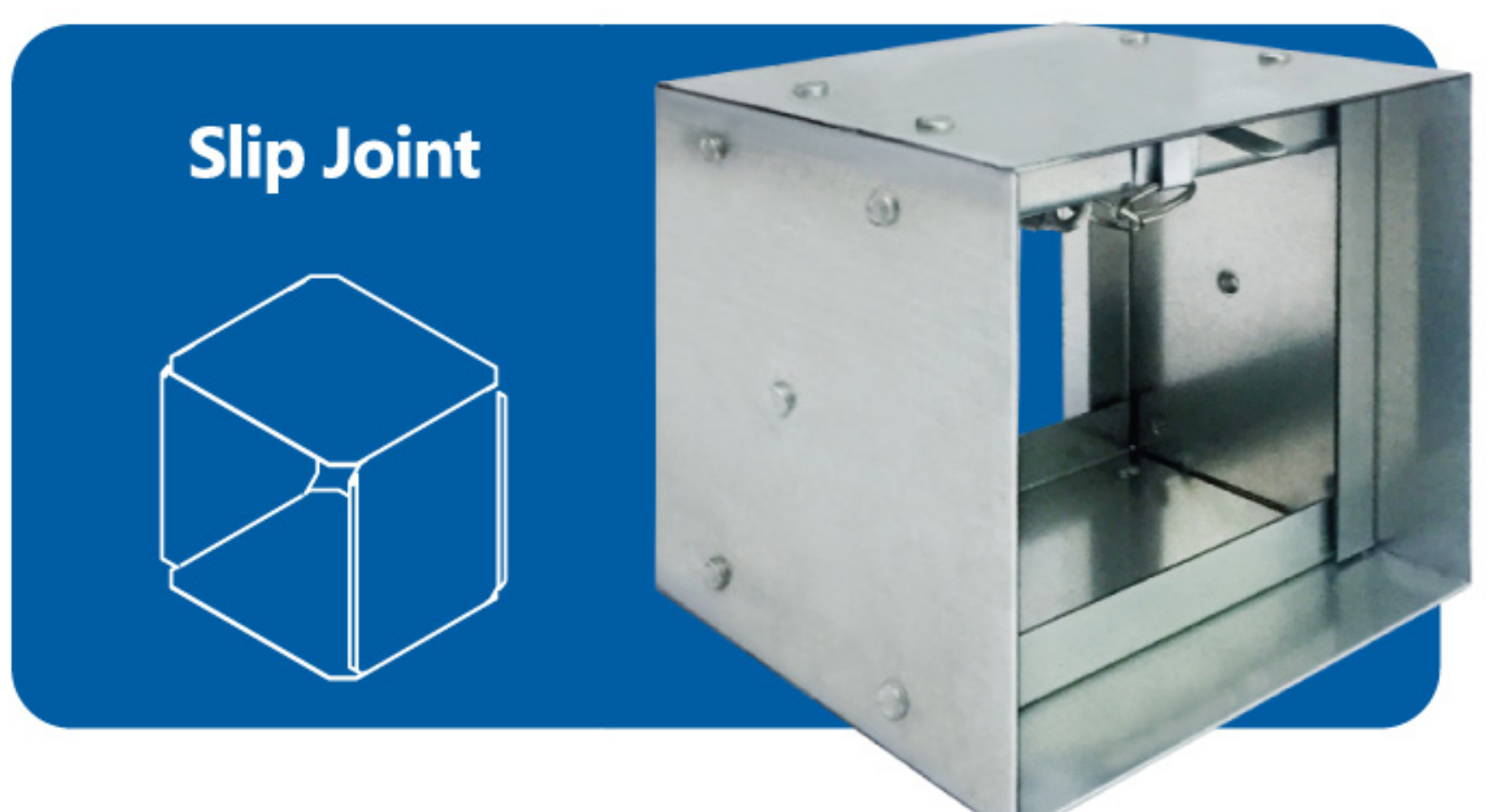
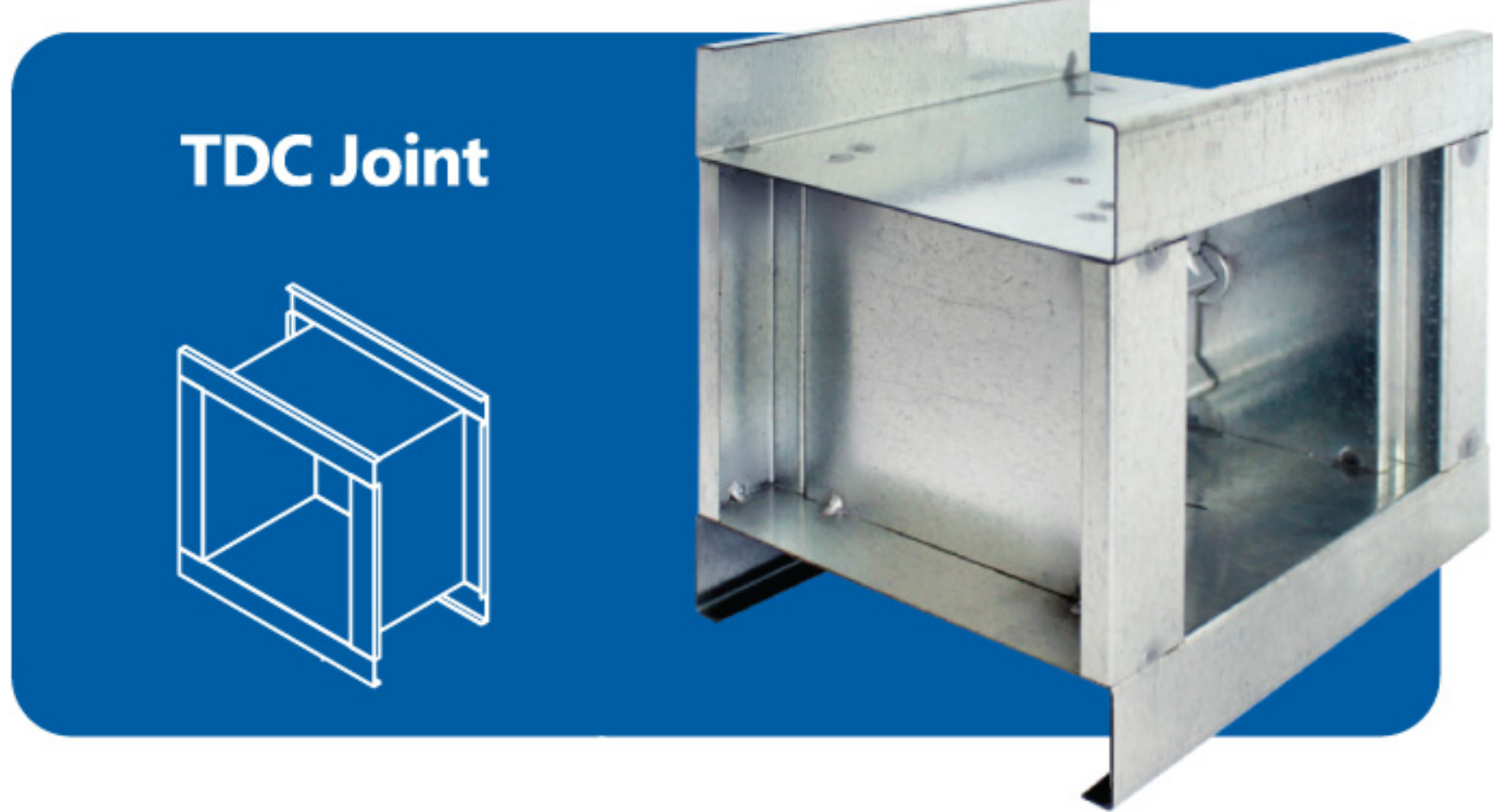
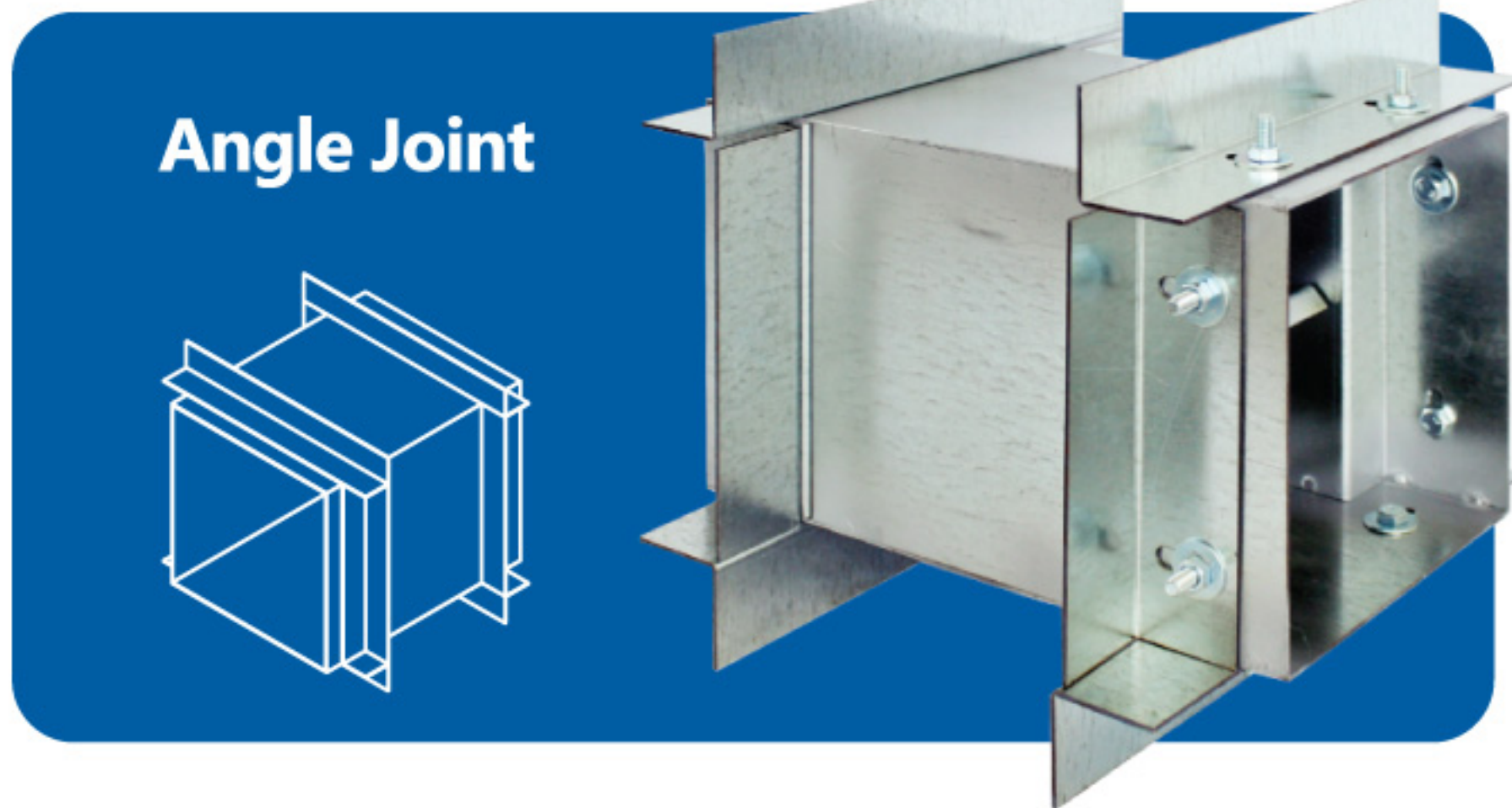
**( DATO' RUSMANI BIN MUHAMAD )**  
Penolong Ketua Pengarah,  
Bahagian Keselamatan Kebakaran,  
b.p Ketua Pengarah  
Jabatan Bomba Dan Penyelamat, Malaysia.



