FLAMGARD
CALIDAIR

Flamgard Calidair Dampers

High integrity dampers engineered for total safety

FLAMGARD CALIDAIR

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Operating in the most arduous conditions and extremes of climate, calidair dampers have a proven record of reliability and high performance in operational service

Fire and Smoke Dampers form an important part of the ventilation system and are installed primarily to prevent the spread of fire or smoke in the event of a fire.

The selection of proven certified dampers is essential to ensure the high level of safety required in today's transport ventilation systems.

Calidair has a depth of experience over many years in the design and manufacture of dampers for the tunnel and metro industry.

This has resulted in the company establishing a comprehensive data base of "know-how" covering operating performance, levels of system safety and installation criteria as well as mean time between failure data.

Extensive industry experience ensures that Calidair is highly competent in the application of its products and services.

Safety of the general public is of prime consideration for operators of transport systems and for consultants and contractors alike. Calidair has extensive experience in the application of dampers in tunnel and metro systems.

Major Tunnel & Metro Contracts Include:

Contract	Country	Application
Heathrow Express	U.K.	Rail/Metro
Limehouse Link	U.K.	Road Tunnel
Rotherhithe	U.K.	Road Tunnel
Heathrow	U.K.	Cargo Tunnel
Frejus Tunnel	Italy	Road Tunnel
Ankara Metro	Turkey	Metro
Istanbul Metro	Turkey	Metro
TAG Tunnel	Turkey	Road Tunnel
Sydney Eastern	Australia	Road Tunnel
TRUPO	Taiwan	Rail
Bung Dang	Korea	Road Tunnel
Changwan	Korea	Road Tunnel
Backdal	Korea	Road Tunnel
RATP	France	Metro
Cointe	Belgium	Road Tunnel
Athens Metro	Greece	Metro
Hofberg	Germany	Road Tunnel
Farchant	Germany	Road Tunnel
Airport Express	Hong Kong	Metro
Central Station	Hong Kong	Metro
Tai Lam	Hong Kong	Road Tunnel
Taites Cairns	Hong Kong	Road Tunnel
Discovery Bay	Hong Kong	Road Tunnel
Quarry Bay	Hong Kong	Road Tunnel
Bangkok Metro	Thailand	Metro
Tseun Kwan O	Hong Kong	Metro
West Rail	Hong Kong	Metro
Mont Blanc	France	Road Tunnel
Chamoise	France	Road Tunnel
Tunnel du Siaix	France	Road Tunnel
Tunnel de Foix	France	Road Tunnel

Applications & Experience
Marine & Offshore Projects

Designed to operate in the most arduous marine conditions and extremes of climate and temperature, calidair dampers have a proven record of reliability and high performance in a marine environment.

Fire and Smoke Dampers form an important part of the ventilation system and are installed primarily to prevent the spread of fire or smoke in the event of fire.

The selection of proven certified dampers is essential to ensure the high level of safety required in marine and offshore ventilation systems.

Calidair has a depth of experience over many years in the design and manufacture of dampers for the marine and offshore industry.

This has resulted in the company establishing a comprehensive data base of "know-how" covering operating performance, levels of system safety and installation criteria as well as mean time between failure data.

Extensive industry experience ensures that Calidair is highly competent in the application of its products and services.

Safety of life at sea is of prime consideration for operators of ships and oil rigs, for consultants and Contractors alike. Calidair has extensive experience in the application of dampers in all marine and off shore situations.

Major Marine & Off-Shore Contracts Include:

Contract	Contractor	Application	Contract	Contractor	Application
Brae 'B'	Marathon	Fire/Control Dampers	Piper 'B'	Occidental	Fire/Control Dampers
Scott	Amerada Hess	Fire/Control Dampers	Saltire	Occidental	Fire/Control Dampers
Cats	Brown & Root	Fire/Control Dampers	Hewett	Philips	Fire/Control Dampers
Terra Nova	Stork	Fire/Control Dampers	J Block	Philips	Fire Dampers
FPSO	Sedco Forex	Fire/Control Dampers	Ekofisk	Philips	Fire/Control Dampers
Captain	Kvaerner	Fire/Control Dampers	K12-BP	Placid	Fire/Control Dampers
Alba	Chevron	Fire/Control Dampers	Satah	Sedco	Fire/Control Dampers
Triton	Kvaerner	Fire/Control Dampers	Brent 'A'	Shell	Fire/Control Dampers
Halul Island	CCTC	Fire/Control Dampers	Cormorant	Shell	Fire/Control Dampers
South Pars	Hyundai	Fire/Control Dampers	Eider	Shell	Fire/Control Dampers
Cakerwala	AAF	General Dampers	Fulmar	Shell	Fire/Control Dampers
Sakhalin	BETS	Fire/Control Dampers	Gannet	Shell	Fire/Control Dampers
Andrew	BP	Fire/Control Dampers	Kittiwake	Shell	Fire/Control Dampers
SOKU	Alstom	Fire/Control Dampers	Leman Bank	Shell	Fire/Control Dampers
Kharg	GAT	Fire/Control Dampers	Sole Pit	Shell	Fire/Control Dampers
Enfield	DES	Fire/Control Dampers	Tern	Shell	Fire/Control Dampers
ERAH	DES	Fire/Control Dampers	Sarawak	Shell	Fire/Control Dampers
Westfuture	Hitachi	Fire Dampers	Alwyn	Total	Fire/Control Dampers
QEII	Cunard	Fire Dampers	Dunbar	Total	Fire/Control Dampers
QMII	Cunard	Fire Dampers	Mossebay	EMSO	Fire/Control Dampers
WaterFlood	Ekofisk	Fire/Control Dampers	GFAC	Vosper	Fire Dampers
Tiffany	Agip	Fire/Control Dampers	Queen Vic	Gaylord	Fire Dampers
Brent	Shell	Fire/Control Dampers	NB 6077	Holland Lines	Fire Dampers
Eidfisk	Philips	Fire/Control Dampers	Halul Island	Flaktwoods	Fire Dampers
Tabriz	Alstrom	Fire/Control Dampers	Illustrious	Babcock	Relief Dampers

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Nuclear Projects

Designed to operate in the most arduous nuclear conditions, calidair dampers have a proven record of reliability and high performance in all nuclear environments.

Fire and Smoke Dampers form an important part of the ventilation system and are installed primarily to prevent the spread of fire or smoke in the event of a fire.

The selection of proven certified dampers is essential to ensure the high level of safety required in nuclear ventilation systems.

Calidair has a depth of experience over many years in the design and manufacture of dampers for the nuclear industry.

This has resulted in the company establishing a comprehensive data base of "know-how" covering operating performance, levels of system safety and installation criteria as well as mean time between failure data.

Extensive industry experience ensures that Calidair is highly competent in the application of its products and services.

Quality Control and safety is of prime consideration for operators of nuclear power stations, for consultants and

contractors alike. Calidair has extensive experience in the application of dampers in all nuclear situations.

Major Nuclear Contracts Include:

Contract	Operator	Application
A91 Building	AWE Aldermaston	Various High Integrity Dampers
A2.1 Building	AWE Aldermaston	Various High Integrity Dampers
E23 Building Capenhurst	BNFL	Various High Integrity Dampers
ILWEP	BNFL	Various High Integrity Dampers
Maswep	BNFL	Various High Integrity Dampers
MDF	BNFL	Various High Integrity Dampers
EP2 Sellafield	BNFL	Various High Integrity Dampers
NOFC Springfield	BNFL	Various High Integrity Dampers
THORP	BNFL	Various High Integrity Dampers
WPEP	BNFL	Various High Integrity Dampers
EPS2	British Energy	Various High Integrity Dampers
Berkley	British Energy	Fire Dampers
Dungeness 'B'	British Energy	Fire Dampers
Hartlepool Power Station	British Energy	Fire Dampers
Heysham II	British Energy	Various High Integrity Dampers
Sizewell 'B'	British Energy	Various High Integrity Dampers
Hinkley Point 'B'	British Energy	Various High Integrity Dampers
Trawsfynnyd Power Station	Magnox Electric	Various High Integrity Dampers
Oldbury Power Station	ARE	Various High Integrity Dampers
Wylfa Power Station	EDF	Various High Integrity Dampers
Harwell	Derby	Various High Integrity Dampers
Nuclear France	Winfrith	Various High Integrity Dampers
Rolls Royce Nuclear	EDF	Various High Integrity Dampers
UKAEA	BNFL	Various High Integrity Dampers
Radwaste Treatment	AWE	Various High Integrity Dampers
SAV	BNFL	Various High Integrity Dampers
EVAP 'D'	BNFL	Various High Integrity Dampers
	BNFL	Various High Integrity Dampers

Calidair offers a comprehensive range of products suitable for all types of ventilation systems for tunnel, marine, off-shore and nuclear applications.

Each product is engineered to meet exacting standards in both performance and manufacture; the following pages outline some of the technical background.

Airflow

Dampers are simply valves which modify the airflow in a duct by changing the air passage area. Dampers are designed to fit in ducted systems and invariably they will affect the airflow along a duct by restricting the free area in some way or by creating turbulence.

FIRE AND SHUT-OFF dampers close off the duct for protection purposes while CONTROL dampers present a variable area, thereby regulating the air flow rate. by far the most common type of damper is the multiblade type with opposed action blades. Its own inherent characteristics are defined as the relationship between the angular motion of the blades and the airflow rate at a constant pressure drop across the damper. Fig 1. Shows the typical inherent characteristics of opposed action blades.

Of course the inherent characteristics of the damper is of largely academic interest, as a damper is usually installed in a duct and the resistance to airflow of the duct and other equipment changes the characteristics of the damper to what is called the installed characteristic. The degree of deviation from the inherent curve depends on the relative resistance's of the damper and ductwork plus its fitted equipment. The quotient pd is called the authority, N of the damper where: pd+ps

pd = pressure drop across the fully open damper; and
ps = pressure drop across the rest of the system at maximum air flow. Fig 2. Shows some typical installed characteristics for a range of authorities.

It should be noted that in systems where the damper frame is the same size as the duct (as is usually the case) the authority will be very low and the actual relationship between the rotation of the blades will be similar to the curves in Fig 2. Where N is low. If a linear characteristic is required, then N must be increased. This can be achieved in practice by increasing the pressure drop pd by suitably under sizing the damper.

It is evident that the installed characteristic of a damper can vary considerably and is a product of its inherent characteristic and that of its associated system. It is also relevant to study other non-linearities in the control system to see if they can be matched to that of the damper.

A common method of defining the pressure drop characteristic of a device installed in a duct is to refer to its 'K' factor.

This is defined as: p where p is the pressure drop
K= -------
$0.6v^2$

across the device and v is the average velocity (based on the free duct area) of air flowing at 20°C and atmospheric pressure. Fig 3. Shows a typical open pressure drop characteristic of a control damper.

Tests have shown that in practice, for ventilation equipment of fixed geometry, the K factor tends to increase with the velocity over the normally encountered velocity range, and necessary constructional features tend to cause variations in K between different sizes of the same equipment type.

For example, the K factor for a type CFD-01 Fire Damper would be about 0.1 at 10m/s and 0.15 at 20m/s while the variation between different sizes at, say 10m/s velocity could be between 0.08 and 0.12.

The above is meant to show that although a K factor can be ascribed to all ventilation equipment, it is not necessarily a fixed value for a particular device but can vary over the normally encountered size and velocity ranges. A variable geometry device such as a non-return damper will exhibit a strongly varying K factor in the forward flow condition.

Leakage

The leakage characteristics of dampers are important when tight shut-off is required to minimise the flow of air, smoke or gas along a duct. Calidair control and shutoff dampers exhibit excellent shut-off characteristics for their type and price. Fire dampers of the plate type have no blade or edge seals and therefore do not exhibit as good leakage performance as control dampers or fire dampers with side seals. The type CFD-01 fire and control damper has been specifically developed to provide a fire damper with excellent shut-off characteristics.

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In our experience, it is most important to specify a shutoff performance that is no more stringent than is necessary.

Calidair fire dampers have very low leakage characteristics and will suffice for gas and smoke shut-off in most circumstances. In cases where this is proven not to be the case, then a shut-off damper may be required in addition to the fire damper. The method of specifying leakage limits for dampers also requires discussion. Apart from variations due to fabrication tolerances, the leakage rates based on unit area vary over the normal size range. For example, at 1000 N/m² the type CFD-01 damper leaks 0.03 m³/s/m² for a 600 x 600 mm size and 0.05 m³/s/m² for 1000 x 1000 mm size.

If a damper assembly is manufactured by welding a number of units together then the leakage rate based on the duct area will be considerably increased. It is therefore difficult to achieve a similar leakage rate per unit of duct area for a range of damper sizes and types and so the best method is to specify the leakage requirements for each individual damper taking care a;ways to match the required leakage performance to that which is commercially available at a reasonable price.

Fig 2.

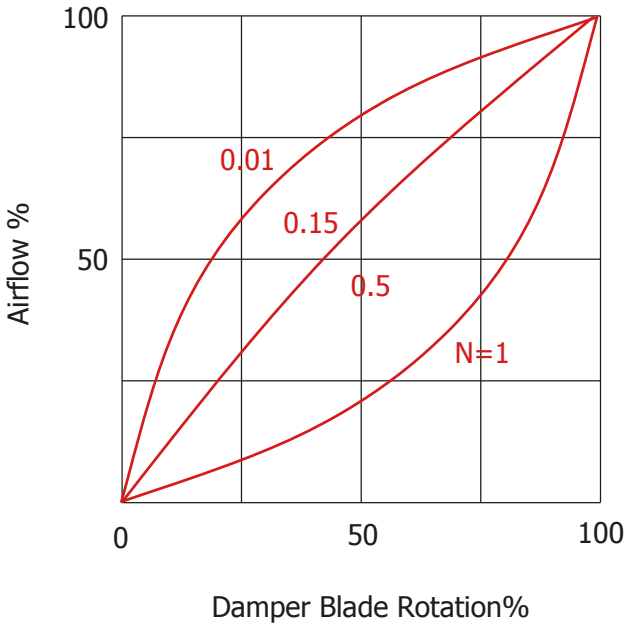


Fig 1.

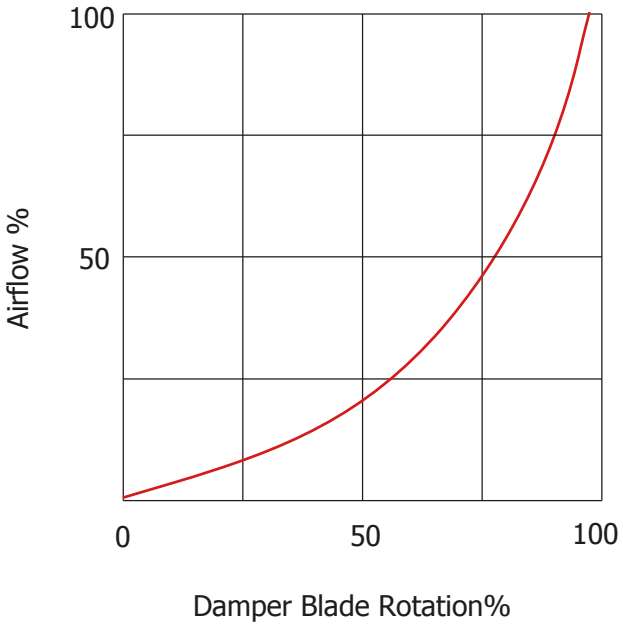
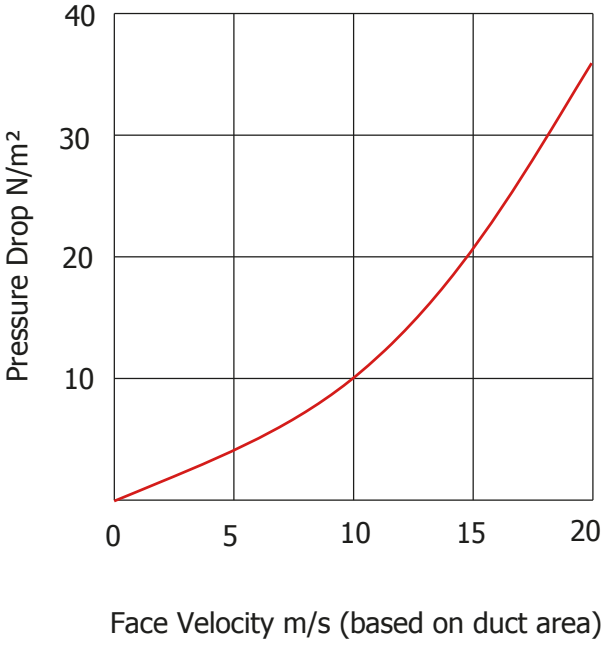


Fig 3.



Velocity

As the velocity in a system increases, the dampers and other ventilation equipment are subjected to increasing stresses. The general loading of blades, shafts, bearings and linkages is both static and dynamic in nature. The dynamic effects on lightweight equipment can and do limit the performance envelope of such devices, whereas Calidair equipment is designed to withstand arduous dynamic loading due to high velocity. To achieve this, the equipment is made from robust material with generously formed and welded components together with heavy duty linkages and bearings.

Static Pressure

Dampers will experience the maximum static pressure difference when they are in the closed position. This maximum value should be known when specifying or ordering dampers.

Turbulence

Excessive turbulence or pulsations can be factors which adversely affect damper performance. Normally, the affects of turbulence on a damper are identical to the affects of increasing velocity, i.e. Increased pressure drop and noise. Moderate turbulence effects can be noted on dampers located near obstructions to the airstream such as bends, coils, etc. Severe turbulence or pulsations capable of destroying an under-designed damper may be encountered on dampers located in close proximity to a fan. The face velocity for equipment located at or near the discharge from a fan should be doubled for damper specification purposes.
This is particularly important in the case if non-return dampers. It is worth noting that the increase in pressure drop across discharge dampers due to turbulence can be as much as 6 or 7 times the pressure drop across a damper in a free duct.

Stratification

Stratification usually occurs to a lesser or greater extent in most ducted ventilation and and air conditioning systems. A typical situation where stratified airflow occurs is when air is mixed with fresh air. A temperature differential of 12°C or more can result from one side of the mixed air duct to the other if the damper type and location are not carefully selected. Correct duct design is essential here and it is generally better to use parallel bladed dampers with the airstreams directed towards each other to promote good mixing of the two incoming flows.

Corrosion

Most equipment in conventional onshore air handling systems is not particularly subject to corrosion. Louvres and dampers mounted on the outside of buildings could be an exception however, as they are frequently wet from precipitation. For onshore use galvanised mild steel is perfectly adequate for normal weather conditions. However, equipment designed for nuclear installations, chemical plants, power stations, swimming pools, etc, has to be specified according to the particular prevailing conditions. For marine and offshore use of course, it is a different story as the corrosion problem can be very severe. There are several methods of corrosion control available to us but, as usual, the answer lies with best compromise between factors. For external equipment such as louvres, cowls, etc, a high quality paint finish over mild steel is to be recommended while for equipment with moving parts such as all type of dampers, a stainless steel construction is advisable. Calidair has standardized on types 304 L and 316 L stainless steels to maximise the combined benefits of good corrosion, ease of fabrication and cost.

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Controls & System

Modern ventilation and fire control equipment increasingly has to be compatible with sophisticated control systems for integrated fire protection and energy management schemes. The past few years have also seen considerable activity in the updating and implementing of regulations concerning safety matters and Calidair has taken steps to keep abreast of these developments.

We have a large variety of standard control methods as well as being able to build control systems to suit your particular specification. This enables our equipment to conform to all known regulations and requirements from simple hand operation to pneumatic control with electrical interlocks, solenoid valves for remote control and switches for blade position indication.

We can offer manual, pneumatic, electric and fusible link actuation for all our dampers with a variety of optional extras so that both simple and sophisticated dampers can be fitted with the appropriate controls.

For offshore use, we have available a control system which provides conformity of the equipment to the Department of Energy's Offshore Installations Guidance on Fire Fighting Equipment and Statutory Instrument 611 insofar as they apply to fire dampers. The control system has the following features:

a) The fire damper may be opened and closed remotely from a number of control points.

b) Remote and local indication of the fire dampers status.

c) In the event of pneumatic or electrical failure, the damper will 'fail safe', i.e. Close.

d) The damper will close automatically during a fire emergency whatever the condition of the pneumatic and electric signals.

e) After closure during a fire emergency, the damper may be opened remotely to allow for smoke clearance (assuming that the failure temperature of any control component has not been exceeded and that pneumatic and electrical supplies are connected).

f) Facility for automatic operation from fire or gas detection systems.

g) Optional provision of local hand valves for test purposes.

h) All electrical equipments certified for use in division 1 hazardous areas if required.

i) Facility for 'black start' operation.

The damper controls can be mounted within an enclosure so as to protect them from the elements and mechanical damage. The enclosure is fitted with a three sided cover that is retained with toggle latches and provides 180° access to the controls for maintenance purposes. The whole control enclosure can be removed from the damper by simply releasing four nuts.

Actuator systems for control dampers tend to be simpler than those for fire dampers. However, one important feature that is often requested is modulation of the control dampers for continuous regulation of airflow. This is achieved by the fitting of a positioner to the actuator. The positioner is a device which receives either a pneumatic signal (0.2 to 1.0 barg.) or an electrical signal (4 to 20 mA). And allows full mains pressure to move the actuator by an amount proportional to the change in the control signal. This allows for full modulation and further ensures that the damper is always moved under full mains pressure thereby ensuring the maximum degree of torque and dependability at all times.

Generally, a fire division carries a rating specifying its resistance to the passage of flame and smoke when subjected to a fire on one side. The 'Standard' fire is as specified in BS476 Part 20. This British Standard is not specifically designed for fire dampers but since the fire damper installation should exhibit the same integrity as the fire division to which it is fitted it has been accepted, so far, as the basis for a fire test for such equipment.

For onshore use, fire divisions and therefore the fire dampers fitted to them are usually required to survive the standard fire tests for a minimum period of time, usually one or two hours.

Samples of all Calidair fire dampers have successfully passed two hour fire tests as a minimum. Offshore fire divisions are normally classified as 'A' or 'B' which relate to the temperature limits to be adhered to on the non-fire side. These divisions have to be insulated to reduce the temperature rise and where a fire damper is fitted these temperature limits, and therefore the insulation, must also be maintained. However, as steel fire dampers by themselves cannot limit the temperature rise through their blades, insulation is applied over the damper frame external surfaces and temperatures measured there.

For a damper installation to be approved for a B class division, it must maintain its integrity and resist the passage of flame and smoke for at least half an hour and the temperature on the insulated damper exterior must not rise more than 139°C above ambient within a specified time from the start of the fire. Nor should the temperature at any one point on the insulation rise more than 225°C during the same time interval. Calidair fire dampers are approved for fitting to all B class divisions.