**CERTIFIED TO ISO 9001 : 2008  
CERT. NO : AR 5037**

# JOINING METHODS

---

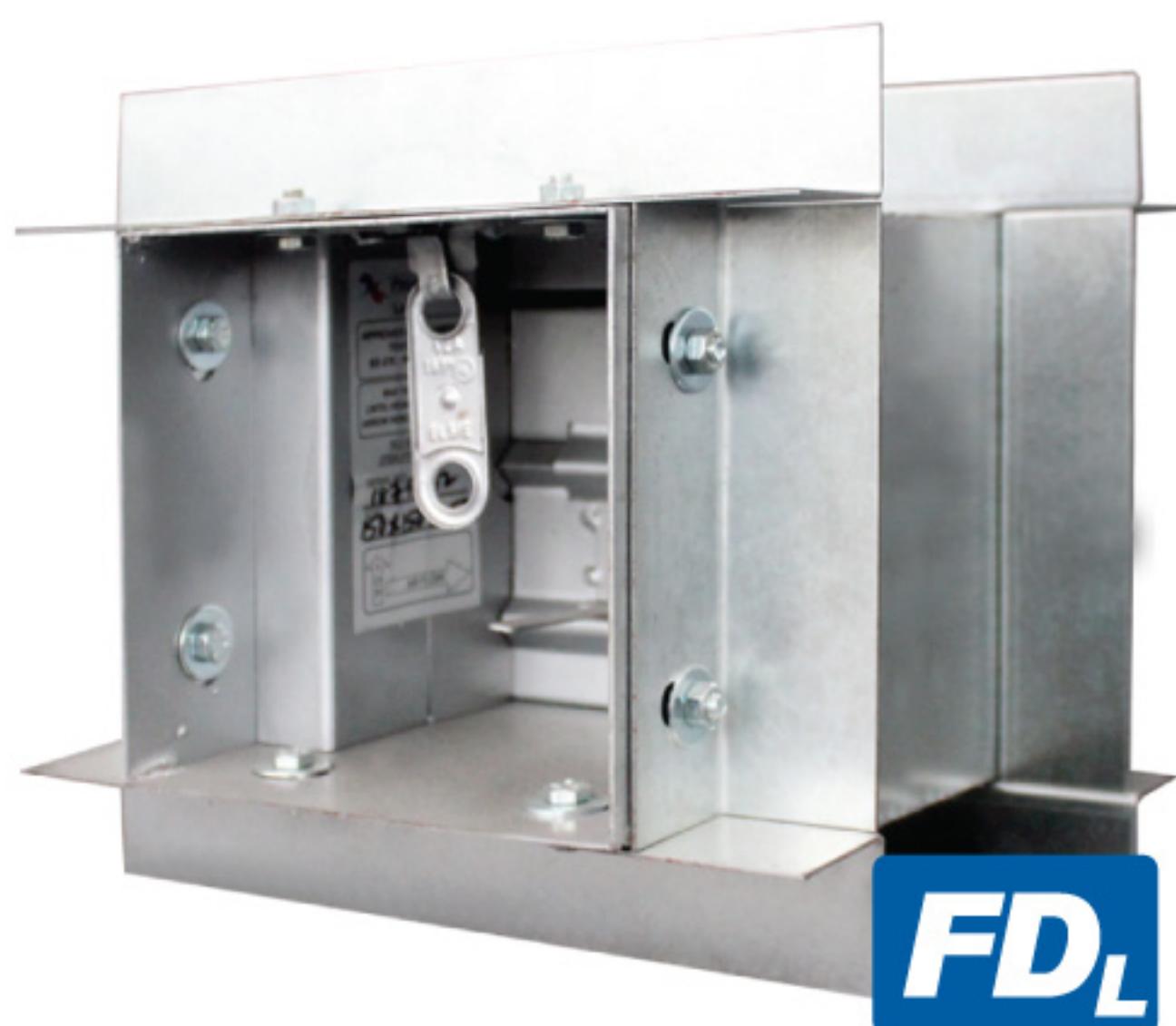




Notice :

Damper size would be fabricate as exact neck size

## AVAILABLE TYPES



Louvre Type







Motorized Louvre



**FD<sub>L</sub>** | *Louvre Type Fire Damper*

**MFD<sub>L</sub>** | *Motorized Fire Damper*

## Products Range

- Grilles 
- Diffusers 
- Dampers 
- Fire & Smoke Protection  ◀
- VAV 
- Others 
- Accessories 



**Prudent Aire Sdn Bhd** 514037-D  
 Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
 43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
 Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
 Fax : +603-9100 4868 Email : sales@prudentaire.com

[www.prudentaire.com](http://www.prudentaire.com)



**AL** *Acoustic Louvre Grille*





## Introduction

Inclining at 45°, each horizontal blade is reversed bent at the rear tip, Prudent Aire's Acoustic Louvre is designed to provide both acoustic attenuation as well as weather resistant applications. Available in standard 150/300mm louvre depth (highly customizable to customer's requirement), it is used primarily in areas where weather and noise protection with minimal pressure loss. For areas without depth concerns, double louvres (back-to-back) configuration is available for the best sound absorption and weather resistance performance; incorporating sight proof function as well.

In efforts of addressing the possible health issues, acoustic infill used in Prudent Aire's acoustic attenuators are bacteria, fungi growth and corrosion/erosion resistant (With standing maximum air velocity up to 30.5 m/s) with toughskin facing in prevention of possible contamination of fiberglass strands.

## CONSTRUCTIONS & MATERIALS

- 45° inclining horizontal blade
- Vertical pitch 150 mm
- Fibreglass infill
- Grille sizing :
  - i) Minimum size : 300 x 450 mm
  - ii) Maximum size : 1800 x 2400 mm
  - ii) Standard depth or 150 mm & 300 mm
- Acoustic Infill :
  - i) Standard Faced Fibreglass (32 kg/m<sup>3</sup> toughskin faced)
  - ii) Faced rockwool (upon request)
  - iii) Perforated sheetmetal protection

### Construction



Stainless Steel

### Frame



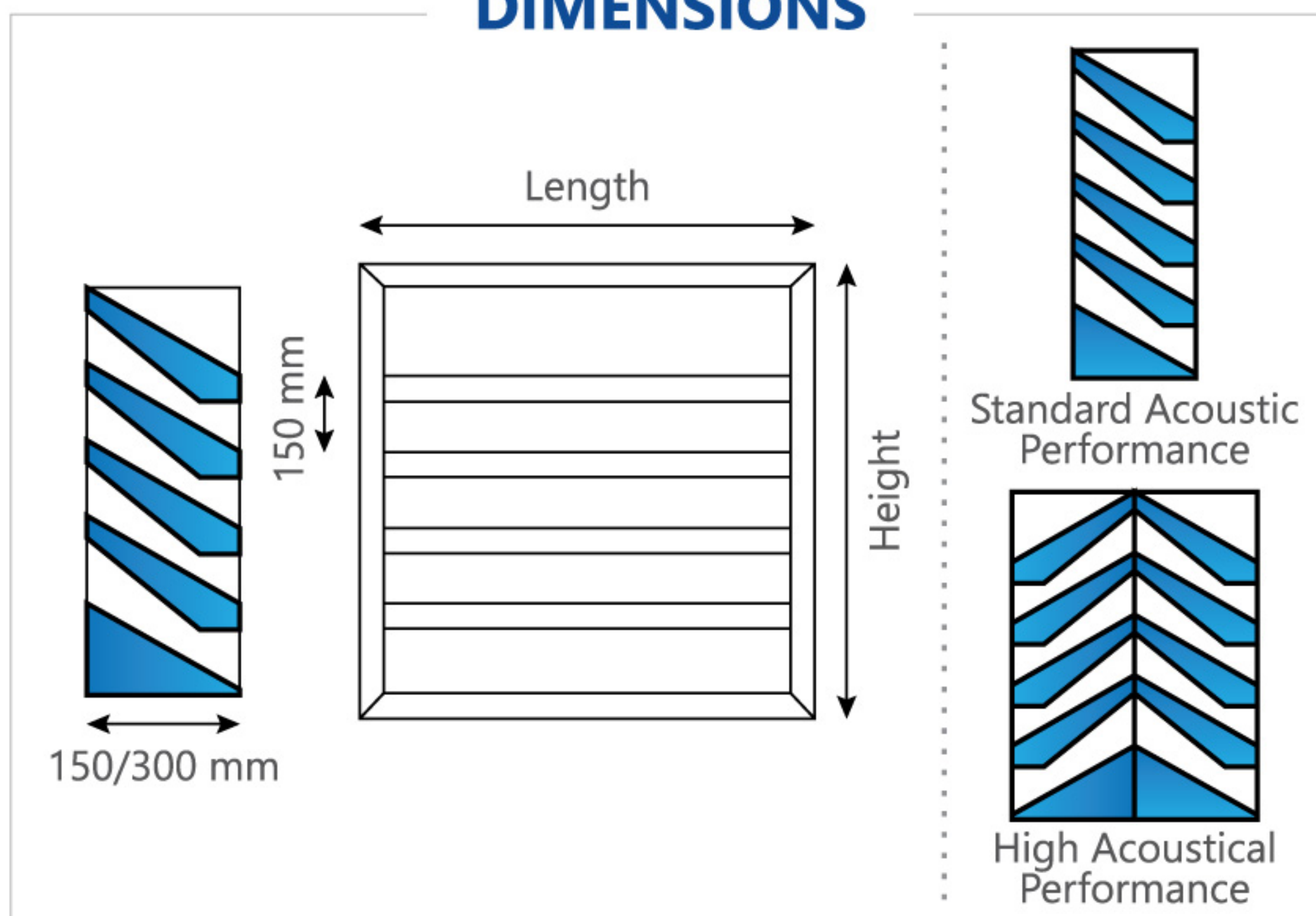
Galvanised Steel

### Blade



Galvanised Steel

## DIMENSIONS



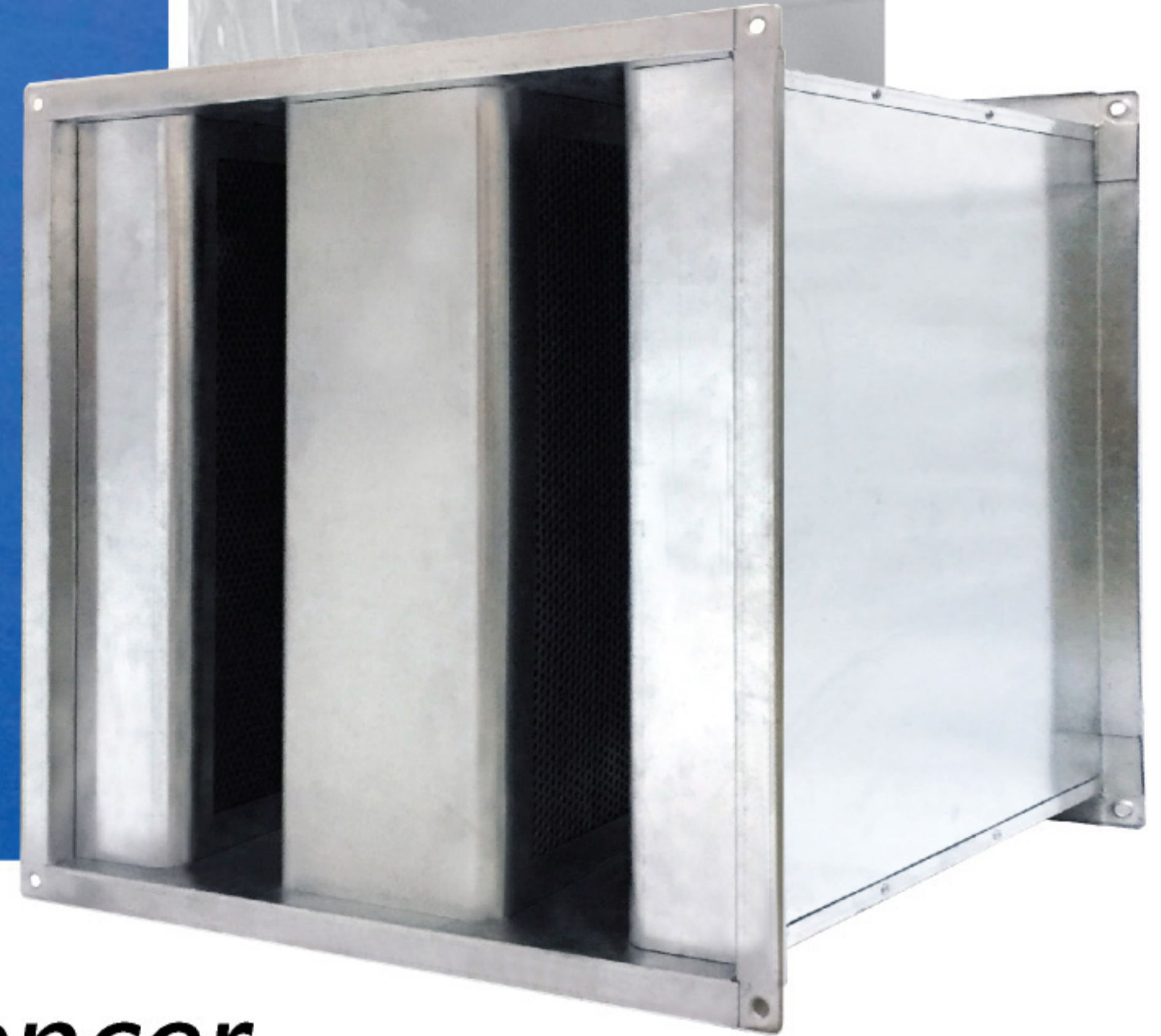
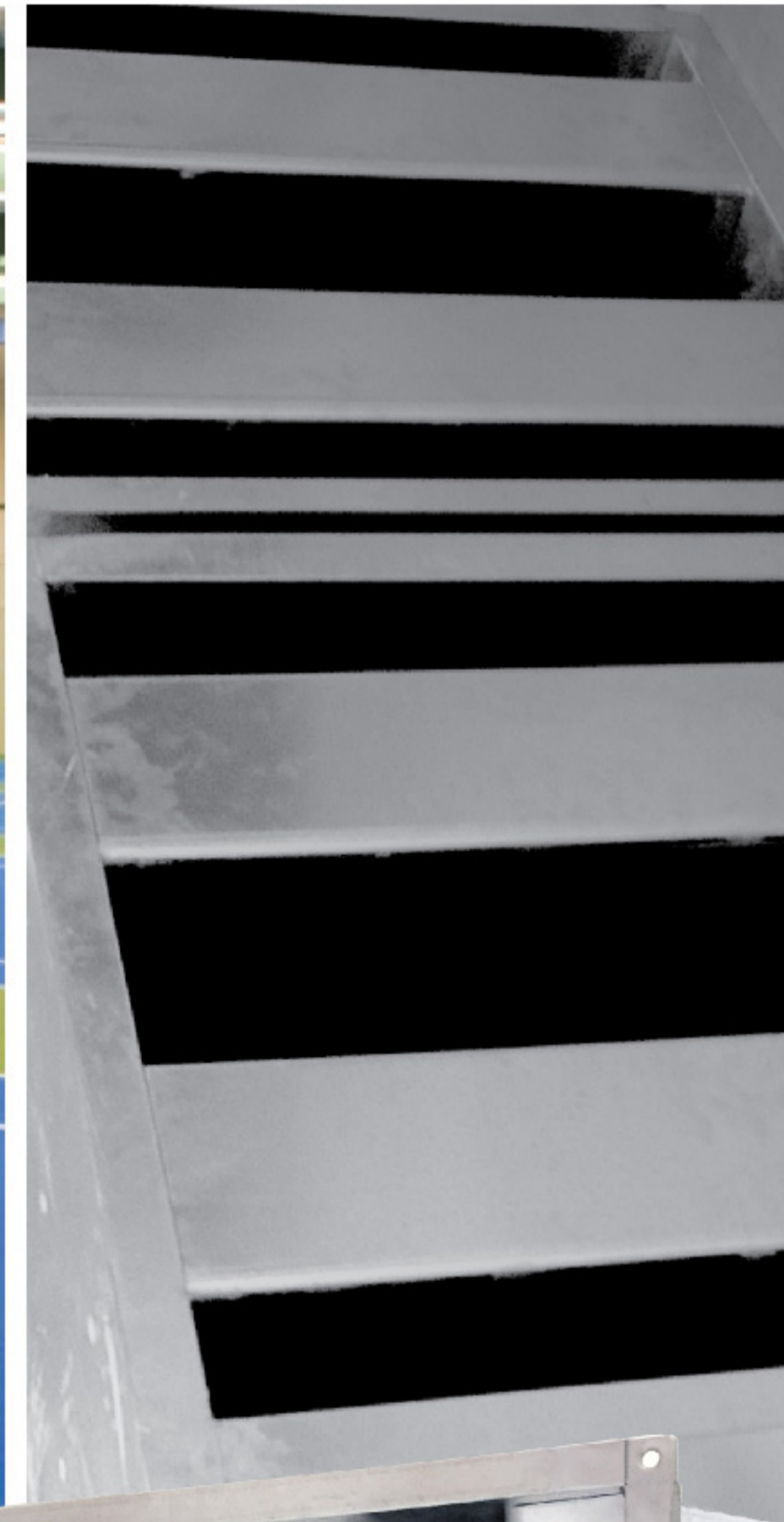
## TECHNICAL PERFORMANCE

Free field noise reduction, dB

Depth (mm)	Octave Band Numbers								
	1	2	3	4	5	6	7	8	
150	12	13	11	14	20	21	22	23	
300	11	11	13	17	21	24	19	19	
Grille Size (HxD) mm	Face Velocity, m/s			0.5	1.0	2.0	3.0	4.0	5.0
200 x 300	Free Velocity, m/s			2.3	3.7	5.6	7.4	2.3	-
	Total Pressure Loss, Pa (1)			<10	27	60	>100	>100	-
	Total Pressure Loss, Pa (2)			<10	20	45	80	>100	-
200 x 400	Free Velocity, m/s			1.7	2.8	4.2	5.6	6.9	13.9
	Total Pressure Loss, Pa (1)			<10	16	35	60	95	>100
	Total Pressure Loss, Pa (2)			<10	11	25	45	70	>100
200 x 500	Free Velocity, m/s			1.2	1.9	2.8	3.7	4.6	9.3
	Total Pressure Loss, Pa (1)			<10	<10	16	27	45	>100
	Total Pressure Loss, Pa (2)			<10	<10	11	20	32	>100
200 x 600	Free Velocity, m/s			1.0	1.6	2.4	3.2	4.0	7.9
	Total Pressure Loss, Pa (1)			<10	<10	<10	22	30	>100
	Total Pressure Loss, Pa (2)			<10	<10	<10	17	22	90
200 x 800	Free Velocity, m/s			-	1.2	1.9	2.5	3.1	6.2
	Total Pressure Loss, Pa (1)			-	<10	<10	12	17	75
	Total Pressure Loss, Pa (2)			-	<10	<10	<10	15	58
300 x 300	Free Velocity, m/s			1.4	2.2	3.3	4.4	5.6	11.1
	Total Pressure Loss, Pa (1)			<10	<10	25	38	60	>100
	Total Pressure Loss, Pa (2)			<10	<10	19	27	45	>100
300 x 400	Free Velocity, m/s			1.0	1.6	2.4	3.2	4.0	7.9
	Total Pressure Loss, Pa (1)			<10	<10	<10	22	30	>100
	Total Pressure Loss, Pa (2)			<10	<10	<10	17	22	90
300 x 500	Free Velocity, m/s			-	1.2	1.9	2.5	3.1	6.2
	Total Pressure Loss, Pa (1)			-	<10	<10	12	17	75
	Total Pressure Loss, Pa (2)			-	<10	<10	<10	15	58
300 x 600	Free Velocity, m/s			-	1.1	1.7	2.2	2.8	5.6
	Total Pressure Loss, Pa (1)			-	<10	<10	<10	16	60
	Total Pressure Loss, Pa (2)			-	<10	<10	<10	11	45

\* Total Pressure Loss, Pa (1) - 300 mm Depth \* Total Pressure Loss, Pa (2) - 150 mm Depth





**RS** *Rectangular Silencer*





## Introduction

Prudent Aire's Rectangular Silencer are designed for silencing noise transmitted through ductwork, utilize sound absorbing media to reduce sound levels. As the discharge noise passes through the silencer, the acoustic energy enters the baffles through the holes in the internal perforated plate. This perforated plate protects the acoustic media from being eroded by the air at high velocities, but have a large enough free area to be acoustically transparent. Once inside the baffle, the acoustic energy interacts with the absorptive media, the friction between the acoustic energy and the fiber glass converts the acoustic energy into heat, thereby reducing the amount of acoustic energy and decreasing sound levels at discharge of the silencer.