The 'A' classification is very common on offshore structures. Fore dampers for A0 class fire divisions are required to pass the standard one hour fire test. Fire dampers for A60 class divisions are required to prevent the passage of flame and smoke for at least the first hour of the standard fire test and they must also be insulated such that the average surface temperature does not rise more than 139°C above ambient within one hour of the start of the fire. Nor should the temperature at any one point rise more than 180°C above ambient in the same period.

When suitably insulated, all Calidair fire dampers are approved to A60 fire divisions. As yet there are no regulations in the U.K. Covering H (Hydrocarbon) class fire divisions although the Norwegian Petroleum Directorate does recognise the H120 classification and Calidair's Type CFD-01 fire damper has successfully passed fire tests to this standard. It is important to understand that any fire damper can carry an A0 rating by itself and is approved for fitting to other fire divisions only when appropriately insulated on site by others. Calidair fire dampers are designed to accommodate the insulation in the most convenient way, in particular the rear of the control enclosures are pre-insulated. We can advise on suitable insulation arrangements, but we must emphasise that approval for each installation must be obtained from the appropriate certifying authority.

Tunnel Ventilation

Ventilation of road tunnels is a key factor in the overall operational and safety strategy of any new road scheme. Calidair by working closely with the fire departments and engineering consultants have designed a suitable damper to meet the new stringent standards. In raising the levels of system safety Calidair have met the new standards by testing to the required new categories.

a) Damper operation and performance at high temperature.

b) Leakage through the damper.

c) Mechanical resistance.

d) Operation at specified pressure differentials

e) Speed of operation.

f) Operational life cycles.

Mechanical tests include cyclic testing for 1000 operations at a pressure differential of 1200 Pa and 2500 Pa. The time for the damper to open and close was no more than 15 seconds.

The structural integrity of the dampers was measured at a pressure differential of 1000 Pa and 4000 Pa and blade deflection fell within the accepted criteria for tunnel damper design.

Leakage through the closed damper is the most critical of all the mechanical tests. The damper was subjected to pressure differentials of between 500 Pa and 4000 Pa in 500 Pa increments. The leakage was no greater than 0.02 $m^3/s/m^2$ of the damper face area.

The Calidair tunnel dampers have been temperature tested up to 400°C for two hours and 600°C for one hour, maintaining their integrity and proving that the Calidair dampers not only meet the rigid temperature performances, but can easily exceed them.

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Testing

Fire testing, high temperature testing, fatigue testing, blast testing, damper and component cycle testing and all independently certified with Safety Integrity Level (SIL) ratings. This intensive testing regime ensures Flamgard Calidair remain leaders within the HVAC damper technology area.

Test Certification

The following is a list of Flamgard Calidair certification and testing:

- Tested to BS 476 Pt. 20 for 4 hours and cycle tested for 400°C when required
- Tested to IMO 2010 FTP Code Part 3 and IMO FTCP part 3 (IMO Res A754(18)) (A Rated)
- Tested to BSEN 1363-2:1999 Hydrocarbon Fire time/Temperature IMO 2010 FTP Code, resolution MSC.307(88) Annex 1, part 3 (H Rated)
- Tested to BS EN 1366-2, 1999 for I, E & S (Patents submitted and pending)
- Where appropriate the above are certified by DNVGL, Lloyds, BV, ABS & GOST
- All are independently certified with SIL Ratings
- They are designed to withstand the transient pressures caused by the movement of trains up to 6000Pa
- Tested also to 10,000pa for Nuclear applications
- NORSOK ISO:15138 & EN1751 Class 3 and Class B compliant
- Blast Dampers are Blast Tested (not air tested) and certified by SIRA
- Warnes No: 40960 BS476 Part 8 - 2 Hour Fire Test.

Performance Testing

i) ERA Technology Ltd report No. 90-0260 seismic qualification.

ii) ERA Technology Ltd report No. 90-0150 environmental qualification.

iii) CTICM report No. 97-V-477 - 400°C for 2 hours elevated temperature test.

iv) CNPP report No. PN 02 6229 - 600°C for 1 hour elevated temperature test.

v) BSRIA - Independent 1000 cycle damper test.

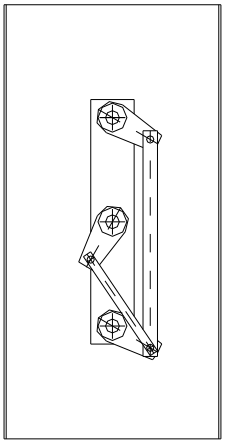
vi) BSRIA - Independent blade deflection tests.

Fire & Smoke Damper
CFD-01

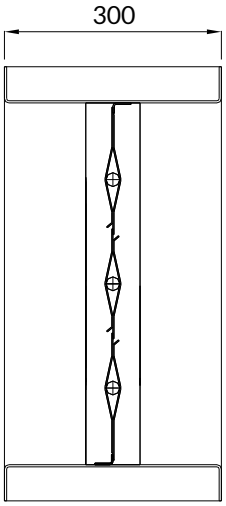
Description

The type CFD-01 Fire and Smoke Dampers are utilized in ventilation systems to prevent the passing and spread of fire and smoke between designated divisions. The Flamgard Calidair Fire Damper is designed for bolting or welding to steel bulkheads & decks, building into walls or floors. The damper has been successfully tested to global international standards highlighted below.

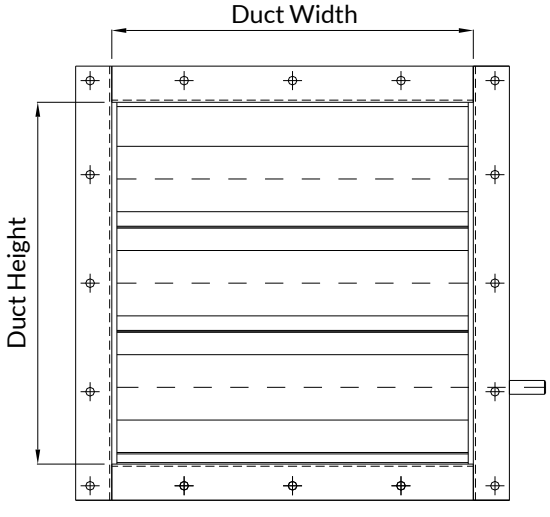
Flamgard Calidair have been manufacturing high integrity Dampers combined for over 60 years in the global Petrochemical Oil & Gas, Marine, Nuclear, Tunnel & Metro and Power Generation market sectors.



End Elevation



Section



Elevation

Specification

Casing

The damper casing is formed from 3.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Damper Units in excess of 3100mm width or height shall be manufactured as a multiple assembly. Where circular dampers or dampers with width or height dimensions less than 150 mm are required, additional spigot adaptors are used which increase the damper insertion length from 300 to 400 mm.

Blades

The blades are a formed double-skin aerofoil section of 1.5 mm sheet metal which operate on the 'Firelock' principle creating a 3-pass labyrinth between the blades which fire cannot penetrate. Blade stops at the top and bottom of the casing and sprung side seals provide excellent low leakage characteristics. Dependent on market sector or required certification of the Damper additional patented sealing and blade materials are utilized.

Shafts

Continuous Ø 19.05 mm with blades plug welded at each end.

Linkage

Opposed action linkage consisting of drive levers and bosses connected by flat link bars, driven through stainless steel pins. All linkage is contained within the depth of the damper casing.

Bearings

Phosphor bronze self lubricated 'Oilite' flanged bushes.

Operation

Manual Reset Mechanism, Pneumatic Actuator, Electric Actuator, Solenoid Release. Other control options are available upon request.

Options

- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Integral or removable enclosures for housing control equipment.
- High temperature bearings.
- Shaft seals to provide airtight casings
- Other variations to suit clients' specific requirements are also available.

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Installation & Assembly

Note:

Larger dampers can be constructed by joining multiple assemblies together.

An approved fire-resistant sealant should be inserted between the damper and duct to ensure a good seal.

Note:

Each section shall have a drive spindle which can be linked together externally or driven independently.

General Certification and Standards

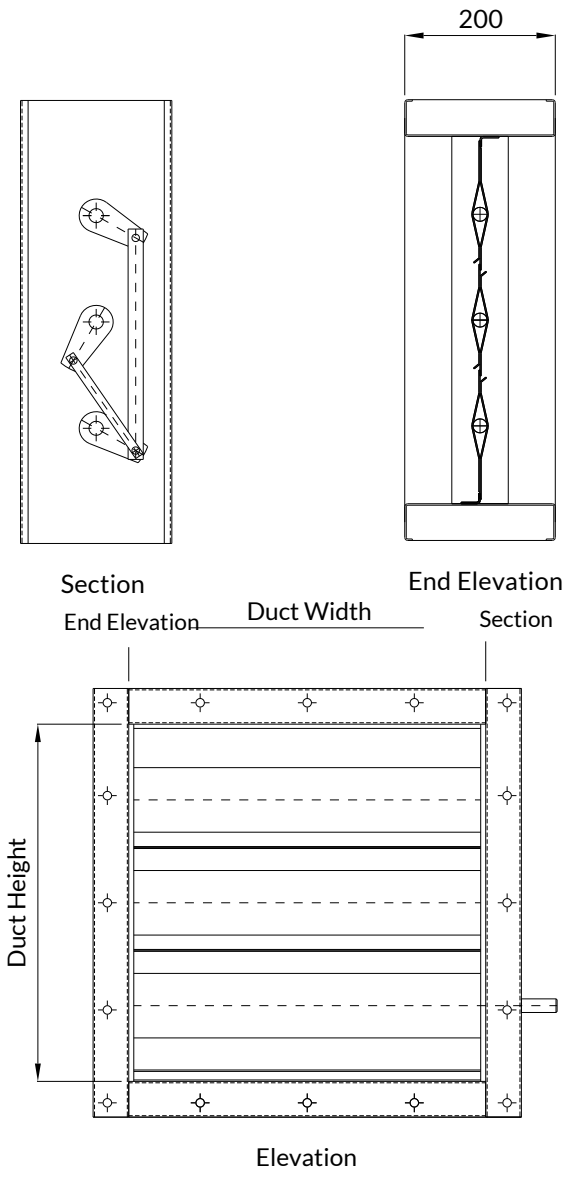
- Certified IMO Annex FTP 1, Part 3 certified by Lloyds Register of Shipping, DNV, ABS & BV.
- Type tested/approved and compliant to EN1366-2 Fire Resistant to E (Integrity) S (Smoke) and I (Insulation) from 30 to 120 minutes. (Patents Pending)
- BS 15650 accredited.
- Type tested/Approved BS476.
- Type tested/approved GOST R 55301-2009. (Patents Pending)
- NORSOK case and blade leakage compliant.
- Case and Blade leakage compliant to EN 1751.
- Independent SIL2 Certified.
- ATEX Compliant.
- ISO 9001-2008 accredited
- Independent BISRIA Pressure drop tested.
- Independent SRL Noise Tested.
- Independent Seismic and Blast tested.

Fire & Smoke Damper
CFD-02

Description

The type CFD-02 Medium Duty Fire and Smoke damper has been designed for building into walls, floors or bolting or welding to steel bulkheads. The damper has been successfully tested in accordance with BS476,and is certified by Lloyds Register of Shipping for A0 and A60 rated divisions when suitably lagged.

To ease installation these dampers can be supplied with pre insulated controls, and are designed to be suitable for mounting in any attitude with the airflow in either direction. These dampers are also suitable for operation At 250°C for one hour for smoke clearance.



Specification

Casing
The damper casing is formed from 2.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Damper units in excess of 1000 mm width or height shall be manufactured as a multiple assembly. Where circular dampers or dampers with width or height dimensions less than 150 mm are required, additional spigot adaptors are used which increase the damper insertion length from 200 to 300 mm.

Blades
The blades are a formed double-skin aerofoil section of 1.2 mm sheet metal which operate on the 'Firelock' principle creating a 3-pass labyrinth between the blades which fire cannot penetrate. Blade stops at the top and bottom of the casing and sprung side seals provide excellent low leakage characteristics.

Shafts
Stub shafts Ø 19.05 mm with continuous drive shafts and blades plug welded at each end.

Linkage
Opposed action linkage consisting of drive levers connected by flat bar link bars, driven through stainless steel pins. All linkage is contained within the depth of the damper casing.

Bearings
Phosphor bronze self lubricated 'Oilite' flanged bushes.

Operation
Manual Reset Mechanism, Pneumatic Actuator, Electric Actuator, Solenoid Release.

Options
- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Integral or removable enclosures for housing control equipment.
- High temperature bearings.
- Other variations to suit clients' specific requirements are also available.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

Installation & Assembly

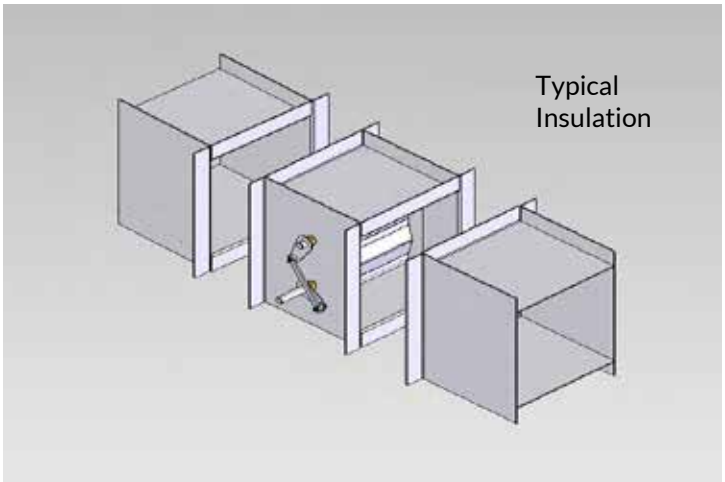
Note:

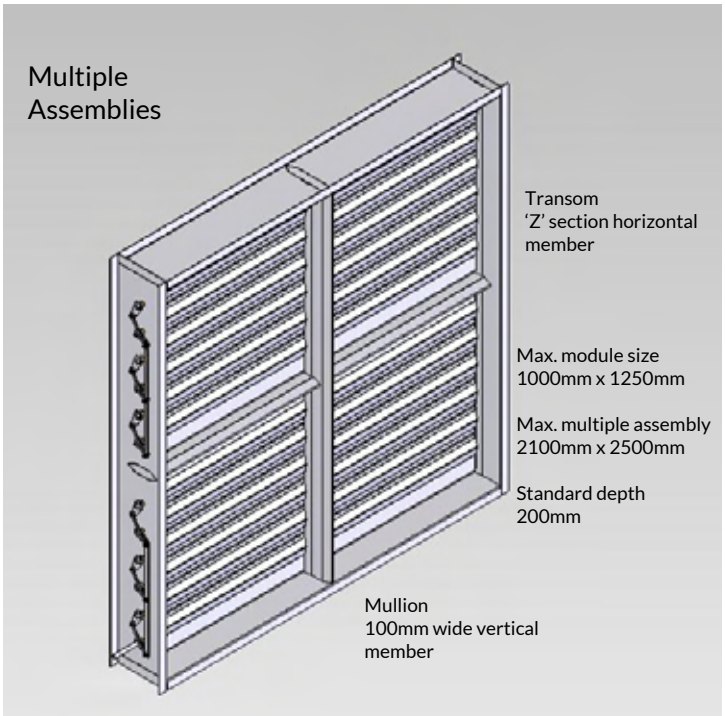
Larger dampers can be constructed by joining multiple assemblies together.

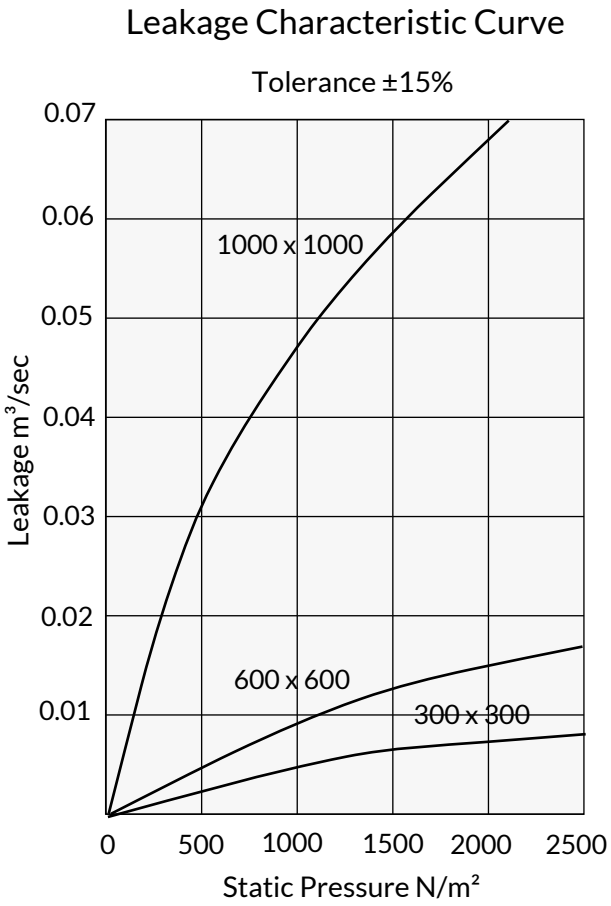
An approved fire-resistant sealant should be inserted between the damper and duct to ensure a good seal.

Note:

Each section shall have a drive spindle which can be linked together externally or driven independently.







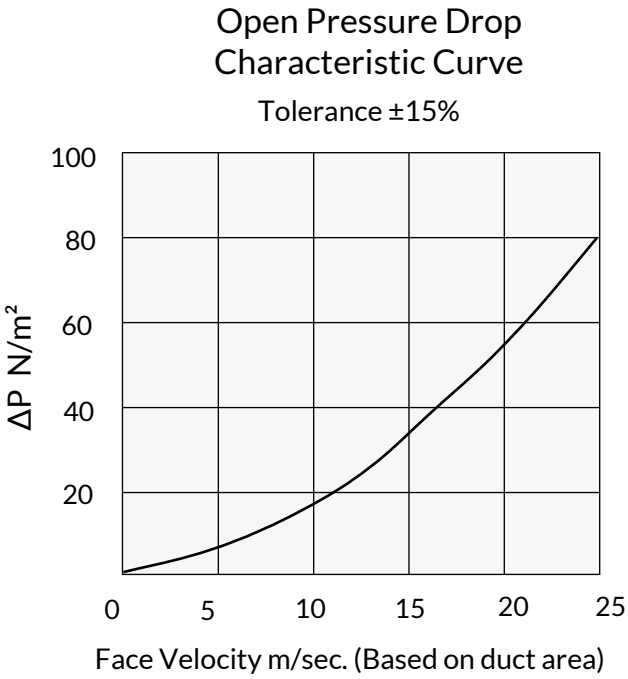
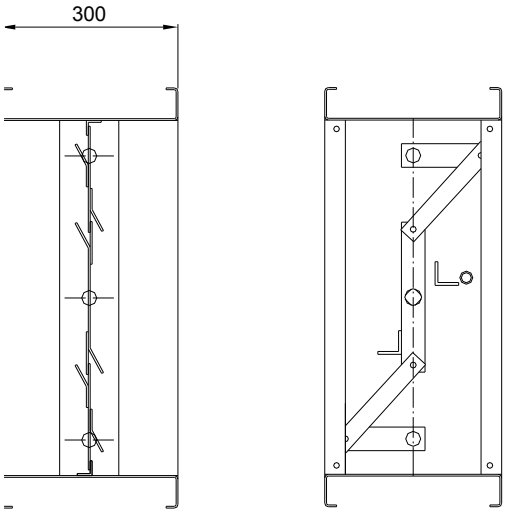


Plate Blade Fire Damper
FD-02

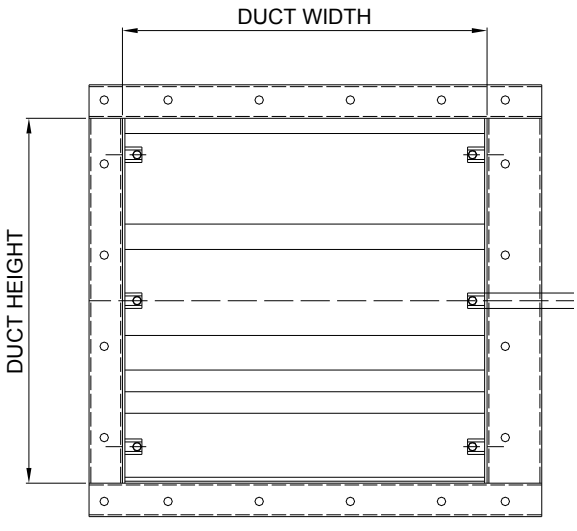
Description

The type FD02 Fire and Smoke damper has been designed for building into walls, floors or bolting or welding to steel bulkheads. The damper has been successfully tested in accordance with BS476 and IMO Resolution A754, and is certified by Lloyds Register of Shipping and DNV for A0, A60 rated divisions when suitably lagged. To ease installation these dampers can be supplied with pre-insulated controls, and are designed to be suitable for mounting in any attitude with the airflow in either direction.



Section

End Elevation



Elevation

Specification

Casing

The damper casing is formed from 3.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Damper Units in excess of 1000 mm width or height shall be manufactured as a multiple assembly. Where circular dampers or dampers with width or height dimensions less than 100 mm are required, additional spigot adaptors are used which increase the damper insertion length from 300 to 400 mm.

Blades

The blades are a single skin flat plate blade section of 3.0 mm sheet metal. Blade stops at the top and bottom of the casing and sprung side seals provide excellent low leakage characteristics.

Shafts

Stub shafts Ø 25 mm with blades bolted at each end.

Linkage

Opposed action linkage consisting of drive levers and bosses connected by flat bar link bars, driven through stainless steel bolts. All linkage is contained within the depth of the damper casing.

Bearings

Zeron 100 flanged bushes.

Operation

Manual Reset Mechanism, Pneumatic Actuator, Electric Actuator, Solenoid Release.