## CONSTRUCTIONS & MATERIALS

- Silencing discharge noise pass through ductwork.
- Baffle designed to reduce the pressure drop
- Preforated plate applied at baffle to minimized acoustic media being eroded and leak out to the system.
- Standard with TDC joint.
- Maximum Size available for single module : 2400 (W) x 1800 (H) x 3000 (L)
- Baffle Infill : Acoustic media

### Casing



Galvanised Steel  
(Size Dependant)

### Baffle



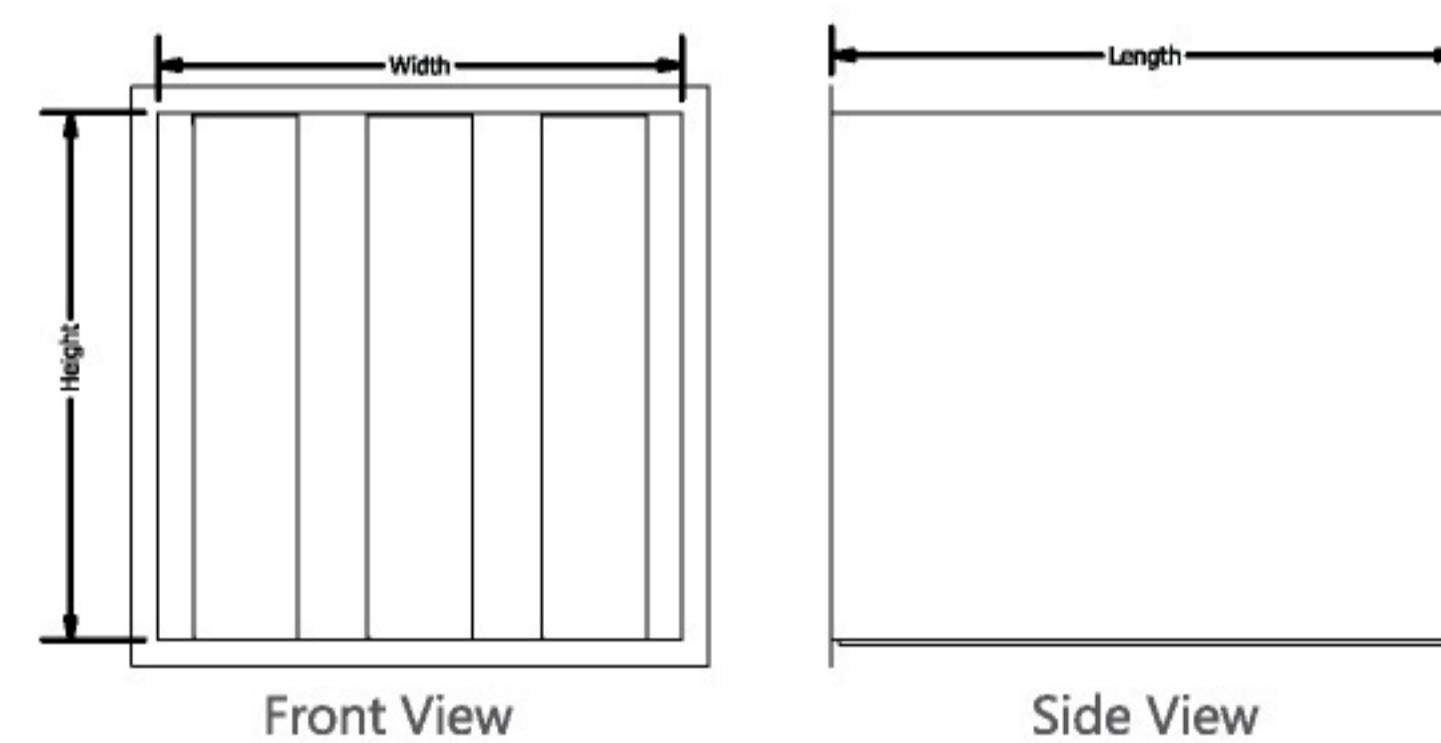
Galvanised Steel  
(Size Dependant)

### Casing & Baffle



Stainless Steel  
(Size Dependant)

## DIMENSIONS



Standard Dimension Table

Number of Splitter	Recommended Size Range		
	Width	Height	Length
1	300 - 600	300 - 900	500 - 3000
2	600 - 900	300 - 1800	500 - 3000
3	900 - 1200	300 - 1800	500 - 3000
4	1200 - 1500	300 - 1800	500 - 3000
5	1500 - 1800	300 - 1800	500 - 3000
6	1800 - 2100	300 - 1800	500 - 3000
7	2100 - 2250	300 - 1800	500 - 3000
8	2250 - 2400	300 - 1800	500 - 3000

### Body of the silencer :

- Exterior casing in galvanized steel, stainless steel or other welded material.
- Exterior casing in steel with minimum 0.8mm thickness with structural steel.
- Additional reinforcements (frame, angle, etc)
- Special paint finishes for certain environment condition.
- Holes on flange for lifting and connection.

### Special assembly :

- In case of concentrated smoke or accumulated dust, it is possible to opt for periodic cleaning or replacement of baffles.

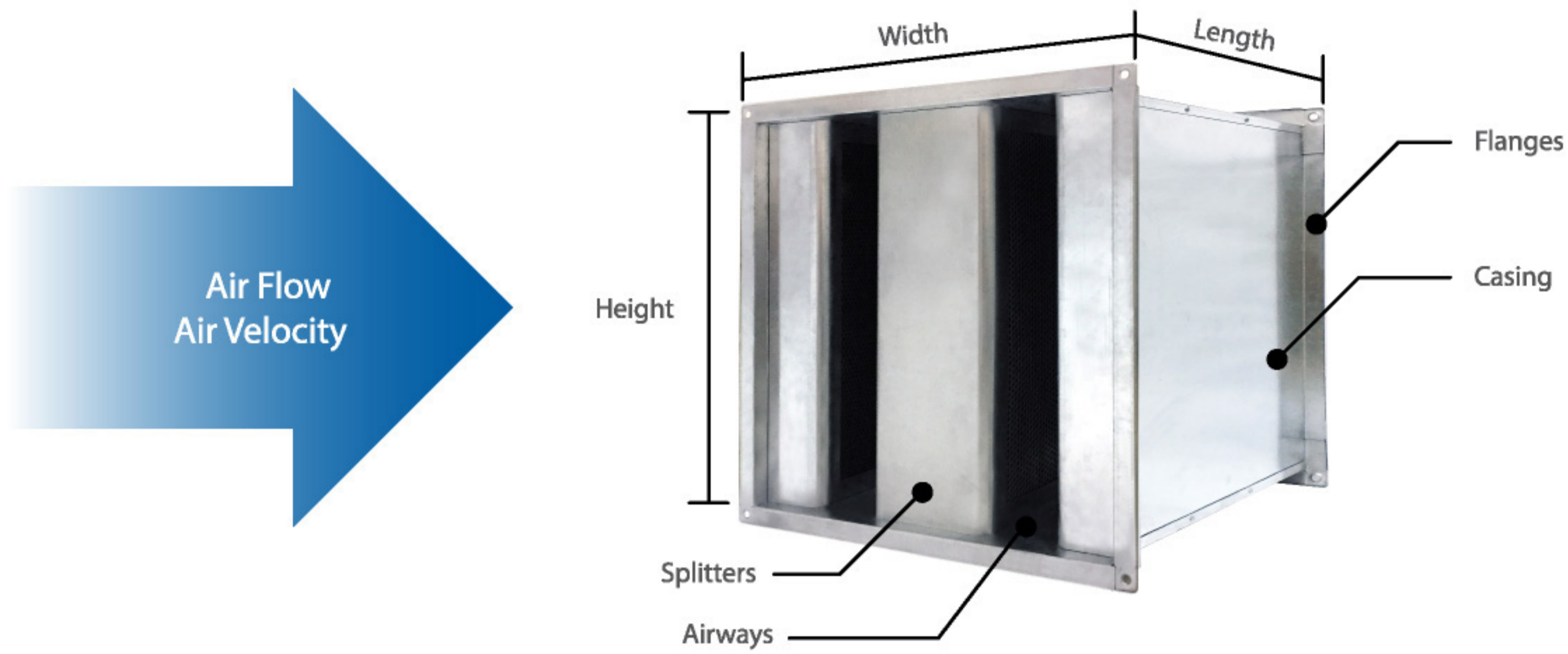
### Baffles :

- Choice of wool types (rockwool, fiberglass, etc)
- Choice of wool thickness and density.
- Polyester film, black matt finished, glass cloth, etc to protect the acoustic media from oil, water, fiber erosion, etc.
- Hexagon profile for flow entry and taper end for flow discharge to limit turbulence and pressure drop.
- Perforated galvanized steel, stainless steel or other material.
- Baffles assemble with internal structure.

### Connecting flanges :

- Angle iron or TDC/TDF flanges to connect to the ventilation duct system.

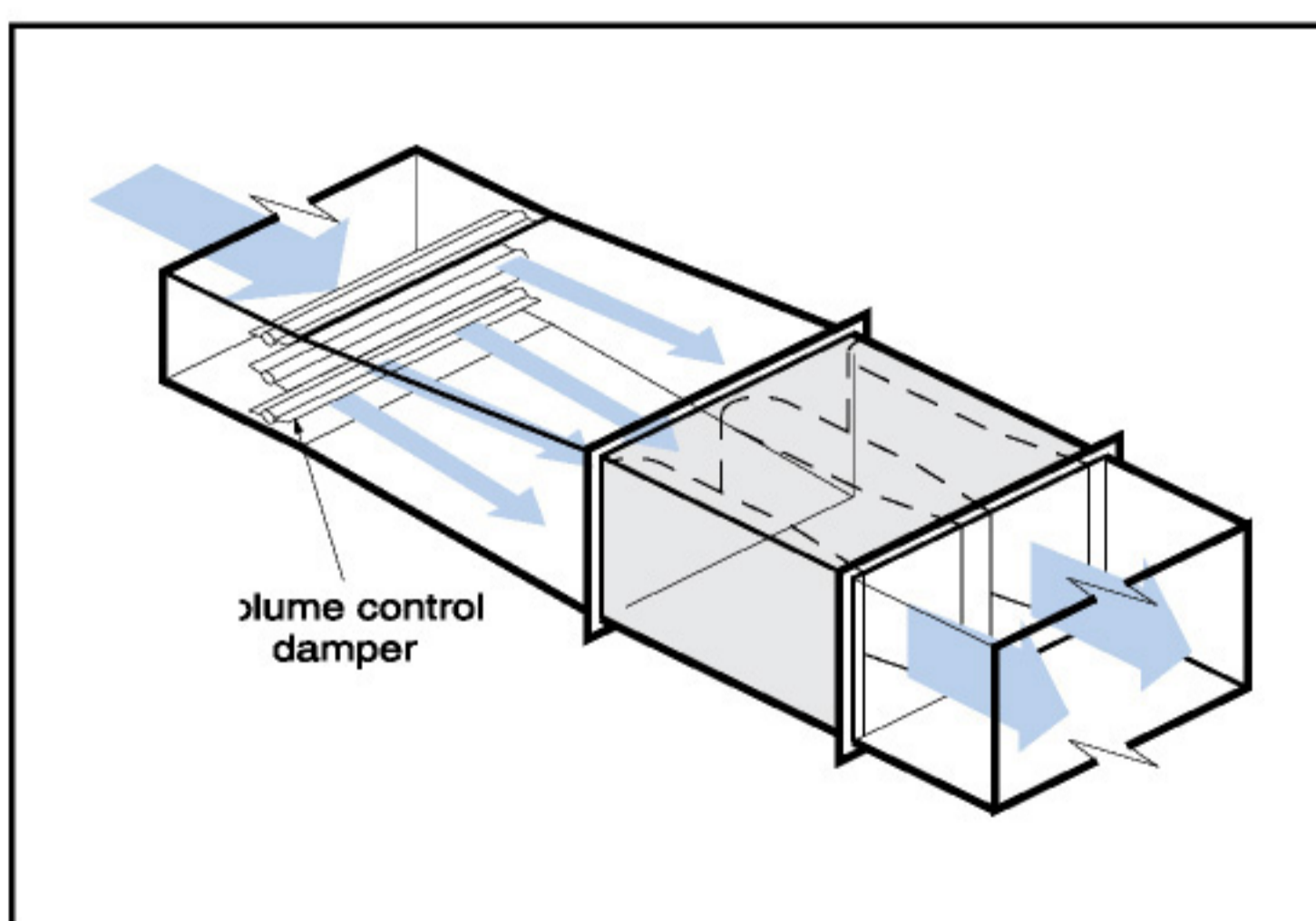
**PERFORMANCE DATA**



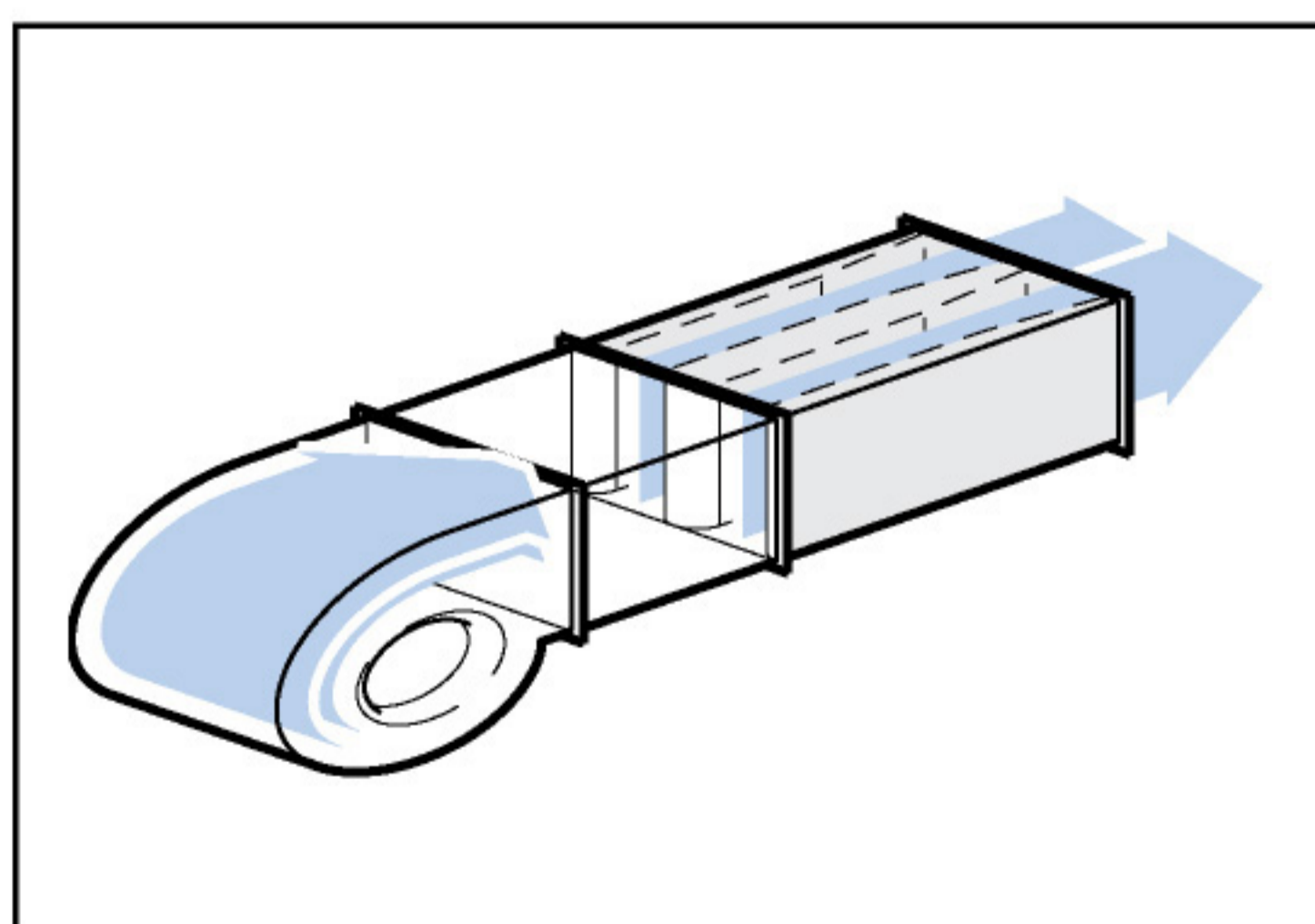
Length	Air Way	Octave Venter Frequency Band (Hz)								Air Velocity VS Pressure Drop (m/s VS Pa)								
		63	125	250	500	1000	2000	4000	8000	4	6	8	10	12	14	16	18	20
500	100	2	3	9	9	12	9	7	6	6	13	24	38	55	74	97	122	151
	125	1	3	7	7	9	7	6	5	5	12	19	31	46	62	80	102	126
	150	1	2	6	7	8	6	6	5	5	10	17	27	39	53	67	87	107
	175	1	2	6	6	8	6	4	4	4	8	15	25	33	46	60	75	94
	200	1	2	6	6	6	5	4	3	3	7	13	21	30	41	53	67	83
1000	100	3	8	18	18	21	15	10	9	7	16	28	44	63	86	111	142	174
	125	3	7	14	14	16	13	9	7	6	13	23	36	52	71	93	117	144
	150	2	6	13	13	14	11	8	7	5	12	20	32	45	60	75	97	122
	175	2	6	12	12	13	9	7	6	4	8	18	27	38	52	68	86	106
	200	2	6	11	11	11	8	7	5	3	9	15	24	34	46	61	77	95
1500	100	4	11	25	26	28	20	23	11	9	18	32	50	71	97	126	168	197
	125	3	10	21	21	22	16	11	9	7	15	25	41	59	80	105	132	162
	150	3	9	19	19	18	14	9	8	3	13	22	29	50	67	89	112	138
	175	3	9	17	17	16	12	9	7	5	10	19	19	42	59	77	97	120
	200	3	8	15	15	13	11	9	6	5	10	18	15	39	53	68	87	107
2000	100	5	15	32	34	36	24	14	13	9	19	35	55	79	108	140	178	219
	125	4	13	27	27	26	19	13	11	7	16	29	46	65	90	116	147	181
	150	4	12	25	25	23	17	11	9	7	14	25	39	56	76	98	124	154
	175	3	12	23	22	19	15	11	8	6	11	21	34	49	66	88	112	140
	200	3	11	22	21	16	14	10	7	5	11	19	30	43	58	76	96	119
2500	100	6	19	28	39	35	29	17	14	10	22	38	60	87	119	155	196	242
	125	6	17	33	33	32	22	14	11	8	18	33	50	67	98	128	162	199
	150	4	15	31	31	29	20	13	10	7	15	27	42	62	83	109	137	169
	175	4	14	27	28	25	17	13	10	6	12	23	37	53	71	94	119	146
	200	4	13	26	25	20	14	12	9	5	12	21	33	47	64	83	106	130
3000	100	8	24	36	39	37	34	21	15	11	24	42	67	96	129	169	219	265
	125	6	20	38	39	38	34	19	12	10	19	35	54	79	107	140	177	219
	150	6	19	36	37	35	22	16	11	8	17	33	47	66	91	119	149	185
	175	5	18	31	34	28	18	14	11	7	15	25	40	57	78	103	130	160
	200	5	17	31	31	23	15	13	10	6	13	23	35	52	69	92	116	142