Options

- Materials can be 304 or 316 stainless steel.
- Earth continuity bosses.
- Lifting lugs.
- Integral or removable enclosures for housing control equipment.
- High temperature bearings.
- Other variations to suit clients' specific requirements are also available.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

Installation & Assembly

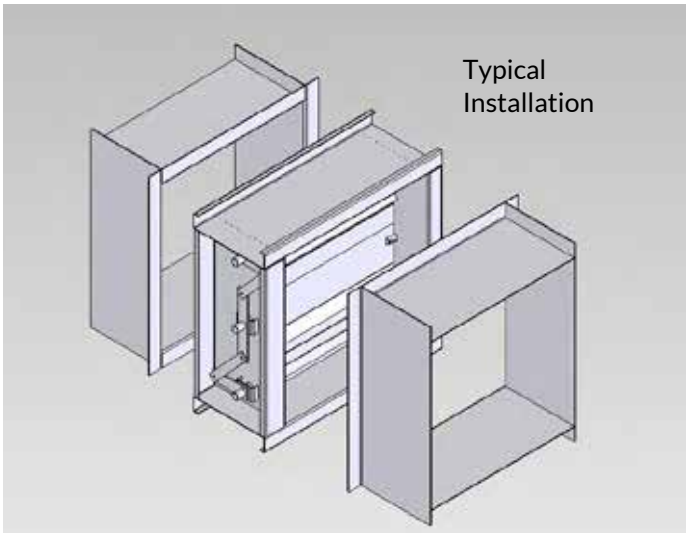
Note:

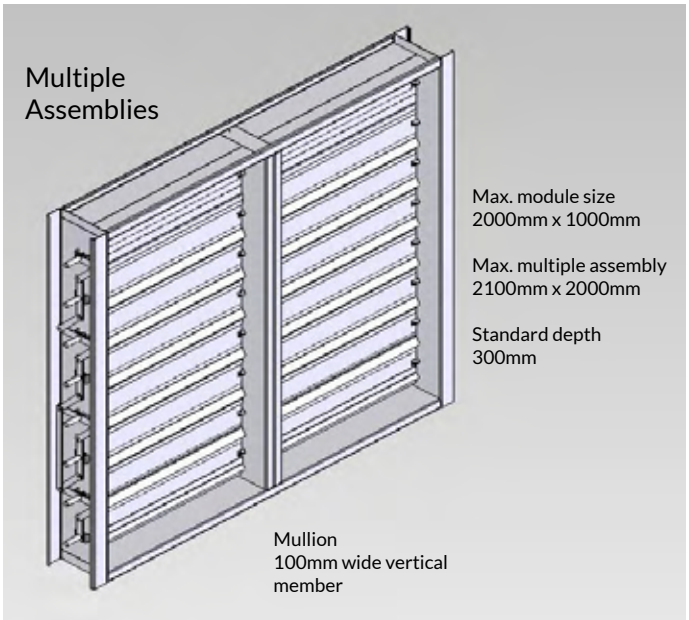
Larger dampers can be constructed by joining multiple assemblies together.

An approved fire-resistant sealant should be inserted between the damper and duct to ensure a good seal.

Note:

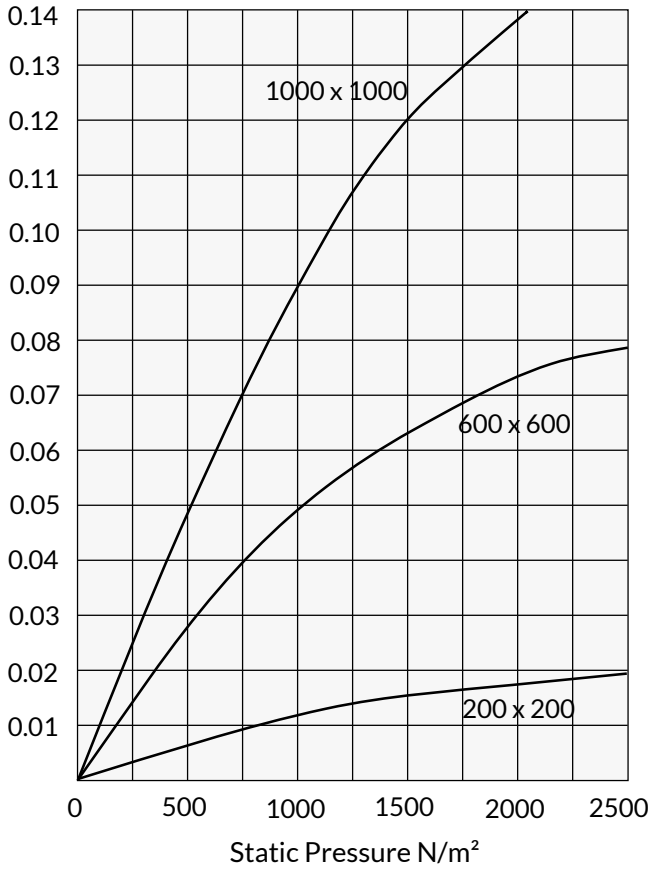
Each section shall have a drive spindle which can be linked together externally or driven independently.





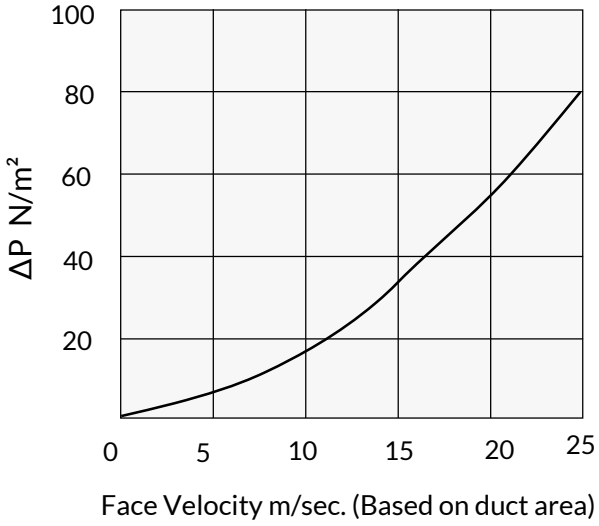
Leakage Characteristic Curve

Tolerance ±15%



Open Pressure Drop
Characteristic Curve

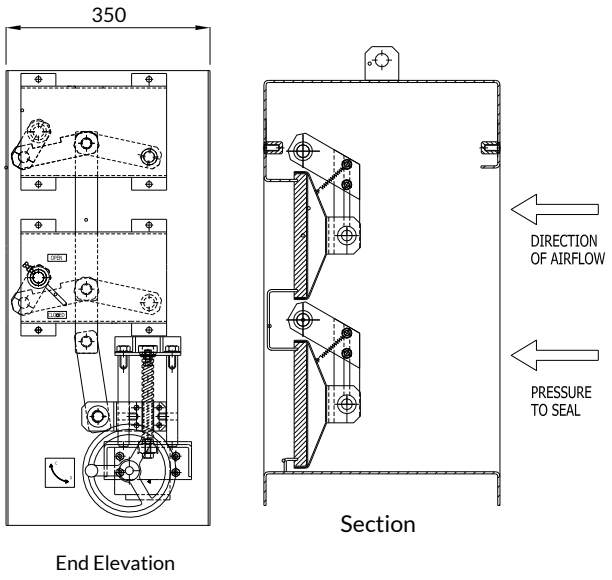
Tolerance ±15%

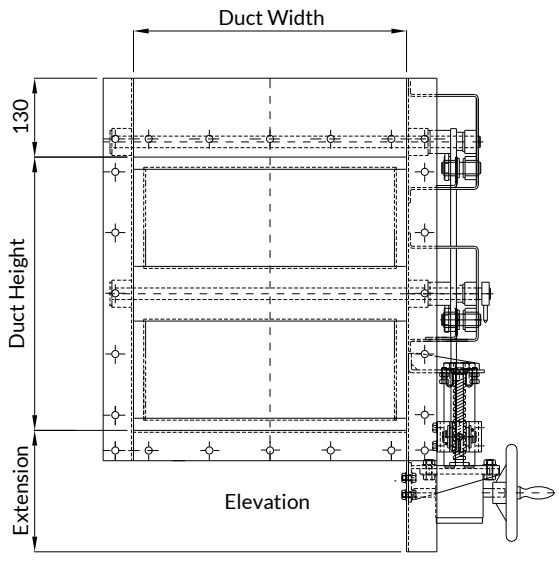


Zero Leakage Isolating Damper
CID-01

Description

The type CID-01 Isolation Damper has been specifically designed to meet the tight shut-off requirements of the industrial and nuclear markets, where isolation of ducting for filter replacement or duct inspection is required, without shutting down complete systems. These versatile dampers can be automatically or manually operated and can be supplied with pre-drilled flanges to ease installation. The dampers may be installed vertically or horizontally with the air flow in one direction.





Specification

Casing
The damper casing is formed from 3.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Where circular dampers are required, additional spigot adaptors are used which increase the damper insertion length from 350 to 450 mm.

Blades
The blades are a formed single-skin of 3.0 mm sheet steel fitted with a closed cell pad that seals against a frame within the damper casing to provide 100% isolation.

Shafts
Continuous shafts Ø 19.05 mm with welded pivoted-blade support at each end.

Linkage
Parallel action linkage consisting of drive levers and bosses connected by flat bar link bars, driven through stainless steel pins. All linkage is contained within the depth of the casing.

Bearings
Phosphor bronze self lubricated plain 'Oilite' bushes fitted into bearing bosses welded to the outside of the casing.

Shaft Seals
Lipseal type fitted into each bearing boss.

Operation
Pneumatic Actuator, Electric Actuator, Manual Handwheel.

Options

- Earth continuity bosses.
- Lifting lugs.
- Solenoid Valves.
- Remote Indication - Microswitches.
- Local Indication.
- Other variations to suit clients' specific requirements are also available.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

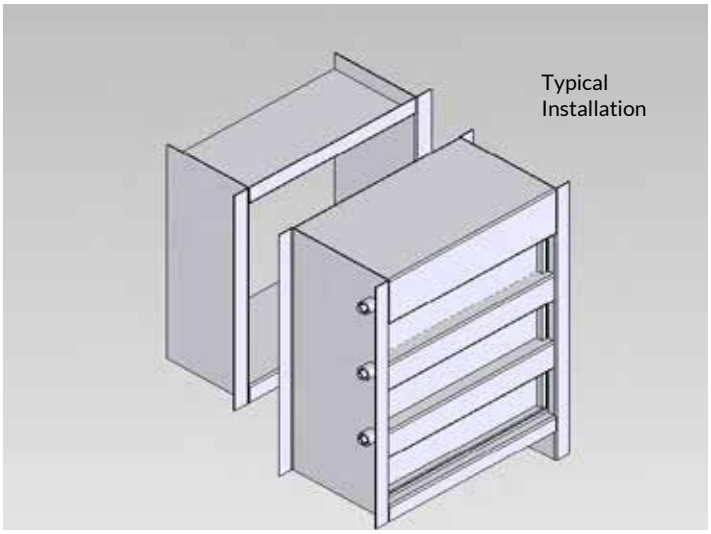
Installation & Assembly

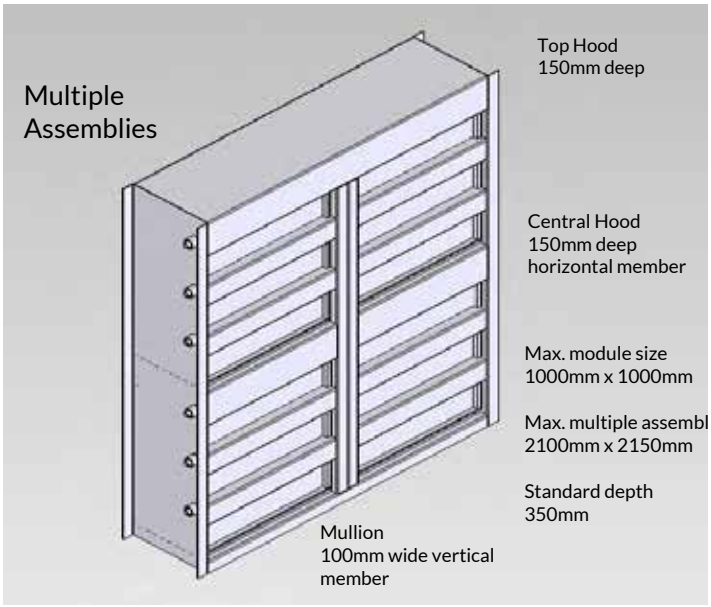
Leakage:

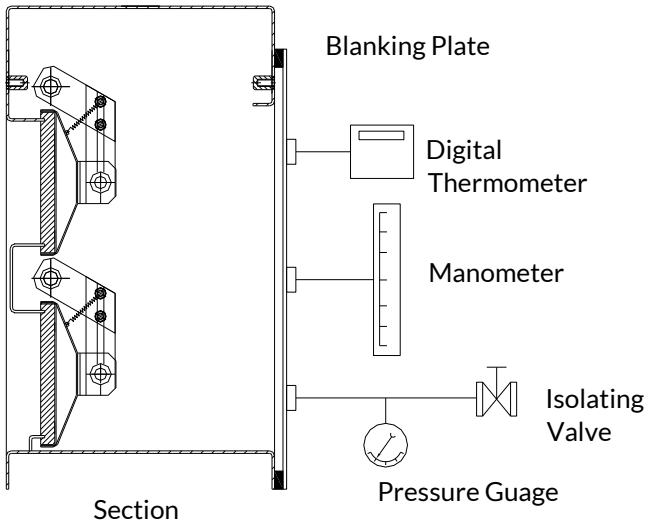
Each damper is tested to ensure there is zero leakage through the blades and casing - as follows:

Test Procedure:

Each complete damper assembly is subjected to a works pressure test of 5000 Pa for one hour. The upstream en of the damper is sealed during the test and the pressurizing source removed. After one hour the pressure is checked to ensure that it has not dropped taking into consideration any changes in air temperature.

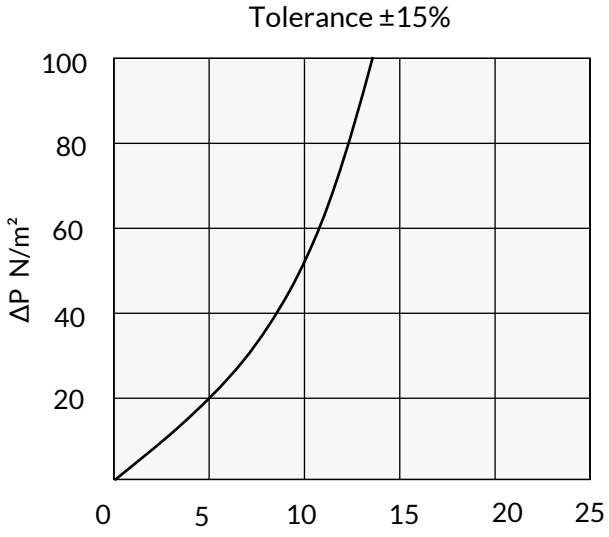






Test Arrangement

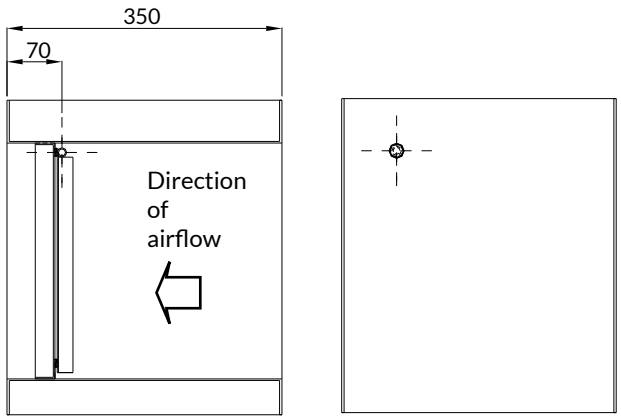
Open Pressure Drop Characteristic Curve



Single Blade Isolating Damper
CID-02

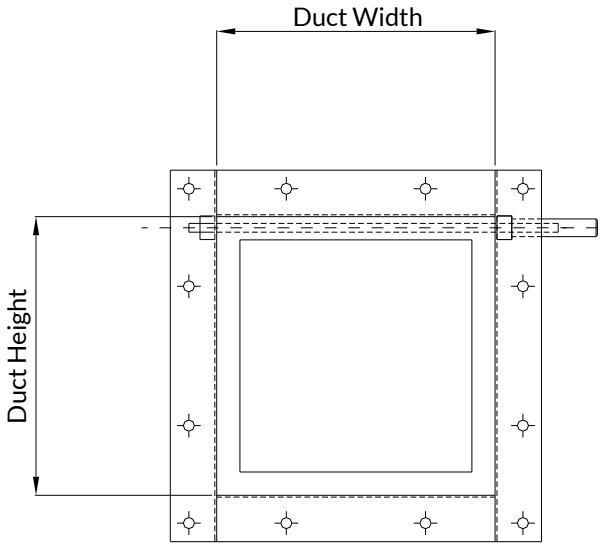
Description

The type CID-02 Isolation Damper has been designed to give maximum efficiency under arduous conditions and is suitable for fitting with the air flow in one direction only. The dampers may be installed vertically or horizontally. This damper will give 100% shut-off when airflow aids closure of blade.



Section

End Elevation



Elevation

Specification

Casing

The damper casing is formed from 3.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Where circular dampers are required, additional spigot adaptors are used which increase the damper insertion length from 350 to 450 mm.

Maximum duct size is:
600 mm Wide x 300 mm High

Blades

The blade is a formed single-skin of 2.0 mm sheet steel and seals against a flame retardant PVC strip attached to the blades and top and bottom stops.

Shafts

Continuous shafts Ø 19.05 mm.

Bearings

Phosphor bronze self lubricated 'Oilite' bushes with lipseals to eliminate casing leakage.

Operation

Pneumatic Actuator, Electric Actuator, Hand Locking Quadrant.

Options

- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Flame retardant PVC blade seals.
- Integral or removable enclosures for housing control equipment.
- High temperature bearings.
- Other variations to suit clients' specific requirements are also available.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

Installation & Assembly

Leakage:

Each damper is tested to ensure there is 100% sealing through the blades and casing - as follows:

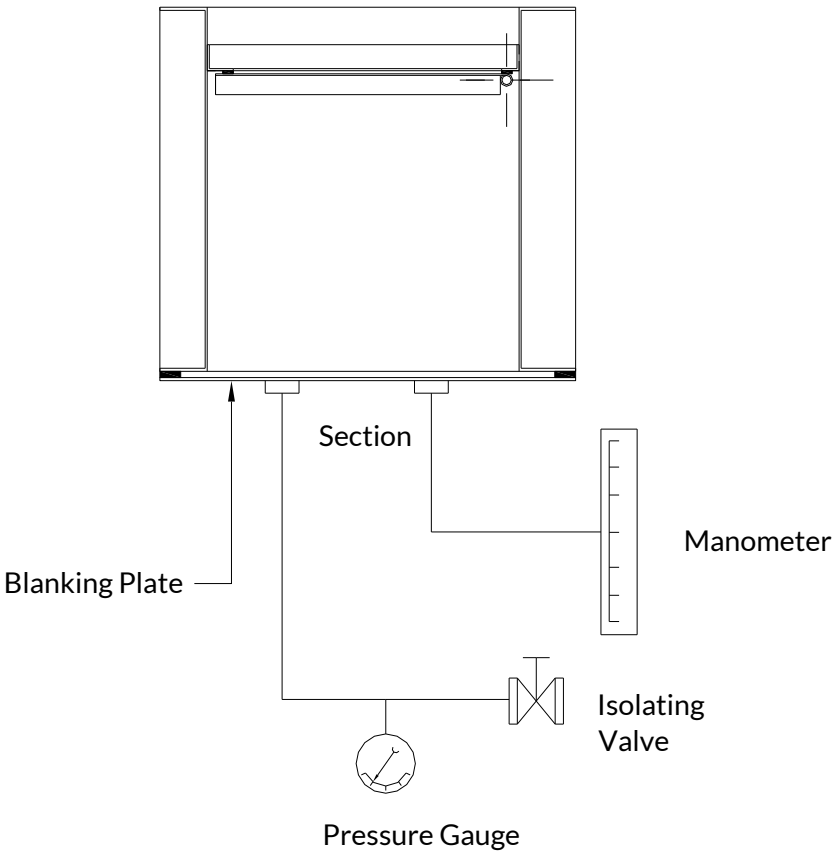
Test Procedure:

Each compete damper assembly is subjected to a works pressure test of 5000 /m² for 10 minutes. The upstream end of the damper is sealed during the test and the pressurizing source removed. After 10 minutes the pressure is checked to ensure that it has not dropped.

Open Pressure Drop Characteristics

The design of this damper is virtually free of obstructions making the pressure drop over the damper so small there are no instruments capable of measuring the value.

If 100% free area is required, simply increase the duct size by 20 mm width and height to eliminate the area occupied by the blade sealing stops. The damper flanges can be adjusted to accommodate the difference.



Test Arrangement

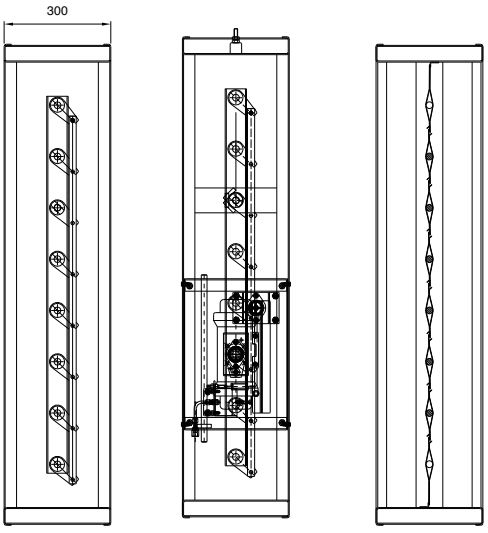
Gas Retention Damper
CRD-01

Description

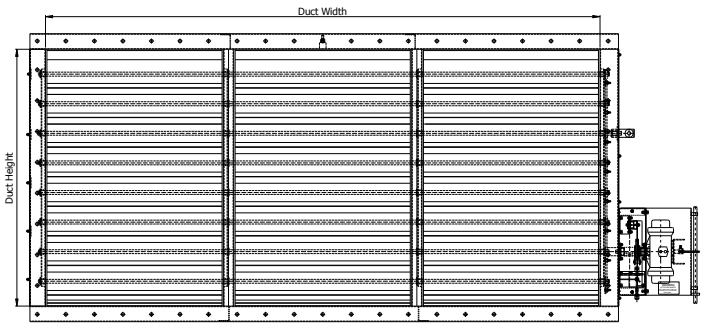
The type CRD-01 Gas Retention Damper has been specifically designed to meet the rigorous duty required in an environment where robust construction and dependable operation are of prime importance.

These versatile dampers are suitable for automatic and manual operation and are used for retaining the release of an inert gas extinguisher during a high temperature event.

To ease installation all dampers are supplied with pre-drilled flanges and are designed to be suitable for mounting in any attitude with the airflow in either direction.



Linkage | End Elevation | Section



Elevation

Specification

Casing
The damper casing is formed from 3.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Damper units in excess of 1275 mm width shall be manufactured as a multiple assembly. Where circular dampers or dampers with width or height dimensions less than 150 mm are required, additional spigot adaptors are used which increase the damper insertion length from 300 to 400 mm.

Blades
The blades are a formed double-skin aerofoil section of 1.5 mm sheet metal with stainless steel edge seals . Blade stops at the top and bottom of the casing and sprung side seals provide excellent low leakage characteristics.

Shafts
Continuous Ø 19.05 mm with blades plug welded at each end.

Linkage
Parallel action linkage consisting of drive levers and bosses connected by flat bar link bars, driven through stainless steel pins. All linkage is contained within the depth of the damper casing.

Bearings
Phosphor bronze self lubricated ‘Oilite’ flanged bushes.

Operation
Pneumatic Actuator, Manual Latching Mechanism, Electric operation unavailable on this damper type.

Options

- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients’ specific requiremen
- Earth continuity bosses.
- Lifting lugs.
- Integral or removable enclosures for housing control equipment.
- High temperature bearings.
- Shaft seals to provide airtight casings
- Other variations to suit clients’ specific requirements are also available.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

Installation & Assembly

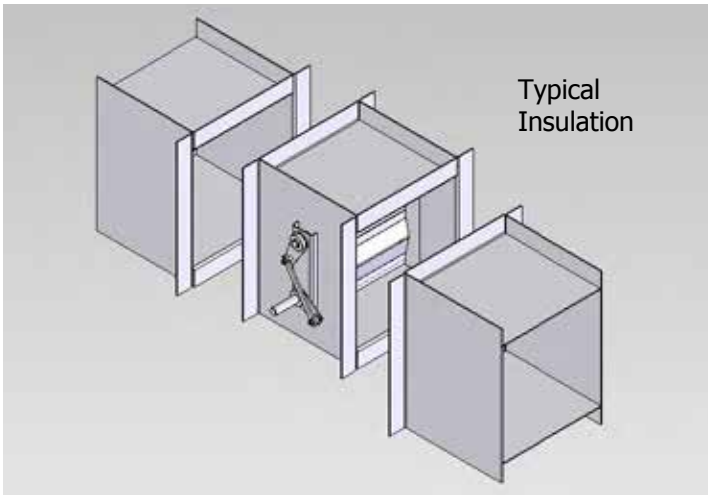
Note:

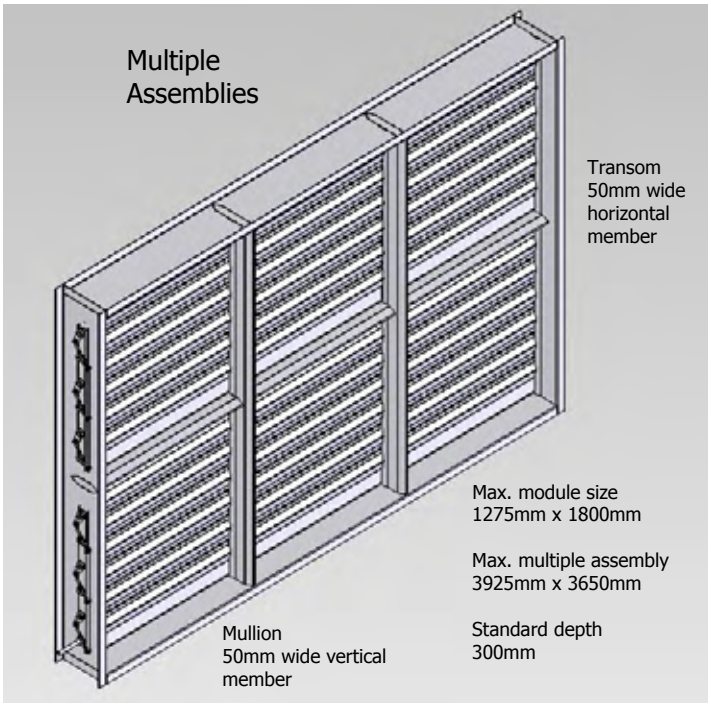
Larger dampers can be constructed by joining multiple assemblies together.

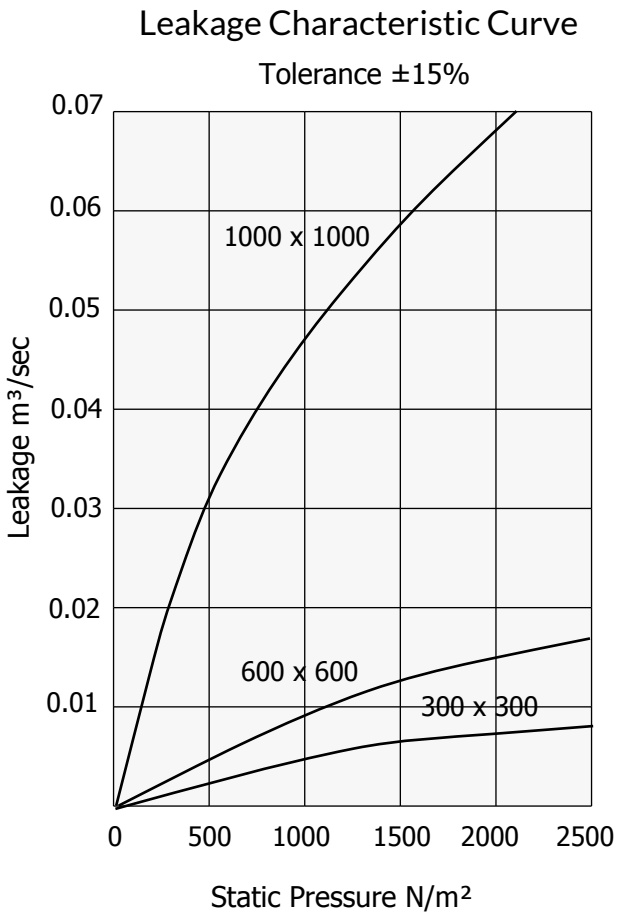
An approved fire-resistant sealant should be inserted between the damper and duct to ensure a good seal.

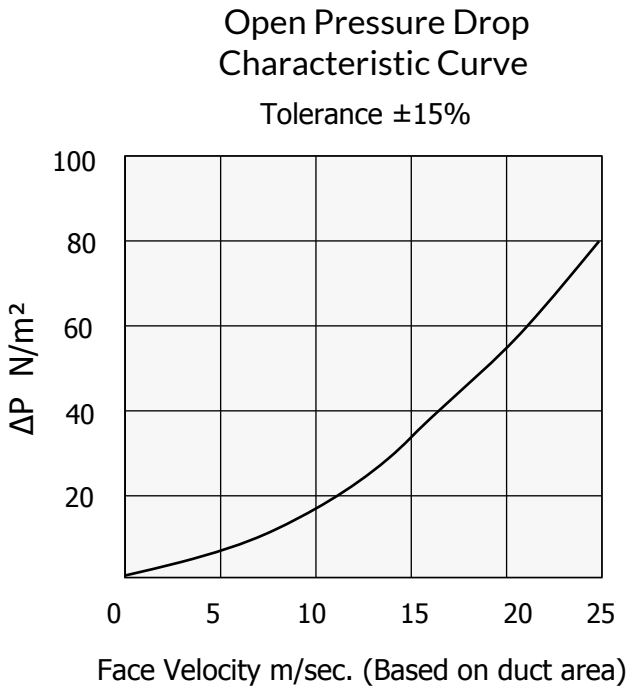
Note:

Each section shall have a drive spindle which can be linked together externally or driven independently.





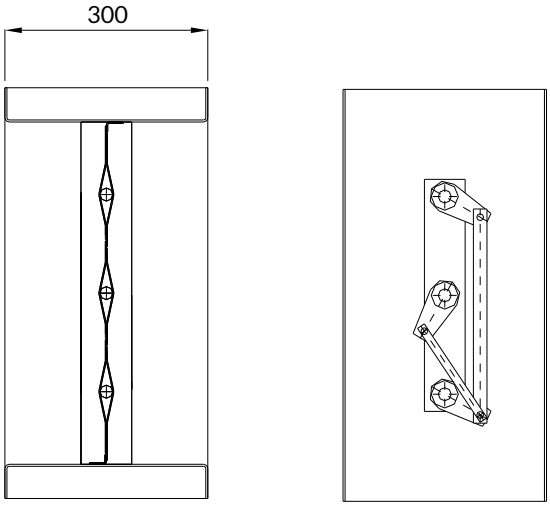




Heavy Duty Shut-Off Control Damper
CCD-01

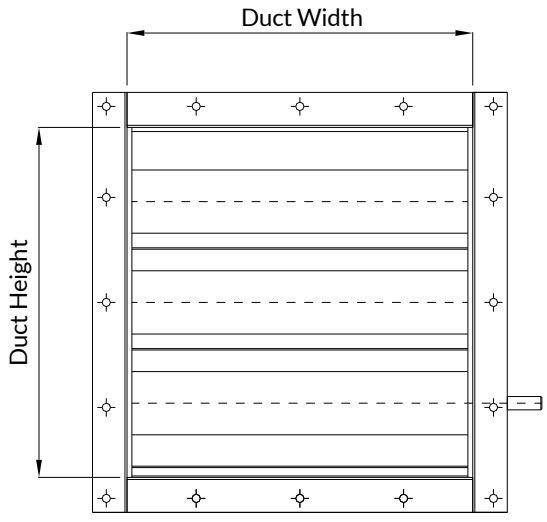
Description

The type CCD-01 Heavy Duty Shut-Off and Control Damper has been specifically designed to meet the rigorous duty required in a hazardous environment where robust construction and dependable operation are of prime importance. These versatile dampers are suitable for automatic and manual operation and may be used for: system balancing, fan shut-off, fresh air re circulation and many more functions. To ease installation all dampers are supplied with pre-drilled flanges and are designed to be suitable for mounting in any attitude with the airflow in either direction.



Section

End Elevation



Elevation

Specification

Casing

The damper casing is formed from 3.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Damper units in excess of 1275 mm width shall be manufactured as a multiple assembly. Where circular dampers or dampers with width or height dimensions less than 150 mm are required, additional spigot adaptors are used which increase the damper insertion length from 300 to 400 mm.

Blades

The blades are a formed double-skin aerofoil section of 1.5 mm sheet metal . Blade stops at the top and bottom of the casing and sprung side seals provide excellent low leakage characteristics.

Shafts

Continuous Ø 19.05 mm with blades plug welded at each end.

Linkage

Opposed action linkage consisting of drive levers and bosses connected by flat bar link bars, driven through stainless steel pins. All linkage is contained within the depth of the damper casing.

Bearings

Phosphor bronze self lubricated ‘Oilite’ flanged bushes.

Operation

Pneumatic Actuator, Electric Actuator, Hand Locking Quadrant.

Options

- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients’ specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Flame retardant PVC blade seals.
- Integral or removable enclosures for housing control equipment.
- High temperature bearings.
- Shaft seals to provide airtight casings
- Other variations to suit clients’ specific requirements are also available.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

Installation & Assembly

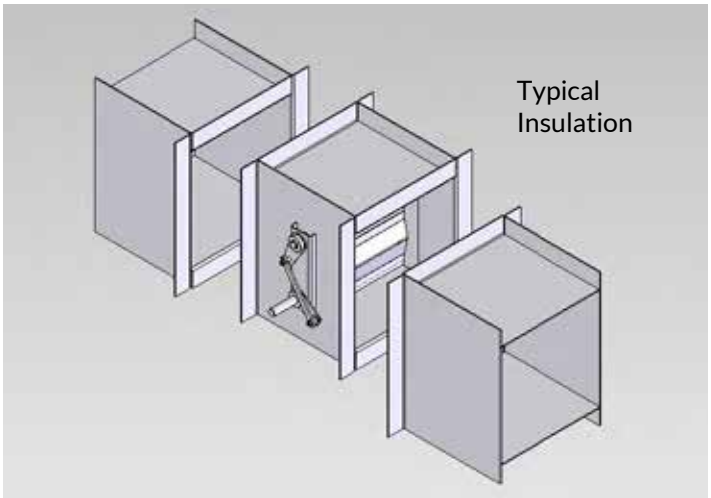
Note:

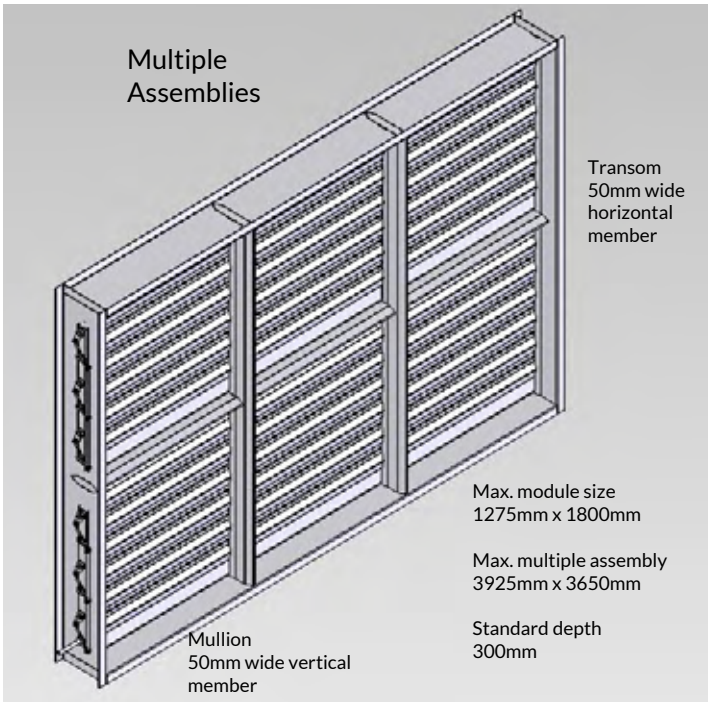
Larger dampers can be constructed by joining multiple assemblies together.

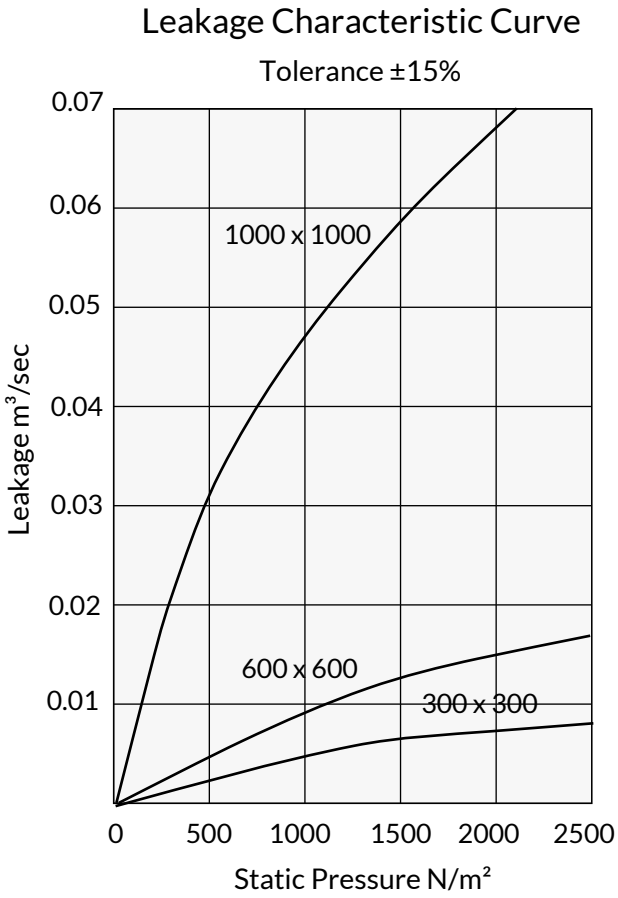
An approved fire-resistant sealant should be inserted between the damper and duct to ensure a good seal.

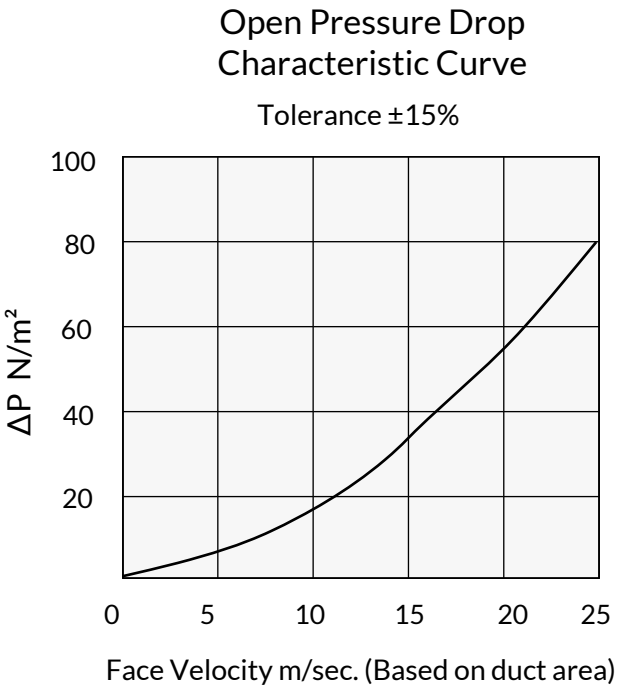
Note:

Each section shall have a drive spindle which can be linked together externally or driven independently.





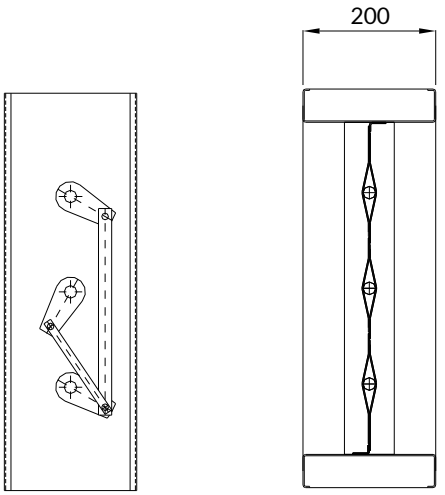




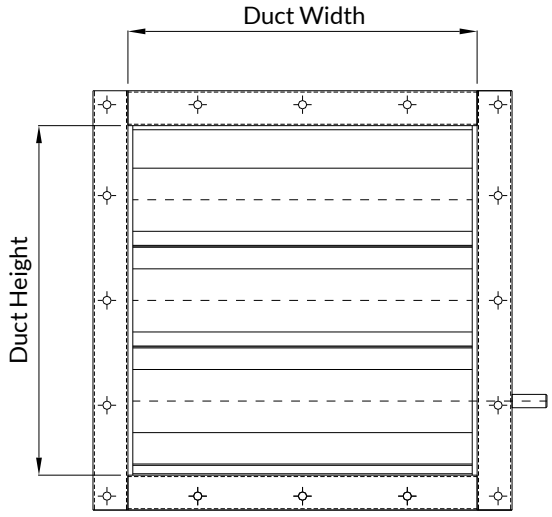
Medium Duty Control Damper
CCD-02

Description

The type CCD-02 Medium Duty Control Damper has been specifically designed for the industrial market where medium weight,construction and dependable operation are of prime importance. These versatile dampers are suitable for automatic and manual operation and may be used for: system balancing, pressure control, fresh air recirculation and many more functions. To ease installation all dampers are supplied with pre-drilled flanges and are designed to be suitable for mounting in any attitude with the airflow in either direction.



Section End Elevation



Elevation

Specification

Casing

The damper casing is formed from 2.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Damper units in excess of 1200 mm width shall be manufactured as a multiple assembly. Where circular dampers or dampers with width or height dimensions less than 150 mm are required, additional spigot adaptors are used which increase the damper insertion length from 200 to 300 mm.

Blades

The blades are a formed double - skin aerofoil section of 1.2 mm sheet metal . Blade stops at the top and bottom of the casing and sprung side seals provide excellent low leakage characteristics.

Shafts

Stub shafts Ø 19.05 mm with continuous drive shafts blades plug welded at each end.

Linkage

Opposed action linkage consisting of drive levers connected by flat bar link bars, driven through stainless steel pins. All linkage is contained within the depth of the damper casing.

Bearings

Phosphor bronze self lubricated ‘Oilite’ flanged bushes.

Operation

Pneumatic Actuator, Electric Actuator, Hand Locking Quadrant.

Options

- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients’ specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Flame retardant PVC blade seals.
- High temperature bearings.
- Other variations to suit clients’ specific requirements are also available.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

Installation & Assembly

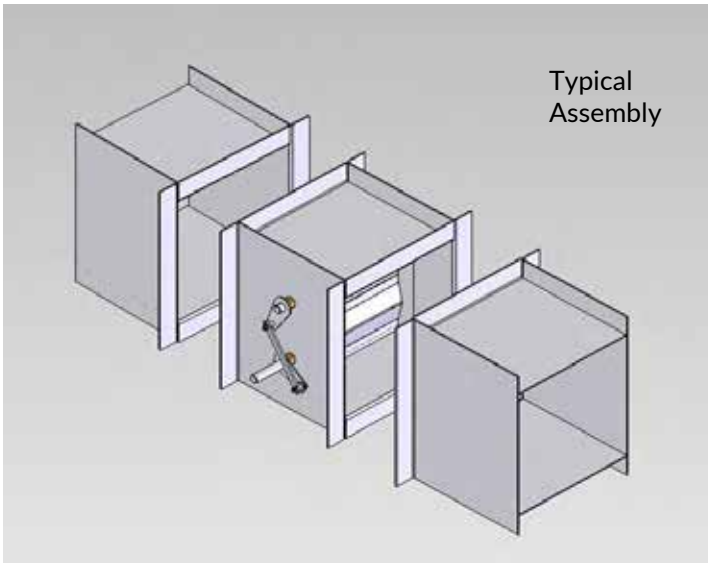
Note:

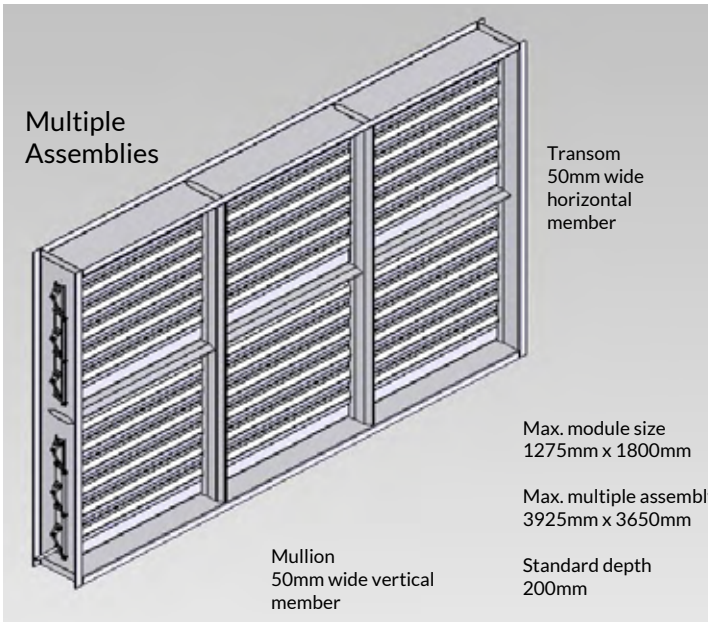
Larger dampers can be constructed by joining multiple assemblies together.