**INSTALLATION GUIDELINE**

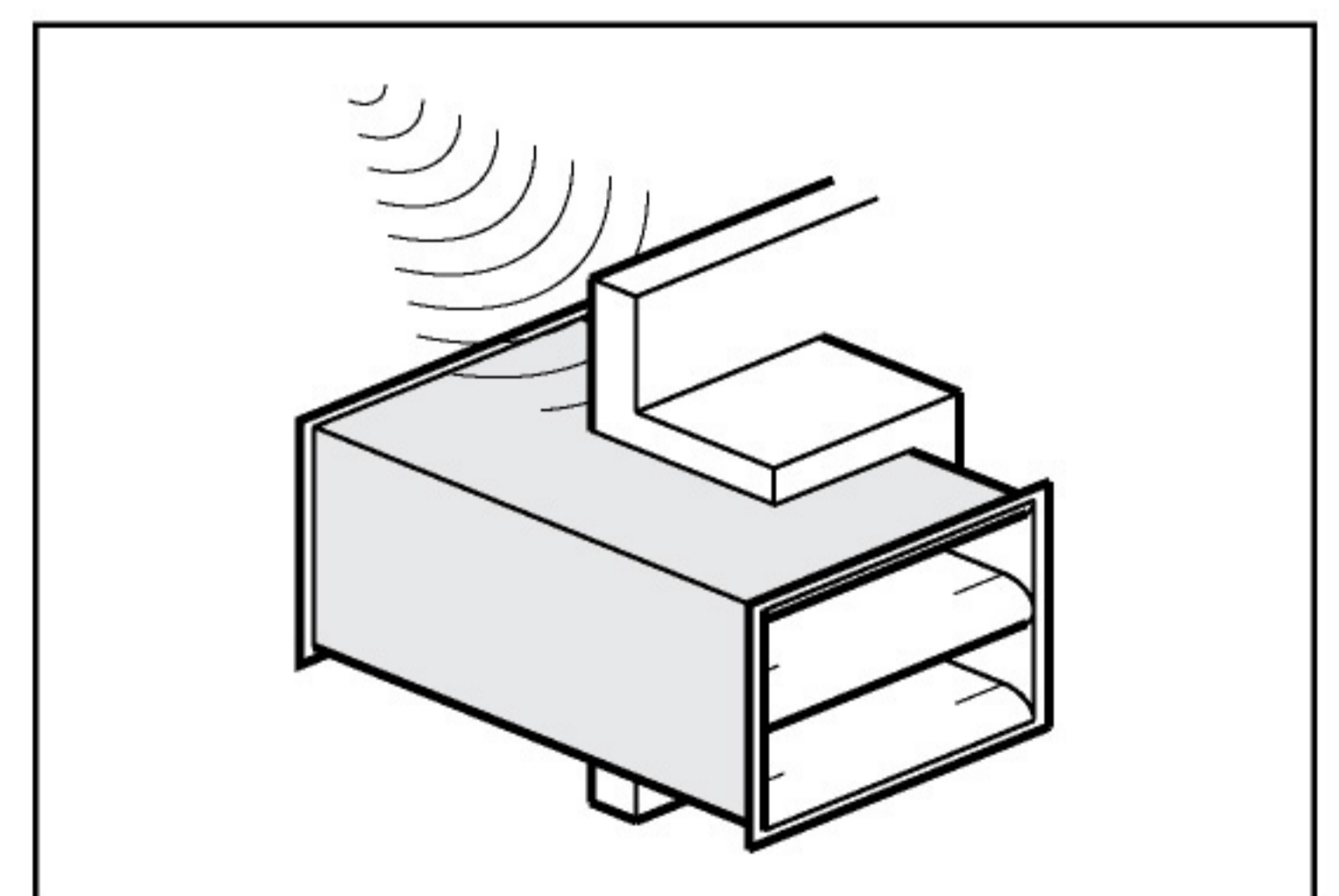
Elements in a duct system, such as transitions, elbows, and tees, will effect the performance of a silencer if they are located too close to the silencers inlet or outlet. This effect for silencers is name as "system effect". Below are some guideline to minimize system effect:



Allow for a settling duct between volume control dampers and silencers.



Allow adequate distance between silencers and fan.



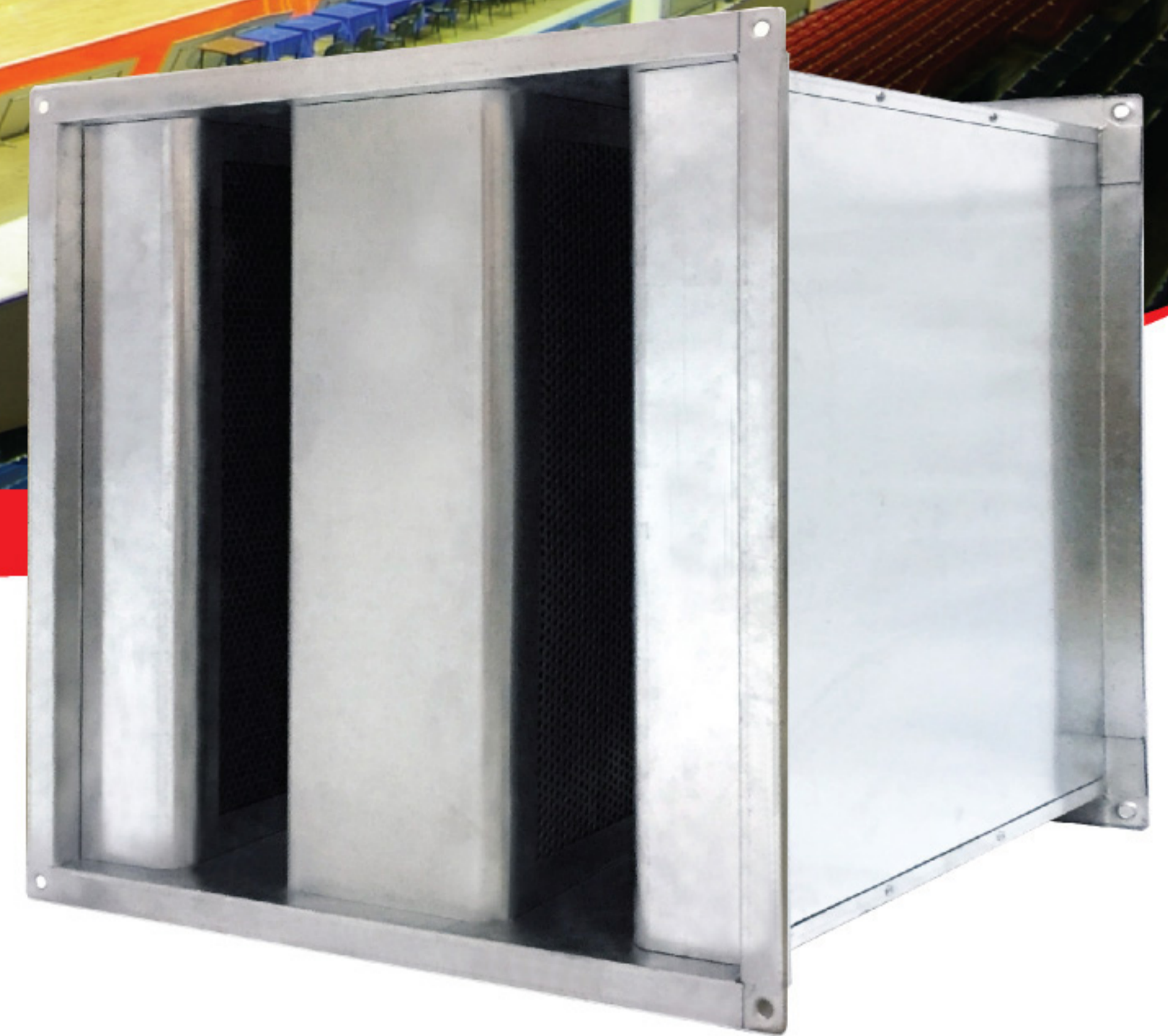
Place a Concrete sleeve around the silencer to increase the acoustic seal between rooms.

Ensure transitions close to silencers are gradual or, better still remote.



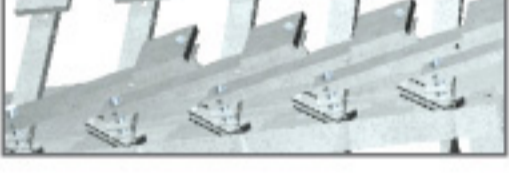




Rotate the splitter orientation by 90°.



# RS | Rectangular Silencer



## Products Range

- Grilles 
- Diffusers 
- Dampers 
- Fire & Smoke Protection 
- VAV 
- Others 
- Accessories 

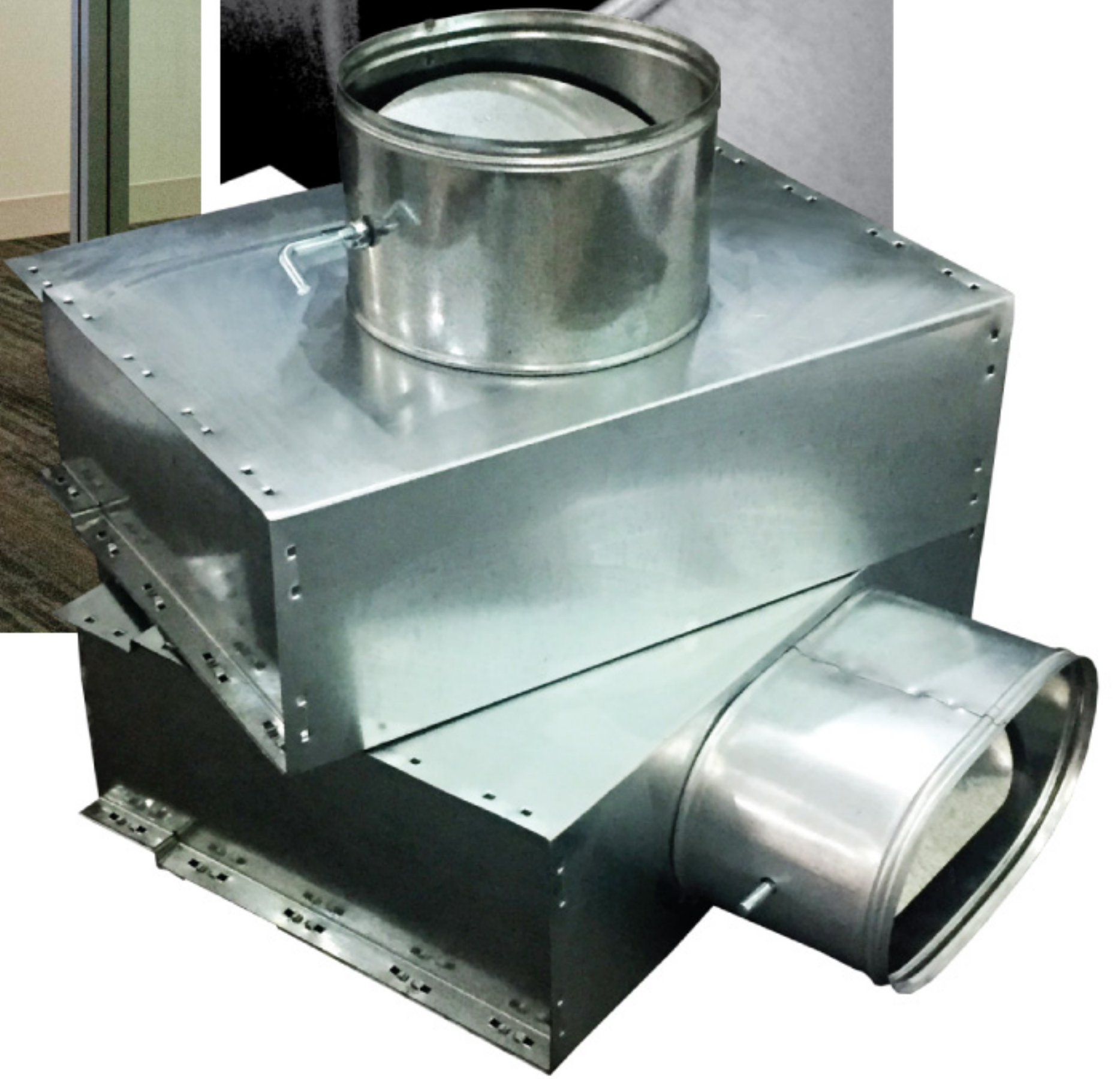


**Prudent Aire Sdn Bhd** 514037-D  
 Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
 43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
 Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
 Fax : +603-9100 4868 Email : sales@prudentaire.com

[www.prudentaire.com](http://www.prudentaire.com)



**PB** *Plenum Box*





## Introduction

An essential part in any ventilation system, the Plenum Box are often the most preferred choice for connecting terminals to ducting.