An approved fire-resistant sealant should be inserted between the damper and duct to ensure a good seal.

Note:

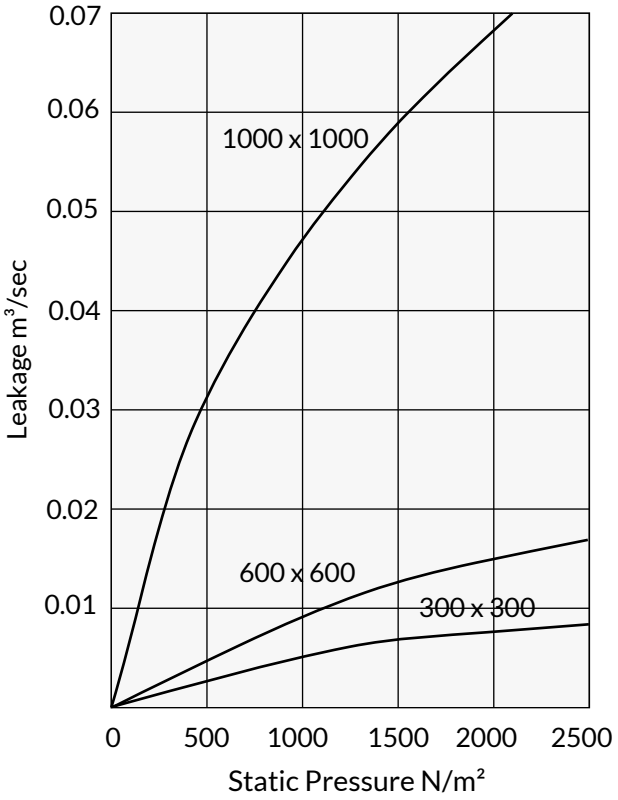
Each section shall have a drive spindle which can be linked together externally or driven independently.





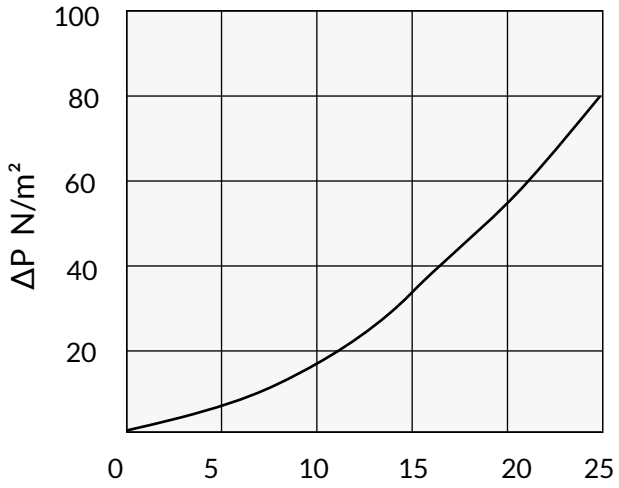
Leakage Characteristic Curve

Tolerance ±15%



Open Pressure Drop Characteristic Curve

Tolerance ±15%



Face Velocity m/sec. (Based on duct area)

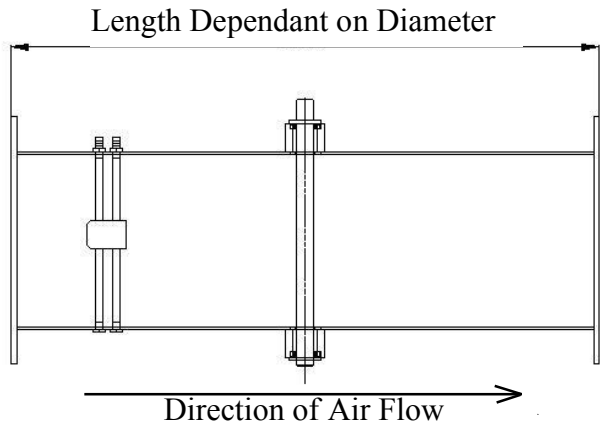
Circular Constant Volume Damper
FC CVD-C1

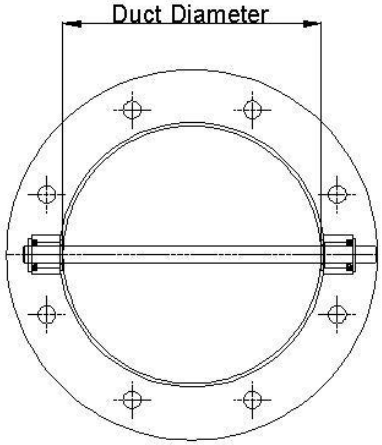
Description

The type CVD-C1 Circular Control Damper has been designed to fit into circular ductwork systems where space is restricted.

These versatile dampers are designed to maintain a constant volumetric flow rate. The control system allows for the required flow rate value to be set and can include both upper and lower threshold values.

To ease installation these dampers can be supplied with pre drilled flanges, and are designed to be suitable for mounting in any attitude.





Specification

Casing
The damper casing is made from 2.0 mm thick stainless steel tube, stiffened at either end with welded flange rings to ensure proper alignment of the blade and shaft.

Duct Sizes
Minimum Ø 150 mm.
Maximum Ø 500 mm.

Blade
The blade is a formed double-skin aerofoil section of 1.5mm sheet metal.

Shaft
Continuous shaft Ø 19.05 mm plug and stitch welded to the blade.

Bearings
Phosphor bronze self lubricated 'Oilite' flanged bushes fitted into a fully welded boss. A lip seal is included to ensure a leak proof damper case.

Operation
The Damper is operated by an electric modulating actuator connected to a stand alone volumetric control device. This linked with an integral flow grid can measure the volumetric flow through the damper and maintain the volume against a pre-set value.

The damper can be factory set to customer requirements and supplied with a flow test certificate of conformity.

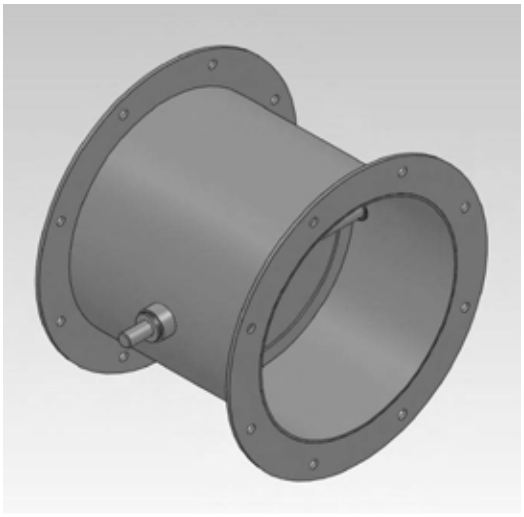
Options
- Materials can be 304L or 316L stainless steel.
- Earth continuity bosses.
- Lifting lugs.
- Integral or removable enclosures for housing control
- equipment.
- High temperature bearings.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

Installation & Assembly

Installation notes

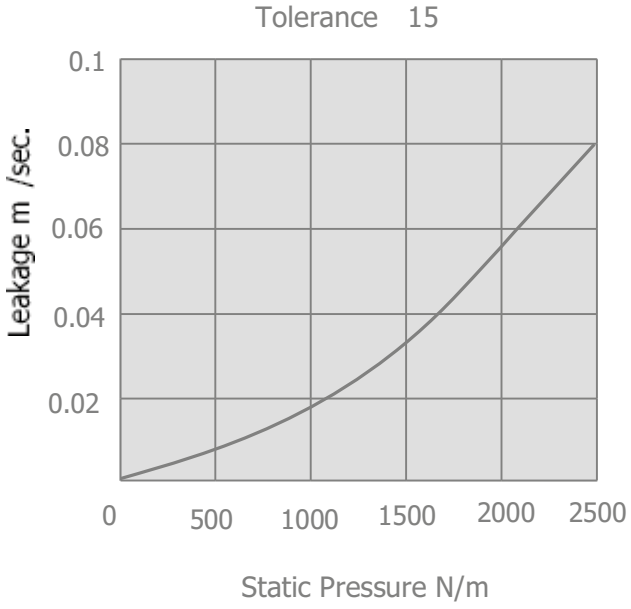
The normally accepted method of installing these dampers is via a channel combing welded round the fire division aperture, with the damper bolted to the combing after insertion of an appropriate gasket.



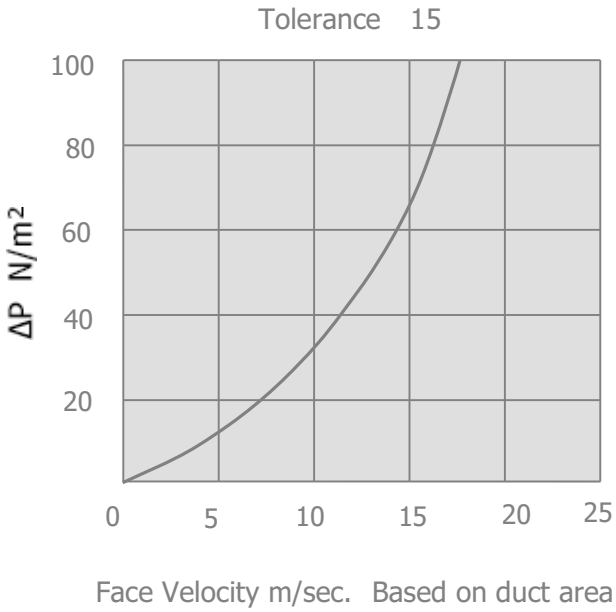
Minimum Diameter - 150mm

Maximum Diameter - 1200mm

LEAKAGE CHARACTERISTIC CURVE



OPEN PRESSURE DROP CHARACTERISTIC CURVE



Circular Control Damper
CCD-C1

Description

The type CCD-C1 Circular Control Damper has been designed to fit into circular ductwork systems where space is restricted.

These versatile dampers are suitable for automatic and manual control and may be used for fan shut-off, fresh air re circulation and many more functions. To ease installation these dampers can be supplied with pre drilled flanges, and are designed to be suitable for mounting in any attitude with the air flow in either direction.

Specification

Casing
The damper casing is rolled from 3.0mm thick sheet into a rigid drum, stiffened at either end with flat bare or angle flange rings to ensure proper alignment of the blade and shaft.

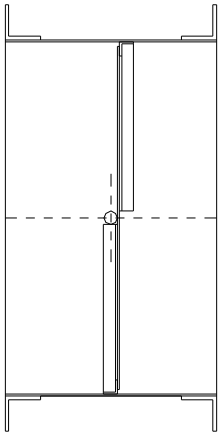
Duct Sizes
Minimum	150mm
Maximum	1200mm

Blade
The blades are cut from 3mm sheet steel and closes against flat bar stops welded round the inside of the casing.

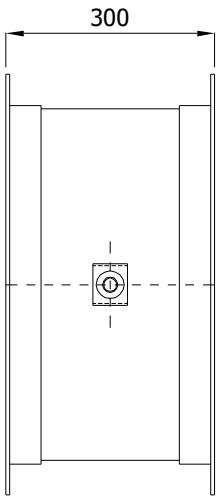
Shaft
Continuous shaft 19.05mm plug and stitch welded to the blade.

Bearings
Phosphor bronze self lubricated 'Oilite' flanged bushes.

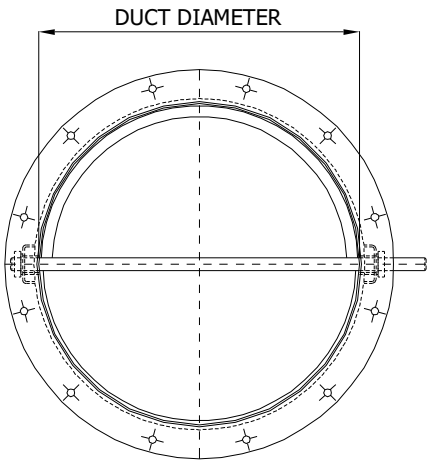
Operation
Manual Reset Mechanism
Pnuematic Actuator
Electric Actuator
Solenoid Release



Section



End Elevation



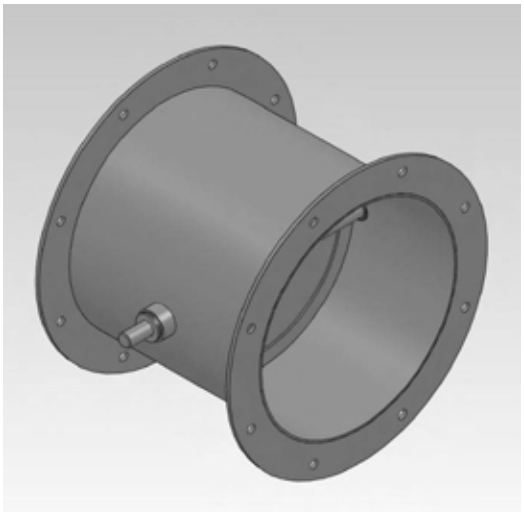
Elevation

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

Installation & Assembly

Installation notes

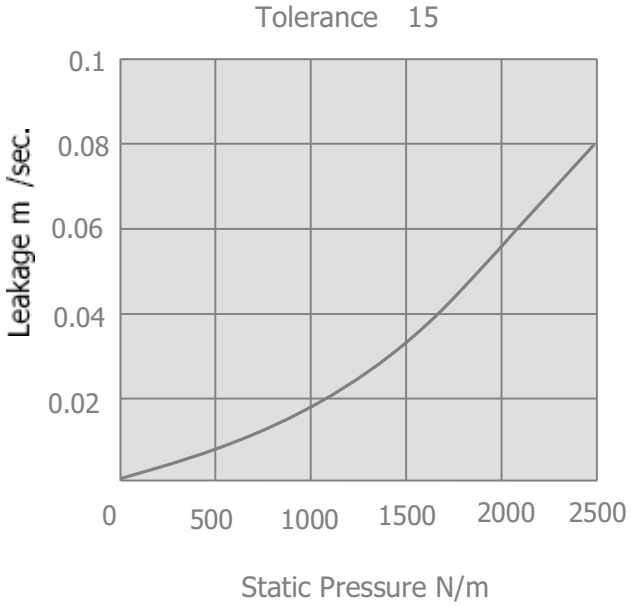
The normally accepted method of installing these dampers is via a channel combing welded round the fire division aperture, with the damper bolted to the combing after insertion of an appropriate gasket.



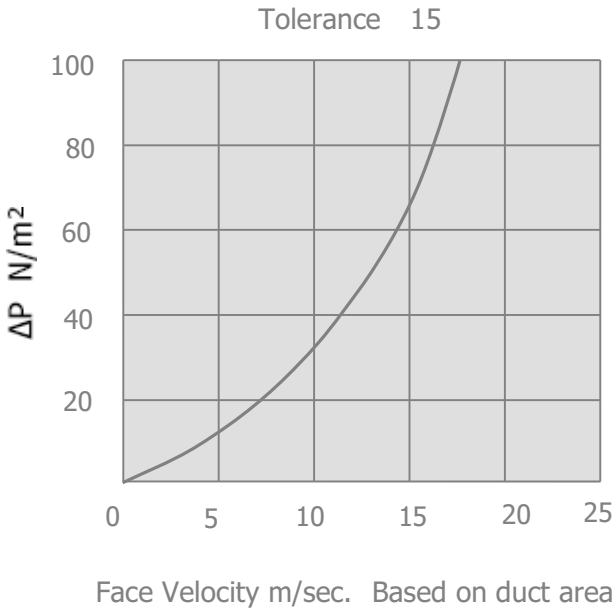
Minimum Diameter - 150mm

Maximum Diameter - 1200mm

LEAKAGE CHARACTERISTIC CURVE



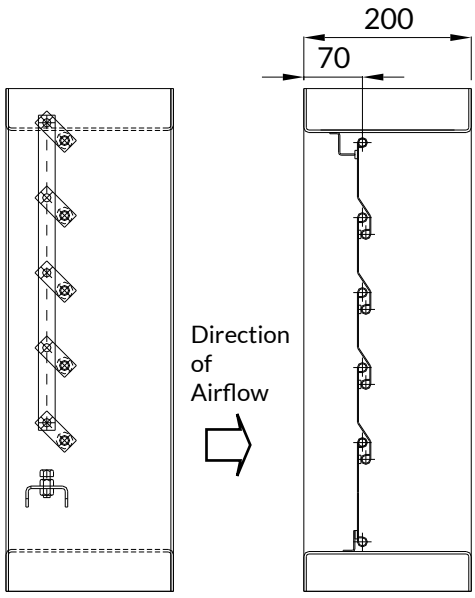
OPEN PRESSURE DROP CHARACTERISTIC CURVE



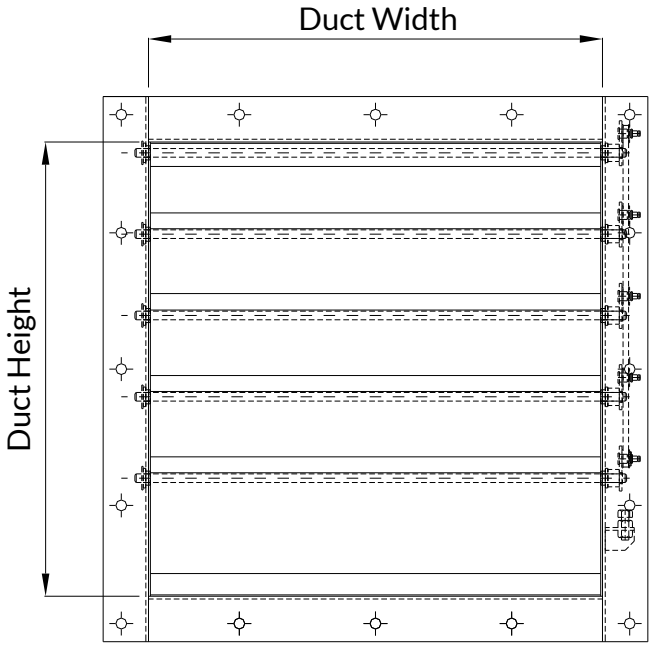
Backdraught Damper
CBD-01

Description

The type CBD-01 Backdraught Damper has been designed to give maximum efficiency under arduous conditions and is suitable for fitting with the air flow in one direction only. The dampers may be installed vertically or horizontally with the air flow upwards.



End Elevation Section



Elevation

Specification

Casing
The damper casing is formed from 3.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Where circular dampers are required, additional spigot adaptors are used which increase the damper insertion length from 200 to 300 mm.

Blades
The blades are a formed single-skin of 1.5 mm sheet steel and seal against a flame retardant PVC strip attached to the blades and top and bottom stops.

Shafts
Continuous shafts Ø 9.5 mm.

Linkage
Parallel action linkage consisting of drive levers and bosses connected by flat bar link bars, driven through stainless steel pins. All linkage is contained within the depth of the casing.

Bearings
Phosphor bronze self lubricated 'Oilite' flanged bushes.

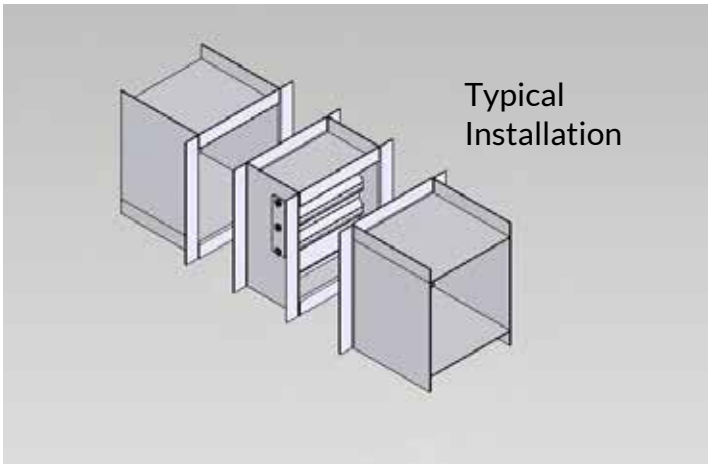
Options

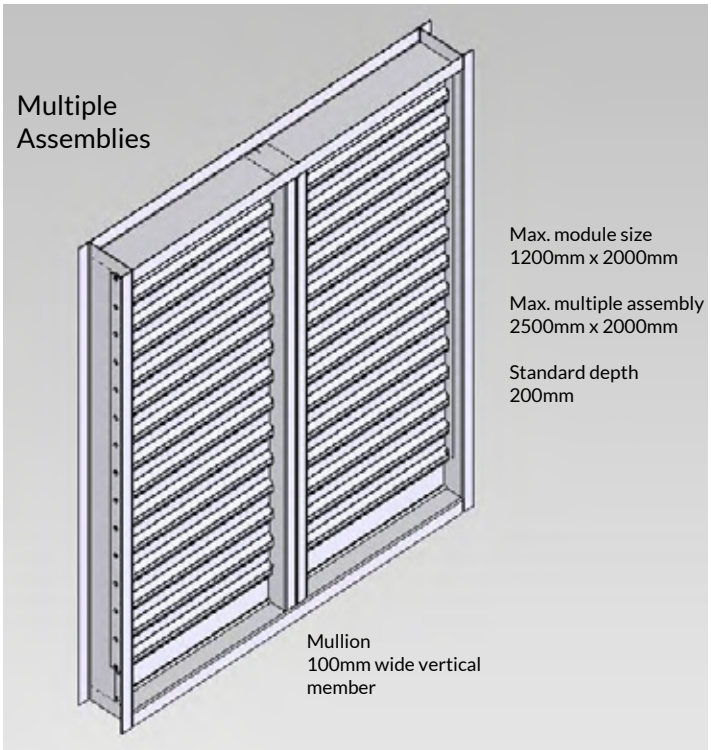
- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Flame retardant PVC blade seals.
- Integral or removable enclosures for housing control equipment.
- High temperature bearings.
- Shaft seals to provide airtight casings.
- Other variations to suit clients' specific requirements are also available.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

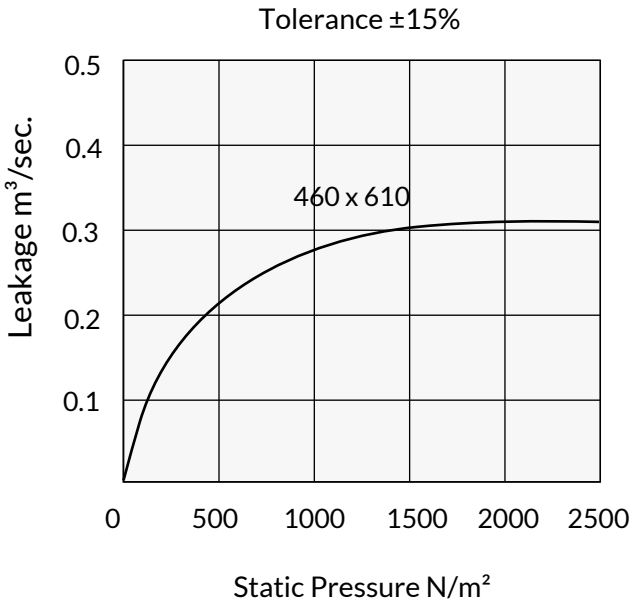
Installation & Assembly

An approved sealant should be inserted between the damper and duct flange to ensure a good seal.