With versatile design, the Plenum Box is highly customizable in terms of sizes and profiles.

### GENERAL FEATURES

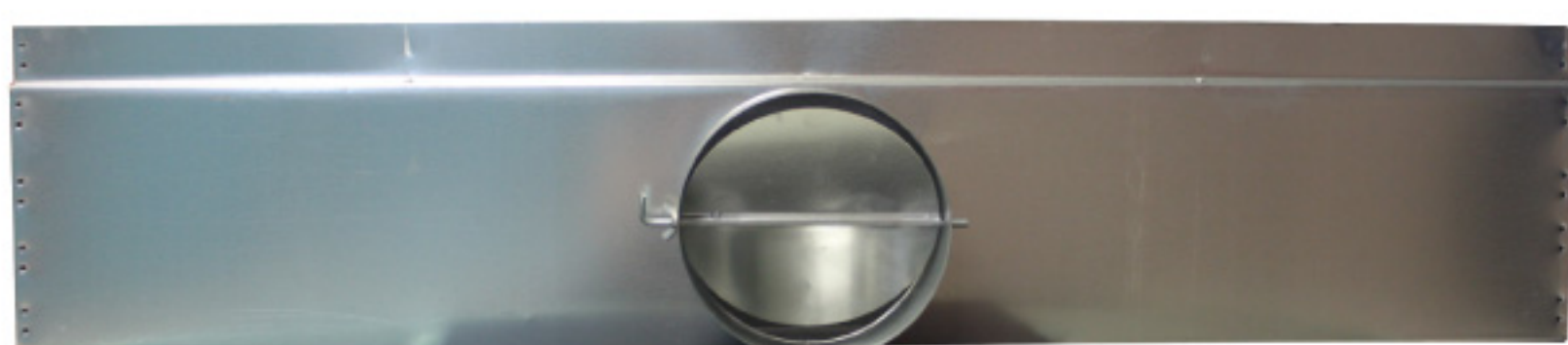
- Highly customizable size and profile
- Insulation choice: 3, 6 & 12 mm thickness
- Top and side enteries configuration available

### MATERIALS

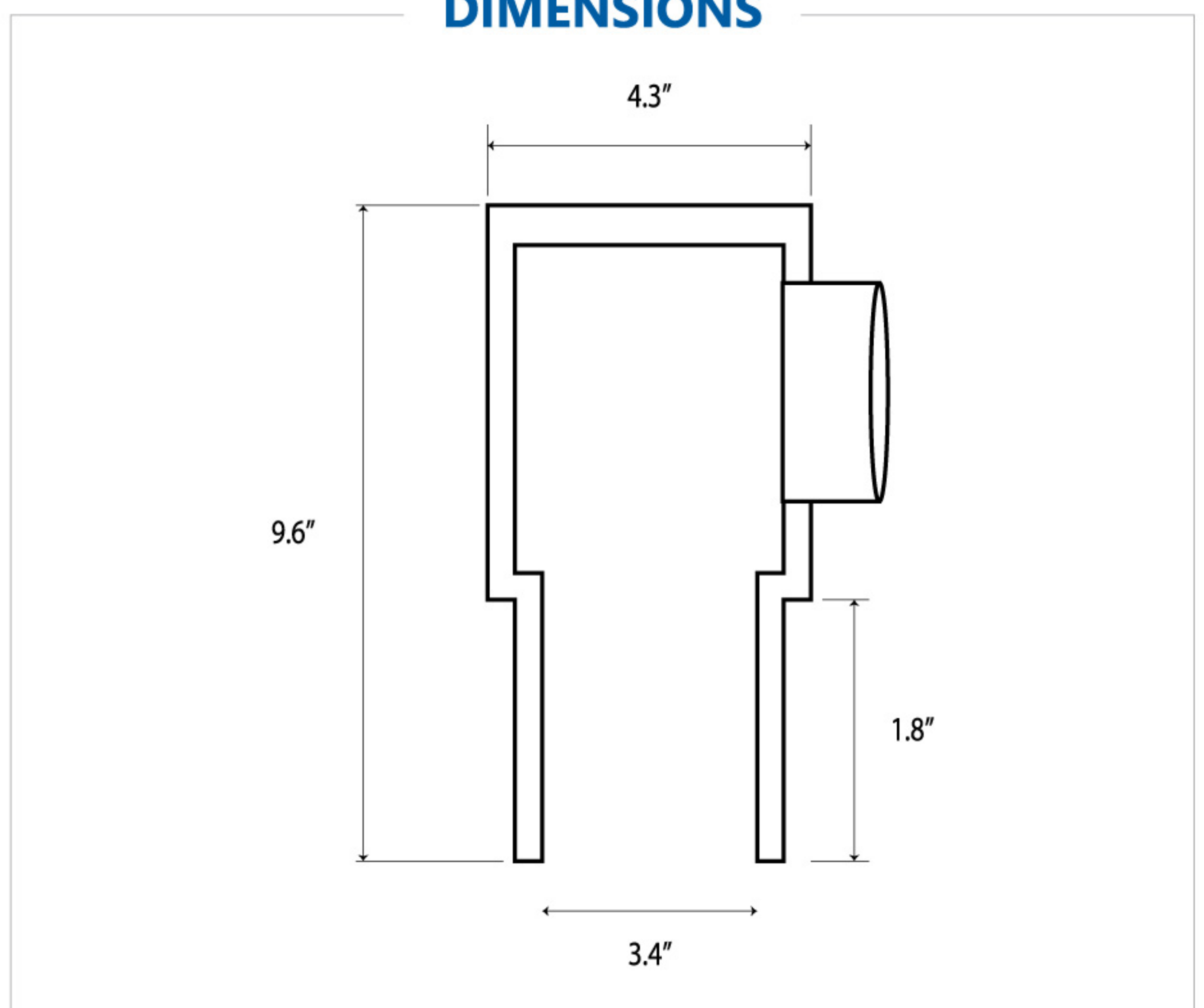
- Box construction : 0.5mm Galvanised Steel
- Insulation : 3, 6 & 12mm PE foam