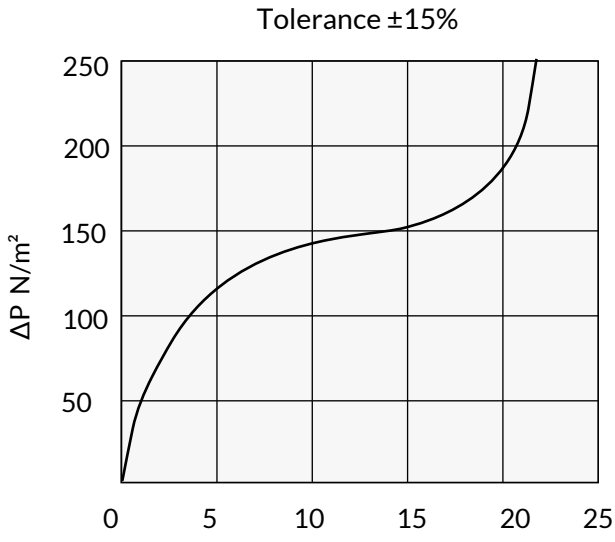


Leakage Characteristic Curve



Open Pressure Drop Characteristic Curve

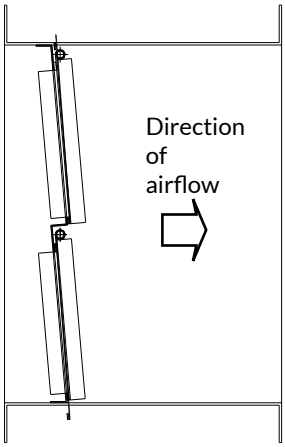
The static pressure drop curve - face velocity characteristic was conducted with free blades without spring or weight assistance or loading.



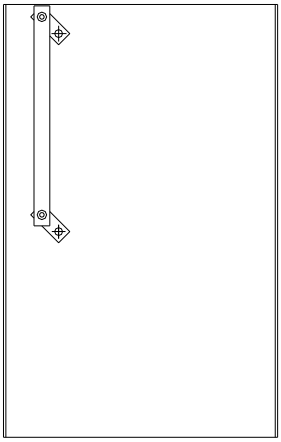
Backdraught Damper
CBD-02

Description

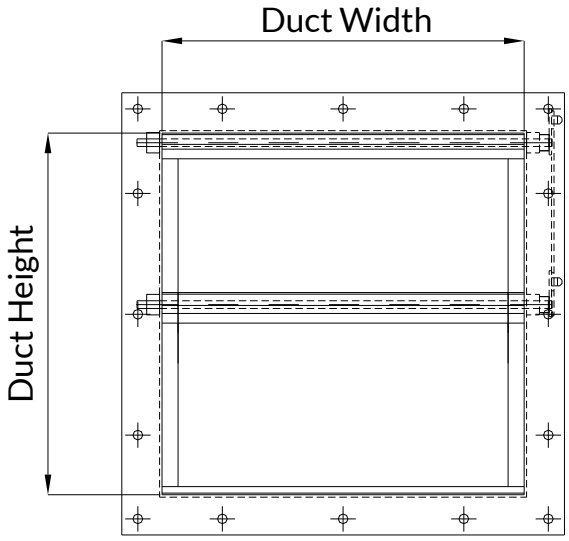
The type CBD-02 Backdraught Damper has been designed to give maximum shut-off under back-flow conditions and is suitable for fitting with the air flow in one direction only. The dampers may be installed vertically or horizontally with the air flow upwards.



Section



End Elevation



Elevation

Specification

Casing
The damper casing is formed from 3.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Where circular dampers are required, additional spigot adaptors are used which increase the damper insertion length from 350 to 450 mm.

Blades
The blades are a formed single-skin of 1.5 mm sheet steel and seal against a flame retardant PVC strip attached to the blades and top and bottom stops.

Shafts
Continuous shafts Ø 9.5 mm.

Linkage
Parallel action linkage consisting of drive levers and bosses connected by flat bar link bars, driven through stainless steel pins. All linkage is contained within the depth of the casing.

Bearings
Phosphor bronze self lubricated ‘Oilite’ flanged bushes.

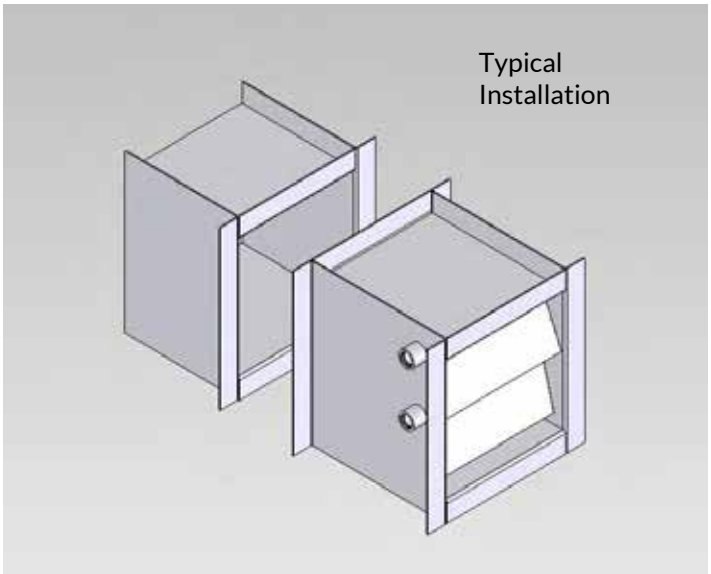
Options

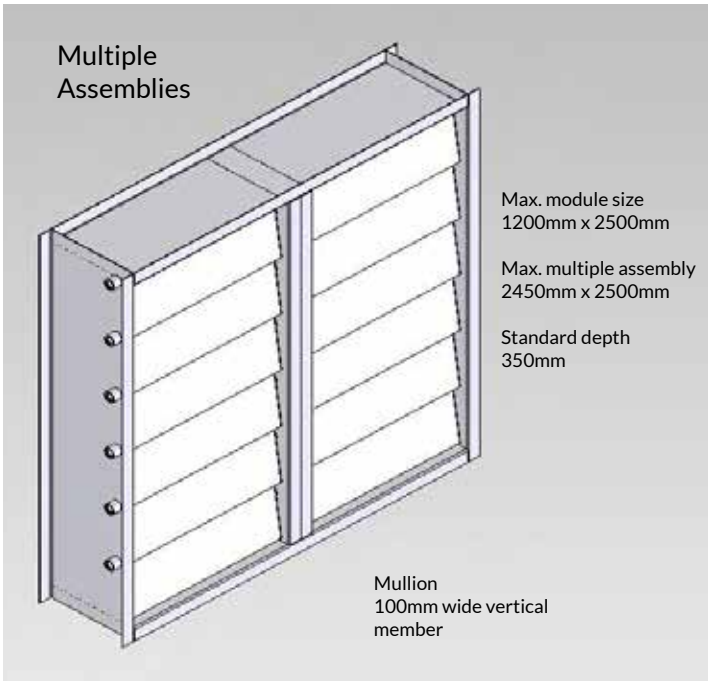
- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients’ specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Flame retardant PVC blade seals.
- Integral or removable enclosures for housing control equipment.
- High temperature bearings.
- Shaft seals to provide airtight casings
- Other variations to suit clients’ specific requirements are also available.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

Installation & Assembly

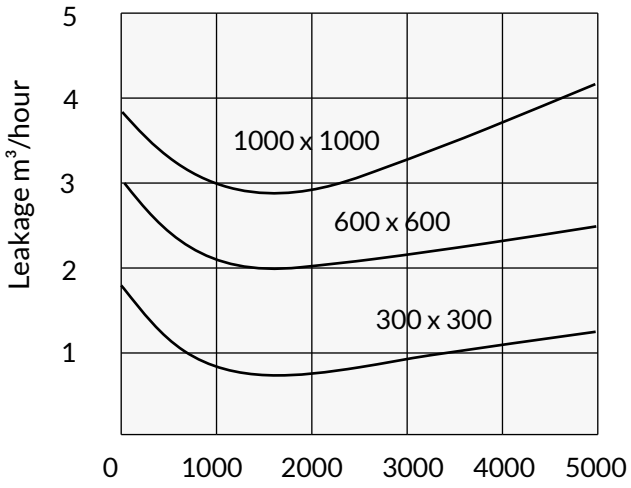
An approved sealant should be inserted between the damper and duct flange to ensure a good seal.





Leakage Characteristic Curve

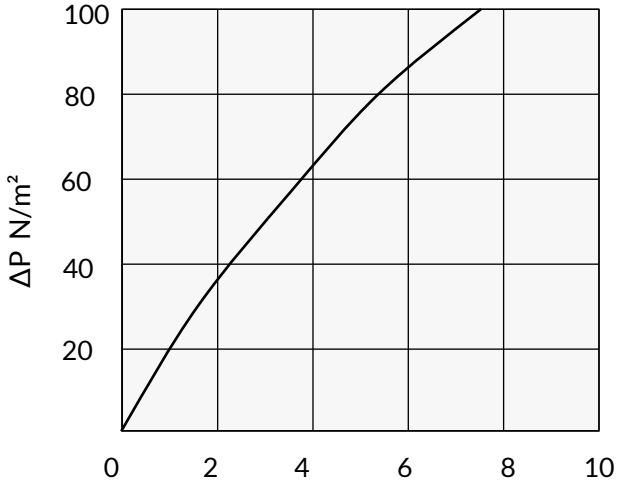
Tolerance ±15%



Static Pressure N/m²

Open Pressure Drop Characteristic Curve

Tolerance ±15%

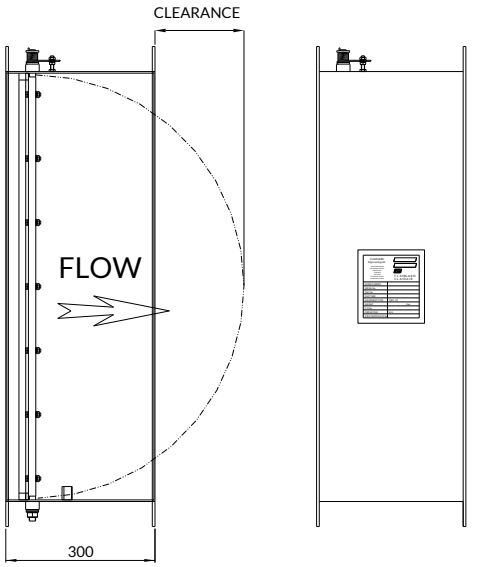


Face Velocity m/sec. (Based on duct area)

Circular Backdraught Damper
CBD-02C

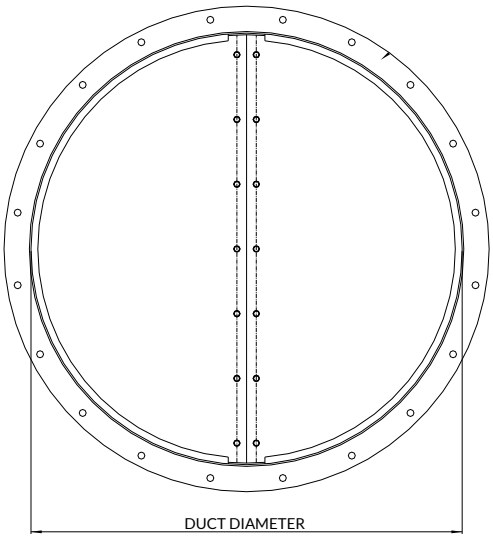
Description

The type CBD-02C Circular Backdraught Damper has been designed to give maximum shut-off under back-flow conditions and is suitable for fitting with the air flow in one direction only. The dampers may be installed vertically or horizontally with the air flow upwards.



Section

End Elevation



Elevation

Specification

Casing

The damper casing is formed from 3.0 mm thick sheet steel into a rigid drum, stiffened at either end with flange rings to ensure proper alignment of the blade and shaft.

Blades

The blades are a formed single-skin of 1.2 mm sheet steel and close against stops welded round the inside of the casing. The blades are bolted to the square shafts.

Shafts

Continuous shafts 12.7 mm square.

Bearings

Phosphor bronze self lubricated 'Oilite' flanged bushes.

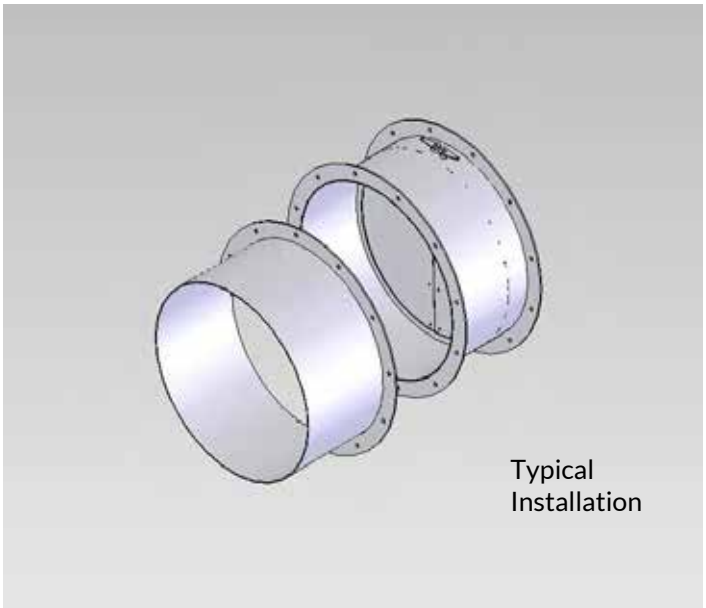
Options

- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Flame retardant PVC blade seals.
- High temperature bearings.
- Shaft seals to provide airtight casings.
- Other variations to suit clients' specific requirements are also available.

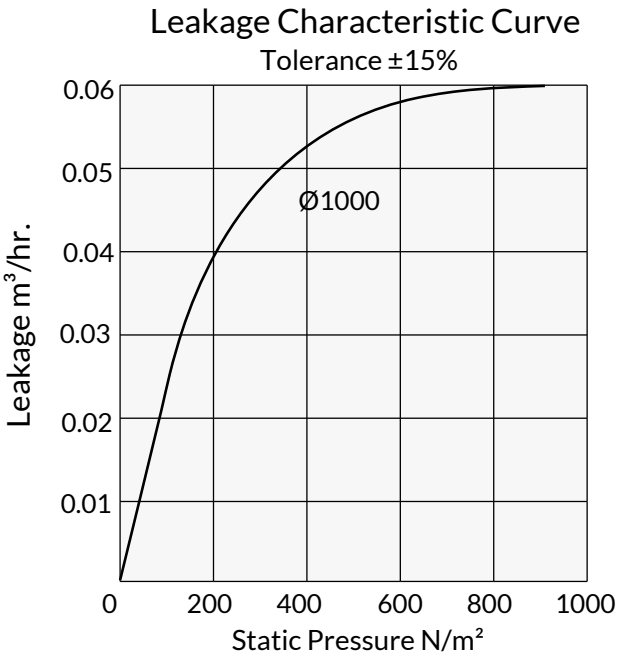
Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

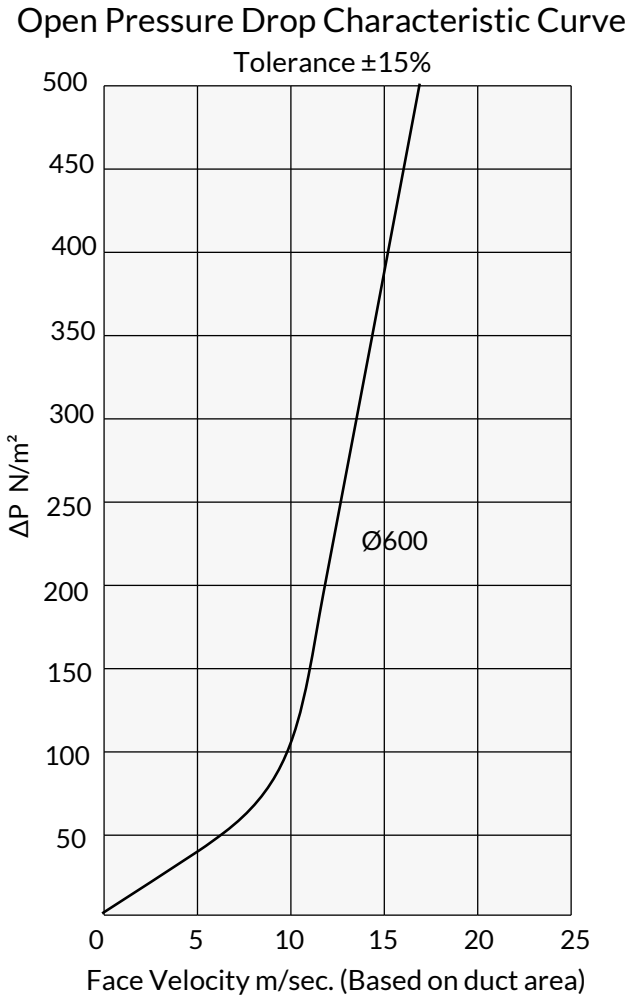
Installation & Assembly

An approved sealant should be inserted between the damper and duct flange to ensure a good seal.



Typical Installation

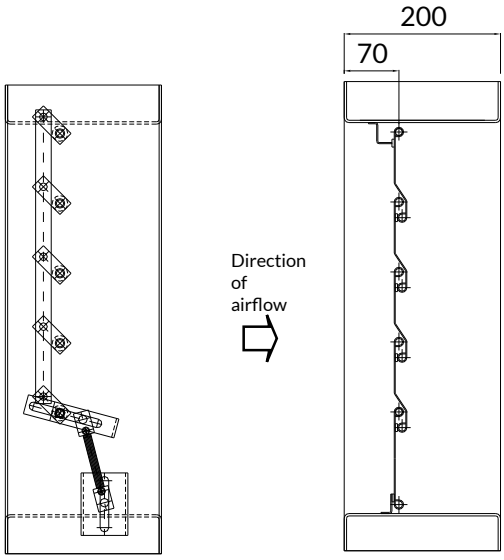


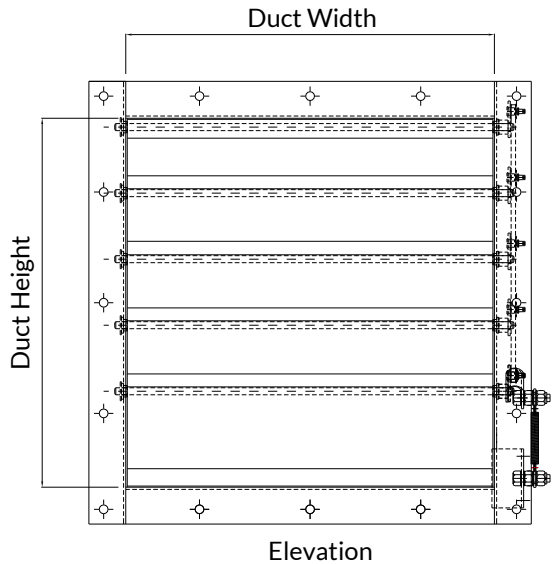


Pressure Relief Damper
CPR-01

Description

The type CPR-01 Pressure Relief Damper has been designed to give maximum efficiency under arduous conditions and is suitable for the air outlets of electrical equipment rooms, control rooms and living quarters. These areas are maintained at a higher pressure than surrounding areas to prevent the ingress of hazardous gases. The differential pressure is usually 63 N/m² although this may be increased to provide a greater safety margin. The dampers may be installed vertically or horizontally with the airflow upward.





Specification

Casing
The damper casing is formed from 3.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Where circular dampers are required, additional spigot adaptors are used which increase the damper insertion length from 200 to 300 mm.

Blades
The blades are a formed single-skin of 1.5 mm sheet steel and seal against a flame retardant PVC strip attached to the blades and top and bottom stops.

Shafts
Continuous shafts Ø 9.5 mm.

Linkage
Parallel action linkage consisting of drive levers and bosses connected by flat bar link bars, driven through stainless steel pins. All linkage is contained within the depth of the casing.

Bearings
Phosphor bronze self lubricated 'Oilite' flanged bushes.

Operation
Spring adjustment unit

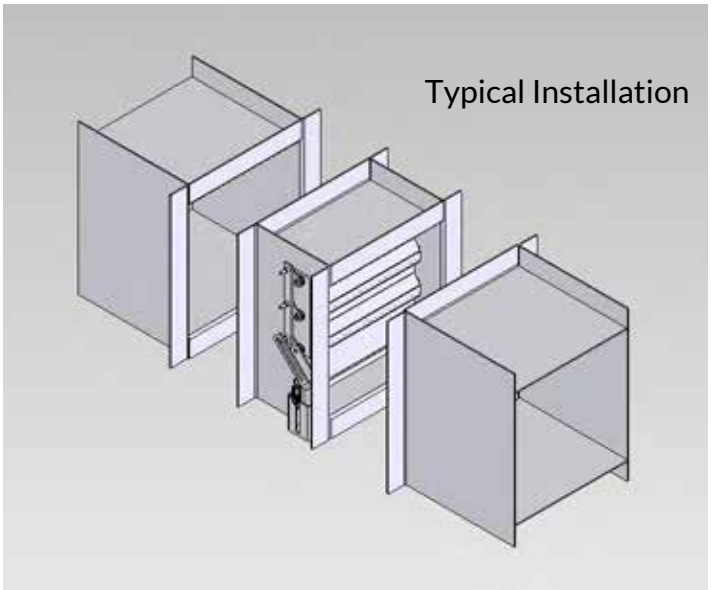
Options

- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Flame retardant PVC blade seals.
- Integral or removable enclosures for housing control equipment.
- High temperature bearings.
- Shaft seals to provide airtight casings.
- Other variations to suit clients' specific requirements are also available.

Tel: (+44) 01495 757 347 | Fax: (+44) 01495 755 443

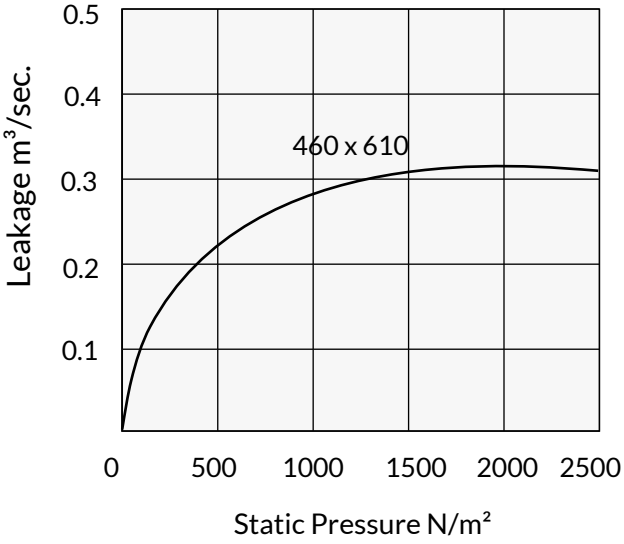
Installation & Assembly

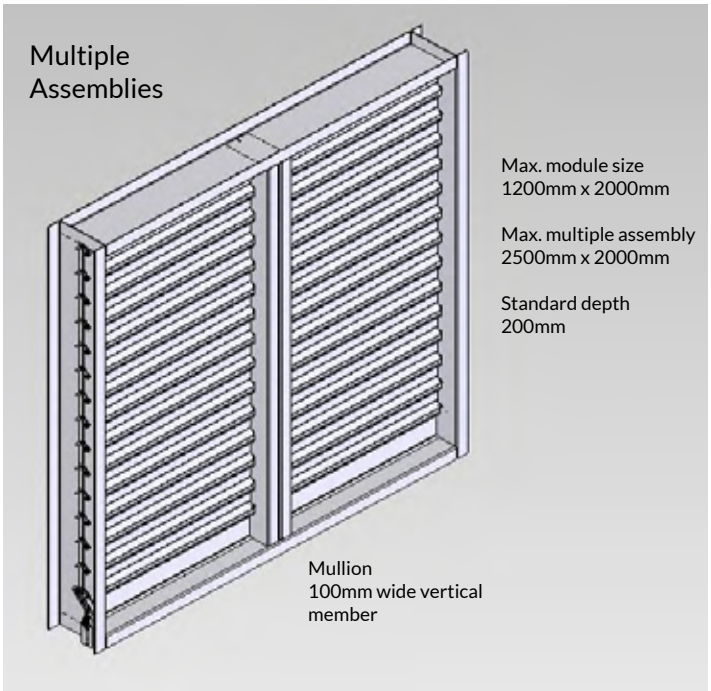
An approved sealant should be inserted between the damper and duct flange to ensure a good seal.



Leakage Characteristic Curve

Tolerance ±15%

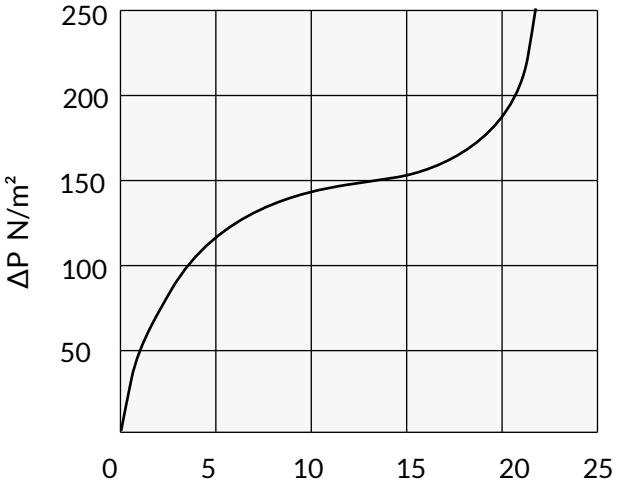




Open Pressure Drop Characteristic Curve

The static pressure drop curve - face velocity characteristic was conducted with free blades without spring or weight assistance or loading.

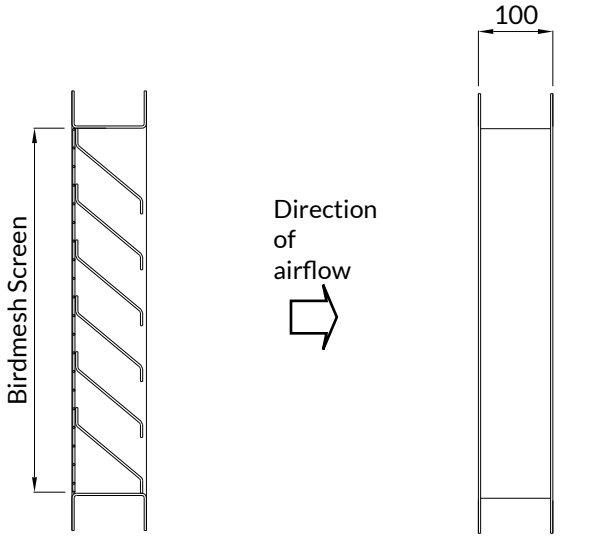
Tolerance ±15%



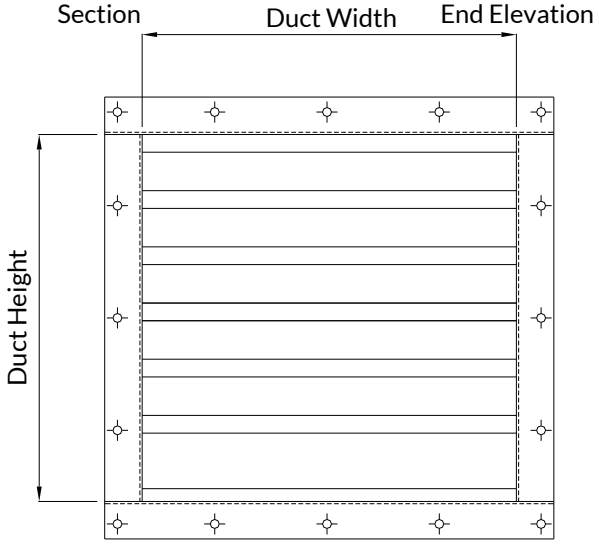
Fixed Blade Weather Louvre
CWL-01

Description

The type CWL-01 Fixed Blade Weather Louvre has been designed specifically to meet the arduous conditions encountered offshore and is suitable for fitting to duct inlets or exhausts.



Section



Elevation

Specification

Casing

3.0 mm sheet steel formed into rigid channel sections suitable for duct or surface mounting.

Blades

3.0 mm sheet steel formed into a Z-section and welded to the inside of the casing. The blades recline at an angle of 37½° and are pitched at 75 m. the maximum unsupported blade length is 1200 mm.

Bird Mesh Screen

A screen can be fitted to either front or rear face of the louvre to prevent the ingress of foreign bodies into the ductwork.

Size Limitations

As louvres reduce in size the free area ratio reduces rapidly which increases the free area velocity, pressure drop and water carry over. It is therefore recommended that the minimum duct size for a louvre be 300 x 300 mm. There is no limitation on the maximum size of a louvre but above a duct width of 1200 mm it would be constructed in multi-banked units.

Options

- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Other variations to suit clients' specific requirements are also available.

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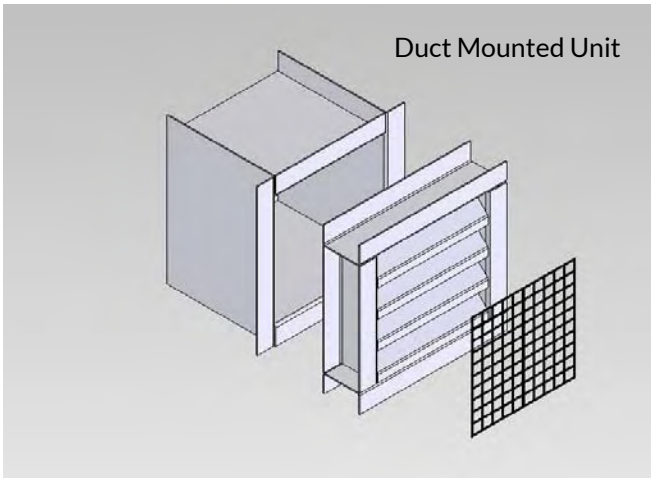
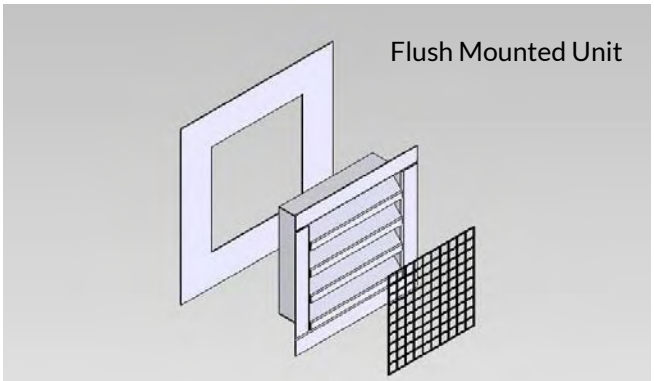
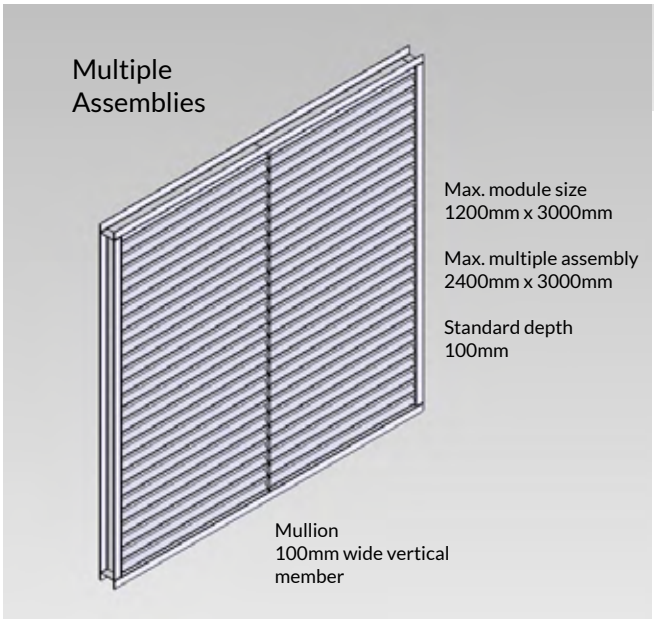
Installation & Assembly

An approved sealant should be inserted between the damper and duct flange to ensure a good seal.

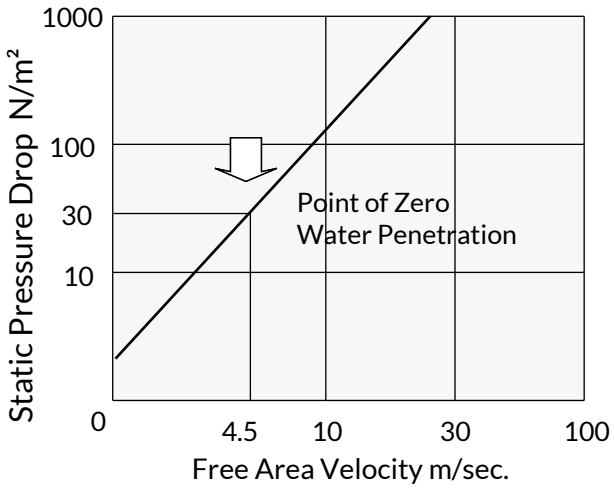






Performance Characteristics

The type CWL-01 louvre performance curve illustrates the relationship between the velocity of the standard density airflow through louvre free area and the static pressure drop upon that airflow. Ratings include the effect of a bird screen. The point of zero water penetration is that point on the curve where water penetration begins, under the standard AMCA water test. Intake louvres may be selected at this point or at lower velocities with reasonable assurance that normal rainfall conditions will not result in water penetration. Water penetration is not a consideration when selecting exhaust louvres and the performance curve and free area guide may be used over their entire range.



Free Area Guide m^2

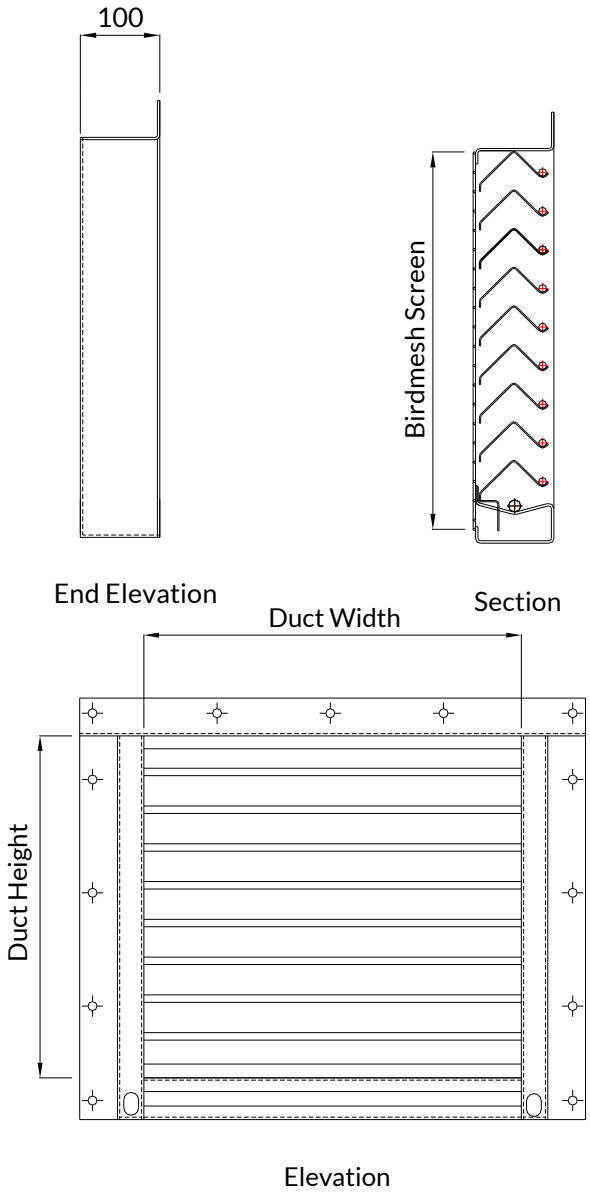
Louvre Width (mm)

Louvre Height (mm)	300	600	900	1200	1500	1800	2100
300	0.023	0.053	0.083	0.112	0.142	0.172	0.201
600	0.070	0.159	0.248	0.337	0.426	0.515	0.604
900	0.116	0.264	0.413	0.561	0.710	0.858	1.01
1200	0.162	0.370	0.578	0.786	0.994	1.20	1.41
1500	0.210	0.476	0.743	1.01	1.28	1.54	1.81
1800	0.255	0.582	0.908	1.23	1.56	1.89	2.21
2100	0.302	0.688	1.07	1.46	1.85	2.23	2.62

Chevron Weather Louvre
CWL-01C

Description

The type CWL-01C Chevron Weather Louvre is of a high performance design suitable for the arduous conditions encountered in marine environments. The louvre has been independently performance tested by BSRIA in accordance with the HEVAC standard weather louvre tests.



Specification

Casing

3.0 mm sheet steel formed into rigid channel sections suitable for duct or surface mounting with side drainage channels and integrated manomeric trap.

Blades

1.5 mm sheet steel formed into a chevron section and welded to the inside of the casing. The blades have a water retaining lip and are pitched at 50 mm. The maximum unsupported blade length is 1000 mm.

Bird Mesh Screen

A screen can be fitted to either front or rear face of the louvre to prevent the ingress of foreign bodies into the ductwork.

Size Limitations

As louvres reduce in size the free area ratio reduces rapidly which increases the free area velocity, pressure drop and water carry over. It is therefore recommended that the minimum duct size for a louvre be 300 x 300 mm. There is no limitation on the maximum size of a louvre but above a duct width of 1000 mm it would be constructed in multi-banked units.

Options

- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Other variations to suit clients' specific requirements are also available.

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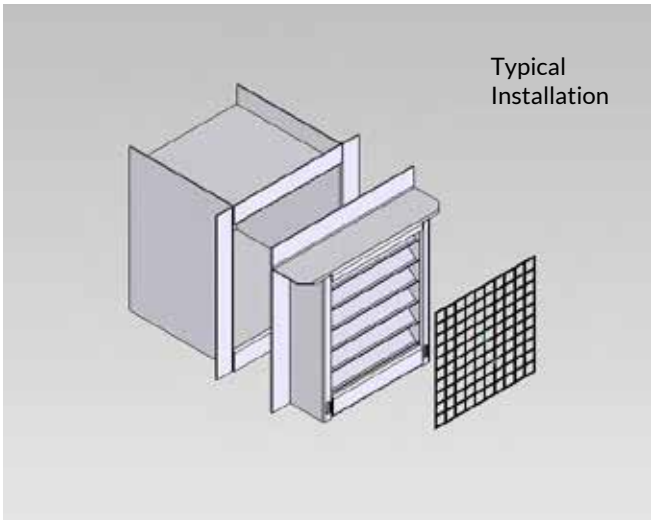
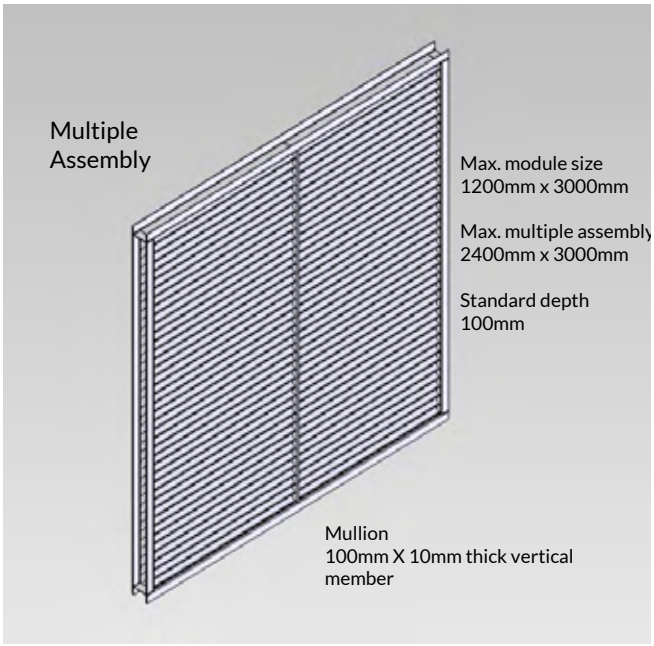
Installation & Assembly

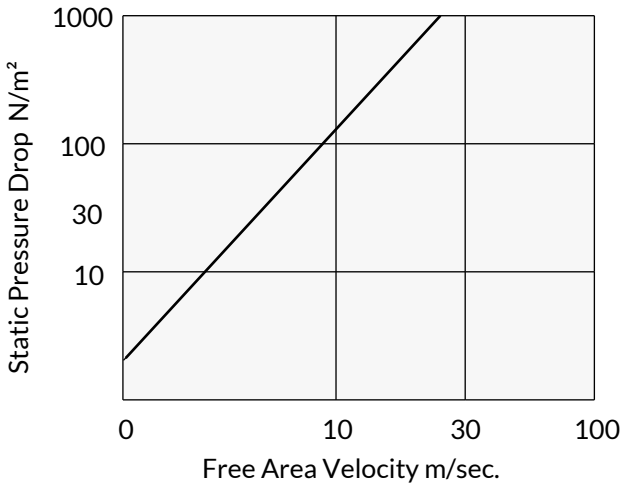
An approved sealant should be inserted between the damper and duct flange to ensure a good seal.





Performance Characteristics

The type CWL-01C louvre performance curve illustrates the relationship between the velocity of the standard density airflow through louvre free area and the static pressure drop. The louvre efficiency when measured 0.5 metres downstream of the louvre face is 99% at an induced free area velocity of 4.3 m/sec. The efficiency drops to 79% when also subjected to a wind speed of 27 m/sec. Full test results of performance tests conducted by BSRIA are available upon request.



Free Area Guide m²

Louvre Width (mm)

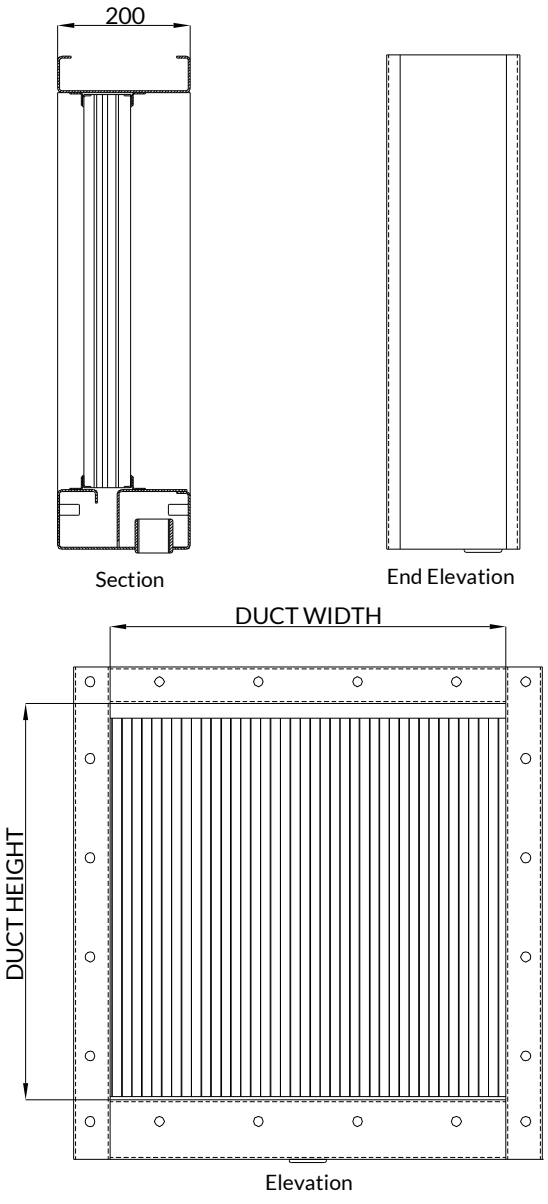
Louvre Height (mm)	300	600	900	1200	1500	1800	2100
300	0.023	0.053	0.083	0.112	0.142	0.172	0.201
600	0.070	0.159	0.248	0.337	0.426	0.515	0.604
900	0.116	0.264	0.413	0.561	0.710	0.858	1.01
1200	0.162	0.370	0.578	0.786	0.994	1.20	1.41
1500	0.210	0.476	0.743	1.01	1.28	1.54	1.81
1800	0.255	0.582	0.908	1.23	1.56	1.89	2.21
2100	0.302	0.688	1.07	1.46	1.85	2.23	2.62

Moisture Eliminator

SL

Description

The type SL high efficiency double deflection moisture eliminator has been designed specifically to meet the arduous conditions encountered in offshore and marine environments and is suitable for fitting to duct inlets or exhausts.