### SURFACE FINISHING

- Standard no-coating



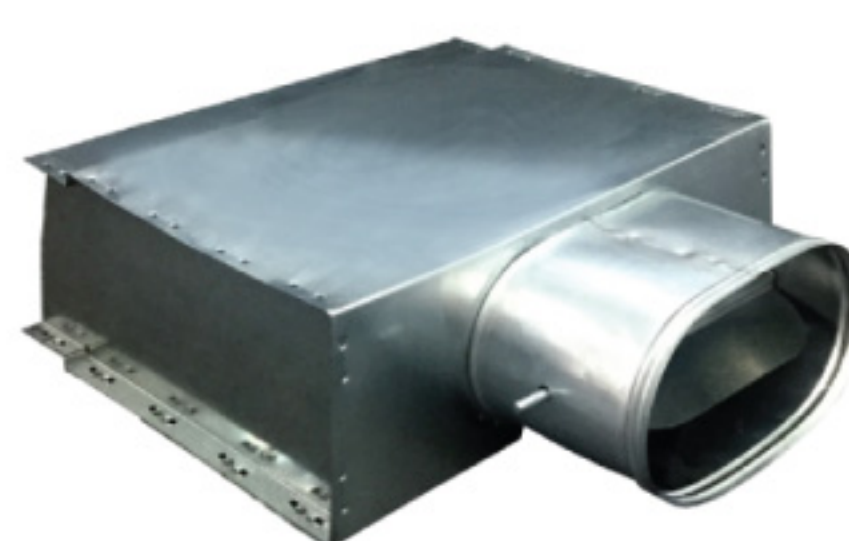
### DIMENSIONS



### TYPES OF PRODUCTS



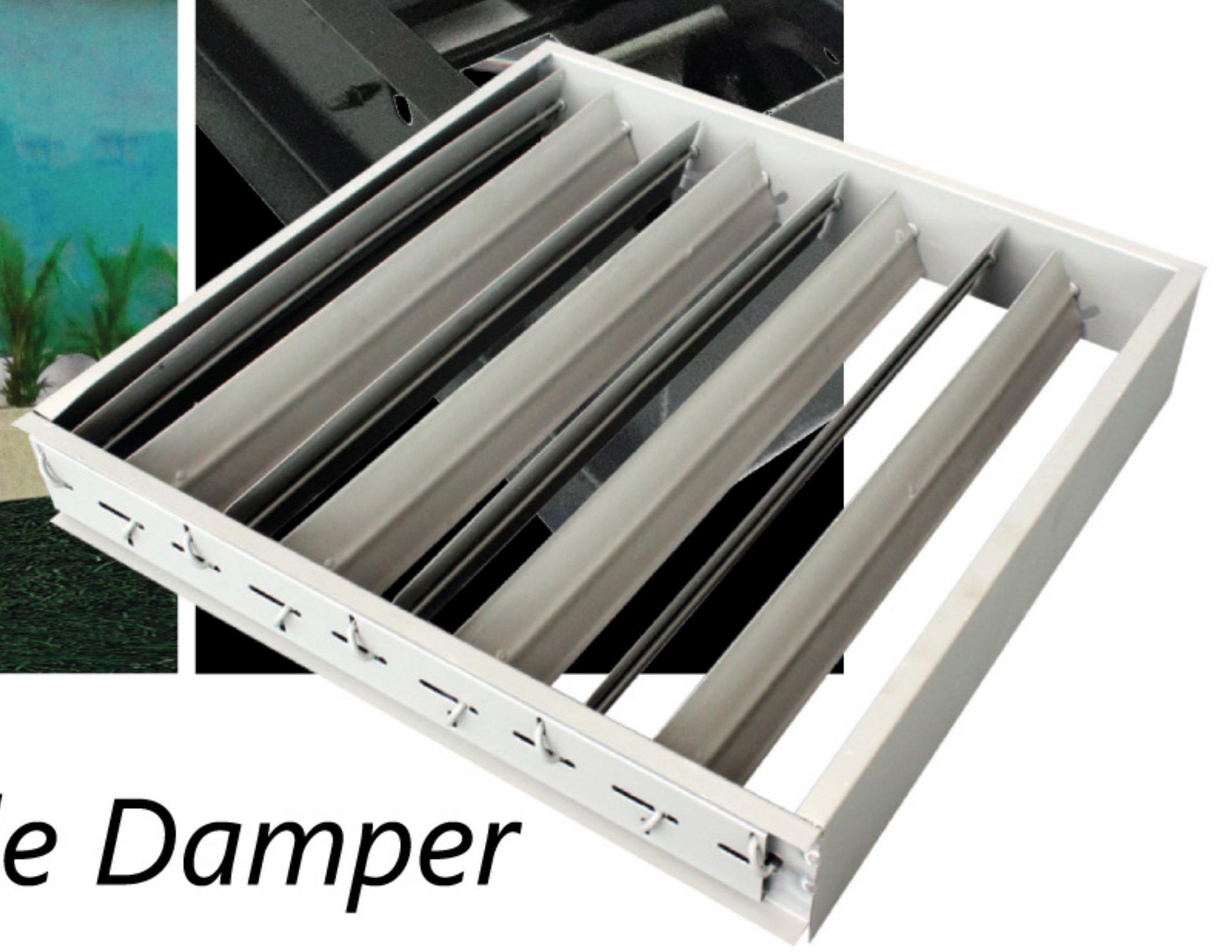
Side Opening



Top Opening



2 Collar



**OBD** *Opposed Blade Damper*



*Square Blade*

AL GI SS

*Radial Type*

AL GI SS

*Butterfly Blade*

AL GI SS

*Round Collar*

AL GI SS

AL Aluminium   GI Galvanised Steel   SS Stainless Steel

## PRODUCT DESCRIPTION

The OBD is an optional accessory (also known as rear assembly components) supplied with grilles and diffusers.

It is used for fine adjustment of air flow, for balancing the air distribution system. The design emphasis is on simplicity and durability for reliable operation.

## MATERIALS

- Frame construction : 0.6mm Galvanised Steel
- Blade construction : 0.6mm Galvanised Steel

## GENERAL FEATURES

Adjusted by :

- Adjusting arm
- Philips screw head adjustment (Optional)

## SURFACE FINISHING

- Standard gray rustproof undercoat
- Matt black (upon request)





**MSFD** *Multiblade Smoke  
Fire Damper*



## Introduction

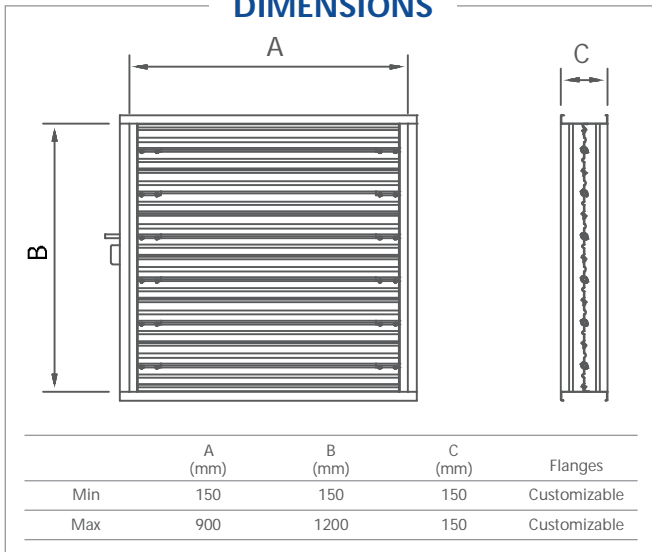
Prudent Aire's smoke Fire damper defined as "a device installed in ducts and air transfer opening of an air distribution or fire resistance and smoke control system designed to resist the passage of air and smoke. Primary function to prevent the passage of fire and smoke through the heating, ventilation, and air conditioning system, or from one side of a fire-rated separation to the other.

## CONSTRUCTIONS & MATERIALS

- Leakage rating Class II
- Fire rating 4 hours comply to BS 476 : Part 20
- Parallel blade closing action
- High pressure rating of up to 3kPa with Min leakage and deflections
- UL certified blade seal at blade edge to minimised leakage (optional)
- Shaft : GI Hexagon shaft.

Casing	Blade	Casing & Blade
GI 1.5mm	GI 1.5mm	SS
Galvanised Steel	Galvanized Steel	Stainless Steel (Available)

## DIMENSIONS



## FUNCTION DESCRIPTION

### Operational

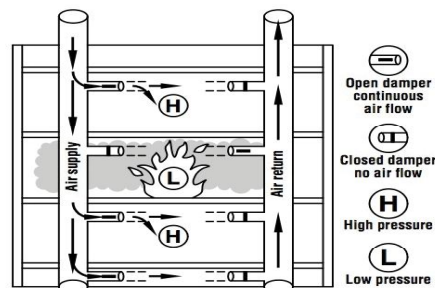
Either a factory-installed electric or a pneumatic actuator, they are ultimately controlled by smoke detectors and/or fire alarms. The smoke fire dampers serve three general applications of 'passive smoke control system' and 'engineered smoke control system' and 'fire resistance'

As a part of the 'passive smoke control system', the dampers close upon detection of smoke and prevent the circulation of air and smoke through a duct, transfer, or ventilation opening.

As part of an 'engineered smoke control system' designed to control smoke migration using walls and floors as barriers to create pressure differences. Pressurizing the areas surrounding the fire results in prevention of smoke spread into other areas.

### Damper Blade Design

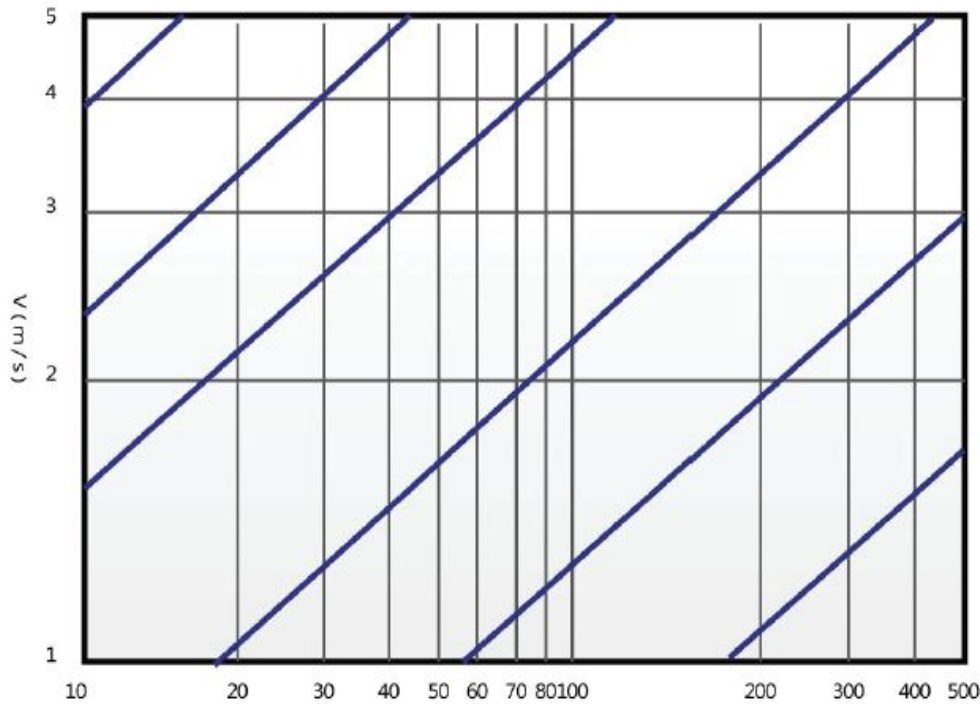
Damper blade designed to optimize allowable width, thus minimizing the required number of obstructing blade per damper and yet maintain the structural integrity with minimum deflections under high pressure differential of up to 3 kPa. UL certified blade seal are installed at blade edge to provide a much better air-tight conditions



Smoke is contained in fire zone by higher pressures in adjacent zones.

AERODYNAMIC PERFORMANCE

Pressure Drop VS Duct Velocity



V = Duct Velocity (m/s)

ΔP = Static Pressure Drop (Pa)

0°, 10°, 20°,... etc = Degree Opening

Max static pressure drop for fully open damper is 10pa

CONSTRUCTION SPECS. MATERIALS SPECS

**Casing Assembly**

- 1.5mm thickness casing sections. Casing sections to be welded externally with welding beads to be ground flush. A 1.5mm materials thickness center million to be provided for larger dimensions of damper. Fire retardant sealant to be applied to the casing joints to minimize possible smoke leakage. if any.
- material provided to be galvanized steel, unless otherwise stated.

**Damper Blade Assembly**

- 1.5mm thickness single skin configuration. The individual blade to be in triple v-grooves design. Blade operation to be of parallel blade action with linkage system that ensures fail-safe closing action to form the required smoke barrier. Opposed blade action configuration to be available upon request. Galvanised steel hexagon shaft to be provided for each blade section.
- Mechanical hexagon bushing to be tight-fitted into the casing channel sections of the casing assembly to support and maintain the blade shafts in the pre-determined locations.
- material provided to be galvanized steel, unless otherwise stated.

**Linkage Cover & Side Seals**

- 1.5mm pre-formed angles to be welded to the damper casing assembly to provide both blade stop and sealing fuctions.
- Actuator mounting angles to be provided when required to ensure proper actuator mounting. Construction design to be changed according to actuator type.
- Material provided to be galvanized steel, unless otherwise stated.

**Finishing**

- Damper assembly to be in natural finish of the material.

**Performance**

- Dampers shall be classified as Smoke Fire Damper in accordance with the latest version of UL555S. The leakage rating in accordance with UL555s shall be Leakage Class II or above.
- Dampers shall be comply to BS 476 : Part 20, 4 hours rating fire resistance.
- In-house testing demonstration for leakage test to be provided by the manufacturer upon request.



# MSFD | *Multiblade Smoke Fire Damper*

## Products Range

- Grilles 
- Diffusers 
- Dampers 
- Fire & Smoke Protection 
- Accessories 
- VAV 
- Silencer 



**Prudent Aire Sdn Bhd** 925456-P  
Lot 2102, Jalan KPB12, Off Jalan Suria Park 1, Kg Baru Balakong,  
43300 Seri Kembangan, Selangor Darul Ehsan, Malaysia  
Tel : +603-9100 3858 (HL) / 9101 3869 / 9101 5868  
Fax : +603-9100 4868 Email : sales@prudentaire.com

[www.prudentaire.com](http://www.prudentaire.com)