Specification

Casing

3.0 mm sheet steel formed into rigid channel sections suitable for duct or surface mounting.

Vanes

0.56 mm sheet steel formed into a High Efficiency section and welded to the inside of the casing. The blades must be mounted vertically. The maximum unsupported blade height is 2100 mm.

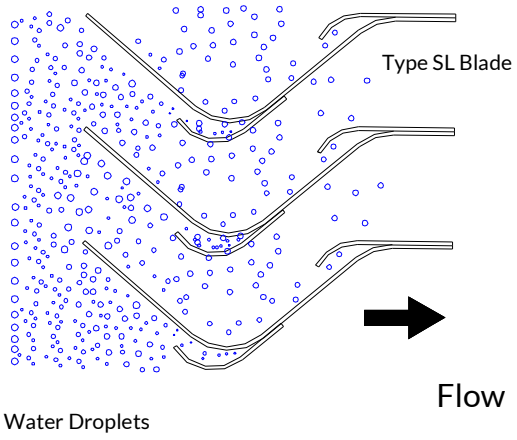
Bird Mesh Screen / Weather Door

A bird mesh screen or weather door can be fitted to either front or rear face of the louvre to prevent the ingress of foreign bodies into the ventilated space.

Size Limitations

As moisture eliminators reduce in size the free area ratio reduces rapidly which increases the free area velocity, pressure drop and water carry over. It is therefore recommended that the minimum duct size for a moisture eliminator be 300 x 300 mm. There is no limitation on the maximum size of a louvre but above a duct height of 2000 mm it would be constructed in multi-banked units.

Principle of Inertial Separation



Options

- Materials can be stainless steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Other variations to suit clients' specific requirements are also available.

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Operation

Flamgard Calidair's high efficiency moisture eliminator is Designed to remove water or other liquid from the air/gas flow passing through them.

They are particularly useful for ventilation system intakes where air velocities and/or the mass of water carried is too great for efficient removal by conventional louvres

The type 'SL' standard duty moisture eliminator can deal with heavy rain storm situations or be used as a water eliminator within an air conditioning plant with air velocities as great as 9 m/sec.

The twin deflection vertical vanes are designed and arranged to achieve effective separation and drainage of entrained water droplets from the passing ventilation air to the following efficiency:

Particle Size	Removal Efficiency
30 Micron	95
15 to 30 Micon	40-90

Performance Characteristics

Water Handling Capacity

Typically 10 litres/sec at 4 m/sec velocity.

Panel Size

400 mm x 400 mm to 3000 mm x 2000mm high (multi panel versions are available for larger sizes).

Design Features

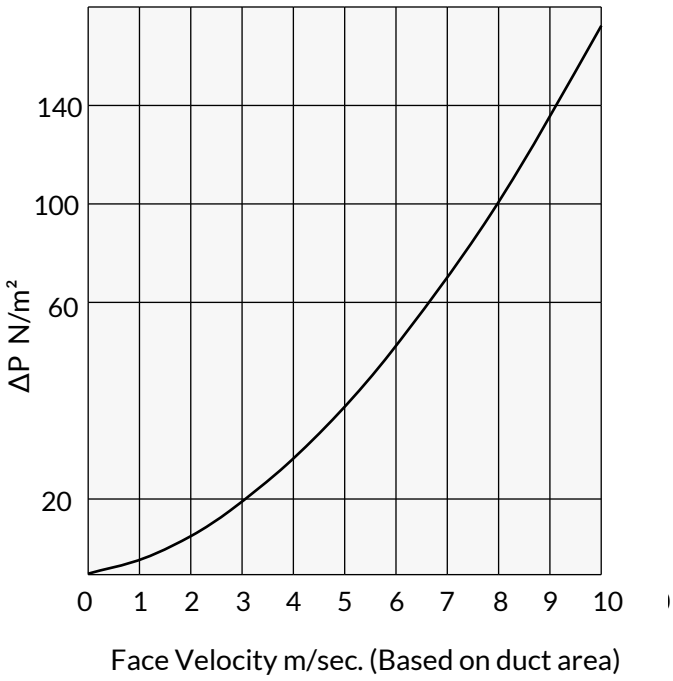
Twin deflection inertial vertical vane water separation technique with integral fluid collection tank.

Options

- Coalescer Panels.
- Front, rear or duct mounted.
- Drilled or undrilled flanges.
- Free flow drain outlet.
- Drain outlet to pipes.
- Drain outlet to water traps.

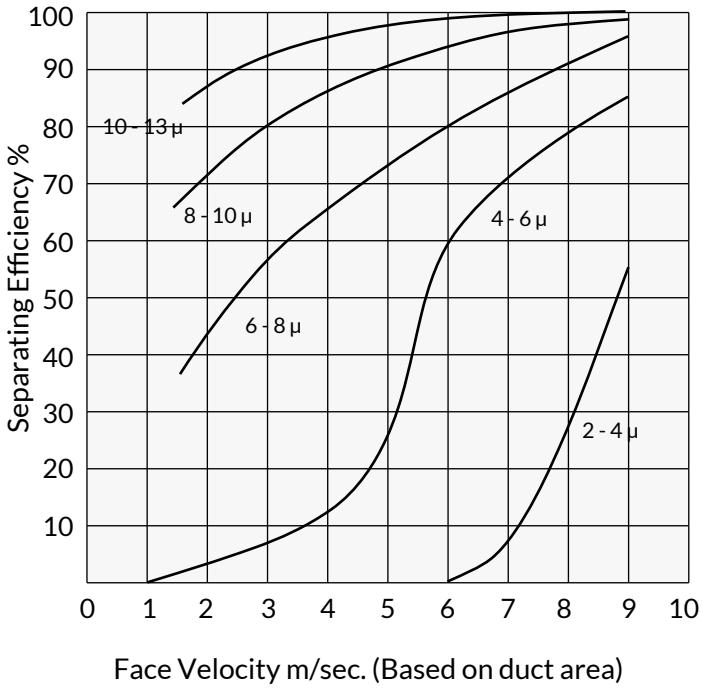
Open Pressure Drop Characteristic Curve

Tolerance ±15%



Collection Efficiency

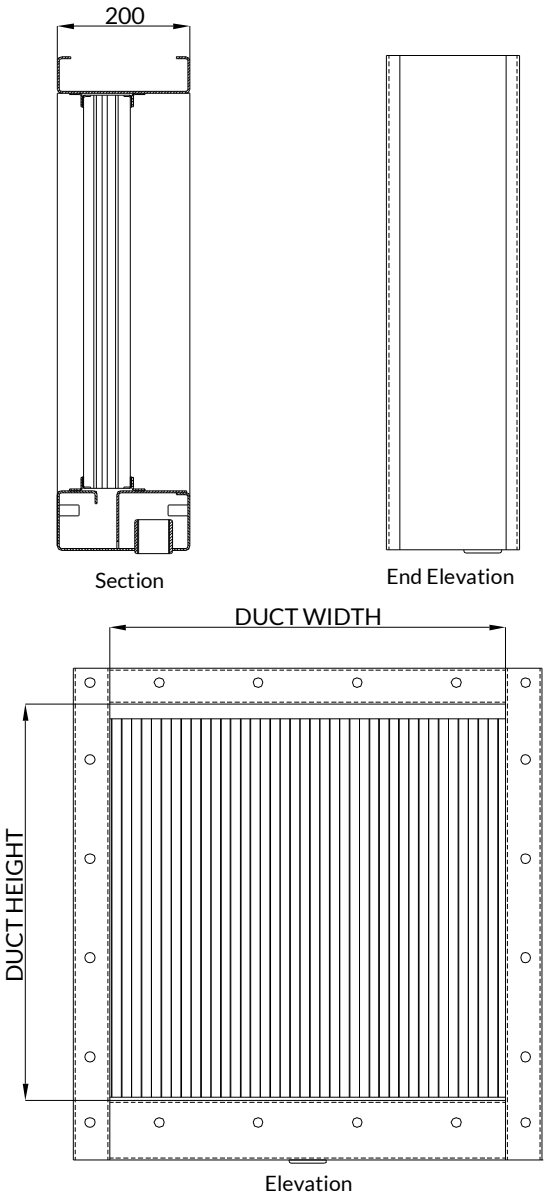
Tolerance ±15%



Moisture Eliminator
HL

Description

The type HL high efficiency triple deflection moisture eliminator has been designed specifically to meet the arduous conditions encountered in offshore and marine environments and is suitable for fitting to duct inlets or exhausts where higher water removal rates can be achieved, than with conventional louvres or with the Flamgard Calidair type HL high efficiency moisture eliminator.



Specification

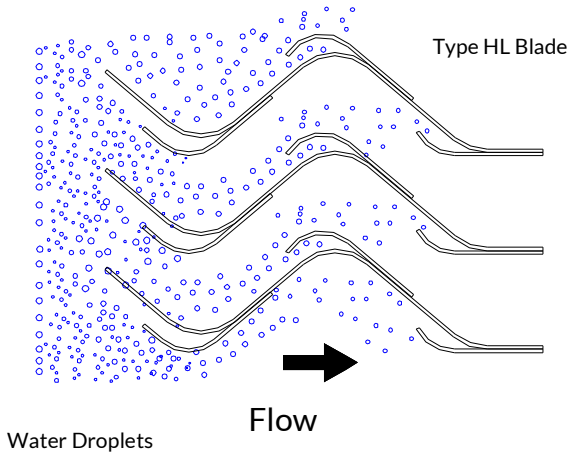
Casing
3.0 mm sheet steel formed into rigid channel sections suitable for duct or surface mounting.

Vanes
0.56 mm sheet steel formed into a High Efficiency section and welded to the inside of the casing. The blades must be mounted vertically. The maximum unsupported blade height is 2100 mm.

Bird Mesh Screen / Weather Door
A bird mesh screen or weather door can be fitted to either front or rear face of the louvre to prevent the ingress of foreign bodies into the ventilated space.

Size Limitations
As moisture eliminators reduce in size the free area ratio reduces rapidly which increases the free area velocity, pressure drop and water carry over. It is therefore recommended that the minimum duct size for a moisture eliminator be 300 x 300 mm. There is no limitation on the maximum size of a louvre but above a duct height of 2000 mm it would be constructed in multi-banked units.

Principle of Inertial Separation



Options
- Materials can be stainless steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Other variations to suit clients' specific requirements are also available.

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Operation

Flamgard Calidair's high efficiency moisture eliminator is designed to remove water or other liquid from the air/gas flow passing through them.

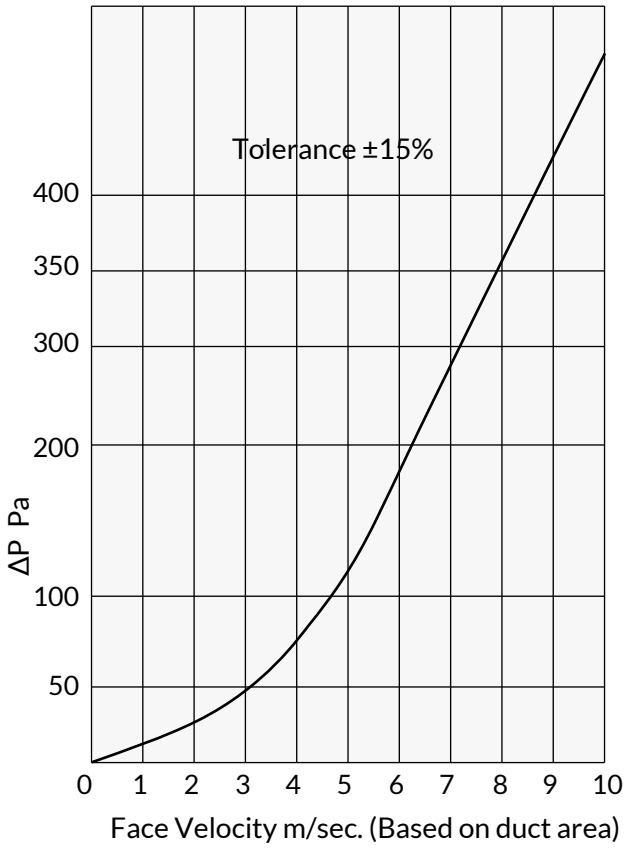
They are particularly useful for ventilation system intakes where air velocities and/or the mass of water carried is too great for efficient removal by conventional louvres

The type 'HL' standard duty moisture eliminator can deal with heavy rain storm situations or be used as a water eliminator within an air conditioning plant with air velocities as great as 9 m/sec.

The triple deflection vertical vanes are designed and arranged to achieve effective separation and drainage of entrained water droplets from the passing ventilation air to the following efficiency:

Particle Size	Removal Efficiency
30 Micron	95
15 to 30 Micon	40-90

Open Pressure Drop Characteristic Curve



Performance Characteristics

Water Handling Capacity

Typically 46 litres/sec at 4 m/sec velocity.

Panel Size

400 mm x 400 mm to 3000 mm x 2000mm high (multi panel versions are available for larger sizes).

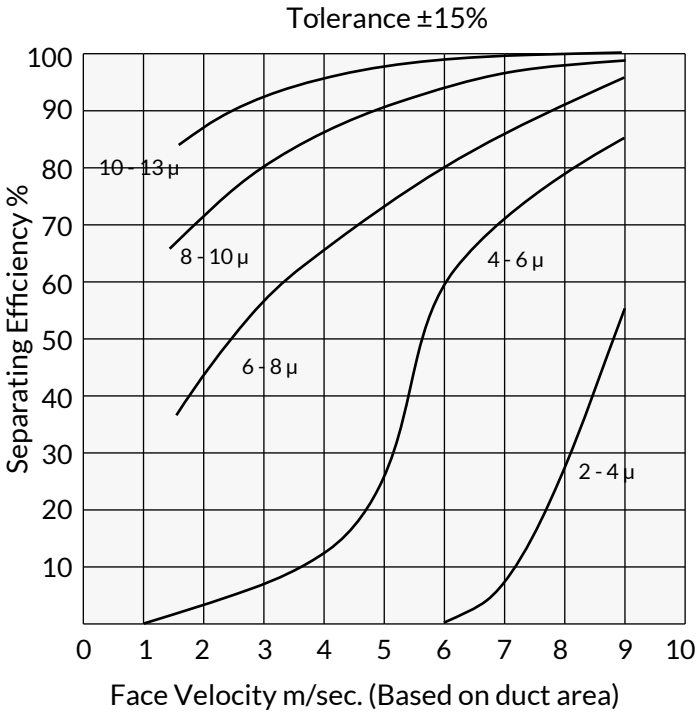
Design Features

Twin deflection inertial vertical vane water separation technique with integral fluid collection tank.

Options

- Coalescer Panels.
- Front, rear or duct mounted.
- Drilled or undrilled flanges.
- Free flow drain outlet.
- Drain outlet to pipes.
- Drain outlet to water traps.

Collection Efficiency

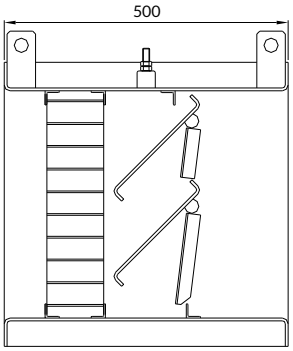


High Pressure Blast Damper
BLD-01

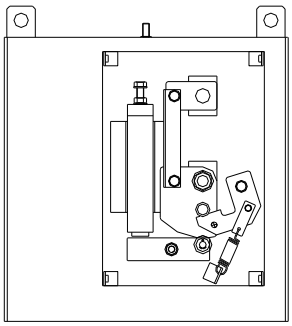
Description

The type BLD-01 High Pressure Blast Damper is of a high performance design suitable for the arduous conditions encountered in marine and offshore environments. The Blast Damper has been independently performance tested by Aberystwyth University and certified to 04ATEX9322 for ATEX Group II Category 2 G/D use by SIRA.

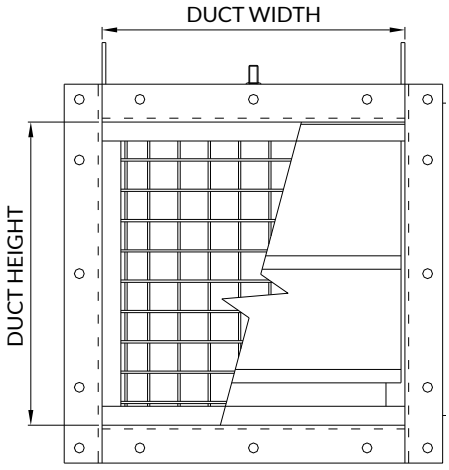
Please Note, these dampers are manufactured From 304L or 316L Stainless Steel only.



Section



End Elevation



Elevation

Specification

Casing

The damper casing is formed from 5.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Damper Units in excess of 1500 mm width or height shall be manufactured as a multiple assembly. Where circular dampers or dampers with width or height dimensions less than 300 mm are required, additional spigot adaptors are used which increase the damper insertion length from 500 to 600 mm.

Blades

The blades are a formed single-skin of 5 mm sheet metal with lips formed at the leading and trailing edges. This lip strengthens the blades and additionally provides a measure of protection from direct weather/storm impingement. in the closed position the blades 'lipped edges' clip together and engage with the top and bottom duct stops to form a seal.

Shafts

Blade shafts are of the stub type design. Each shaft has a machined flat at their inner end for direct attachment to the blade, and is secured with two locked bolts. Shafts at the drive side are linked to transmit motion to the other blades.

Bearings & Housings

Bearing housings are continuously welded to the drive side (control enclosure end) and non-drive side (idle end) frame members. Each bearing housing carries a Zeron duplex stainless steel bearing bush with a thrust face. The Zeron bushes are highly resistant to sea water corrosion and form a non-galling pair with the stainless steel shaft.

Operation

The blast damper blade is designed to close by the blast pressure present in the duct and and aided by gravity. The blades are normally secured in the 'open' position by the tension of the Flamgard blast catch which can be adjusted to release the damper blades from the open position for various explosion pressures, thus shutting down the duct and and protecting the system.

When in the 'open' position the blade is held at 45° by a cam and roller mechanism, which breaks under explosive pressure. The blade remain closed until the torque is applied to the external reset shaft of the damper which will then manually reset the blades.

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Flamgard-Calidair Type BLD-01 High Pressure Blast Damper

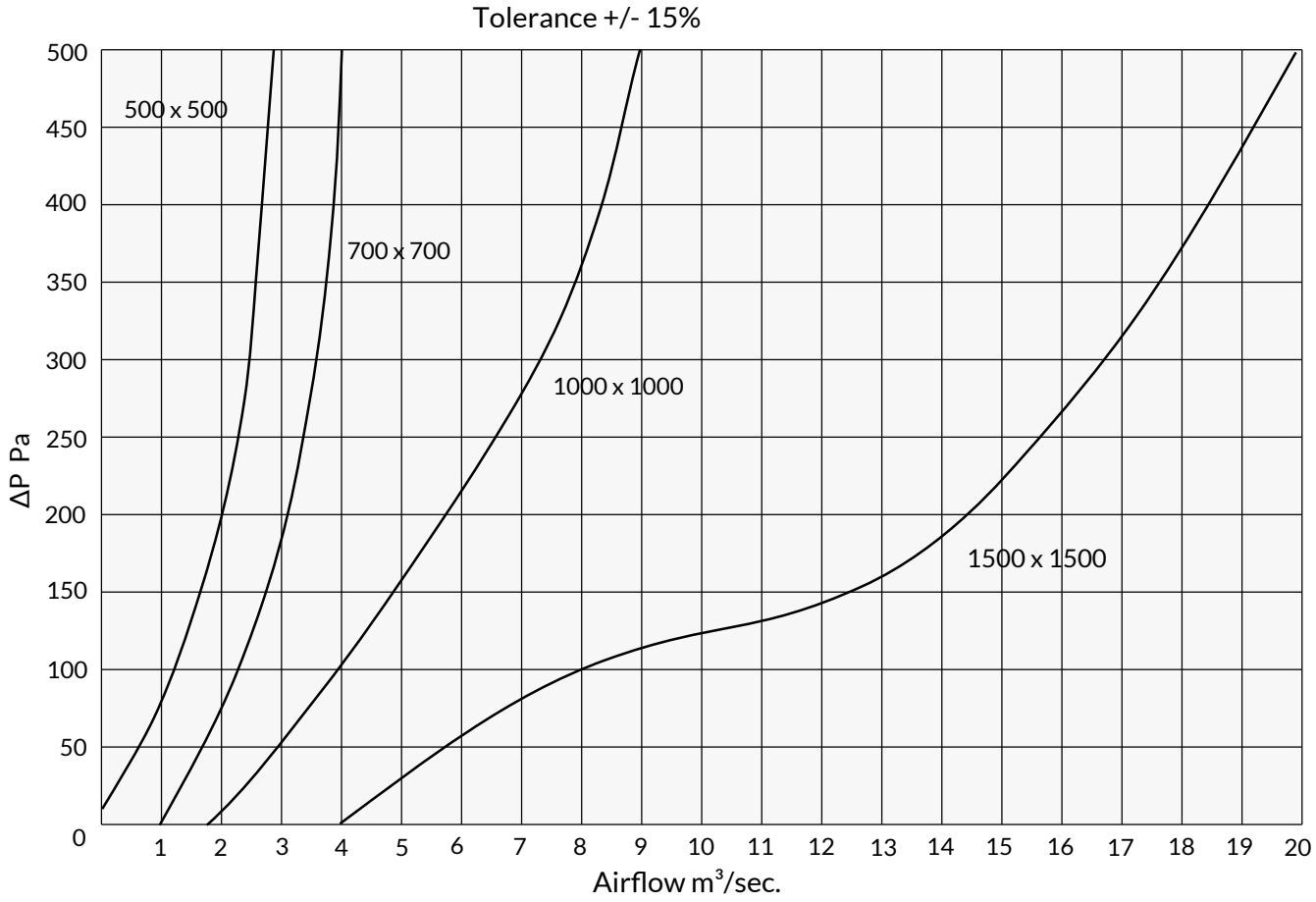
The Flamgard Calidair type BLD-01 high pressure blast damper is of a parallel rotation, multi-blade design of exceptionally rigid construction which will withstand an explosion blast force of 1.0 barg. The damper has been designed to meet the highest specification of ventilation control equipment required for today's HVAC industry.

A single BLD-01 unit utilises both single and multi-blade designs in providing a duct height range of 300mm to 1500mm, together with a maximum width of 3000mm. Duct sizes larger than those given are manufactured as multiple assemblies.

The following pressure drop figures are for initial guidance only. Please consult the Flamgard Calidair Technical Department for individual project requirements.

The following figures were measured at ambient temperature (20°C) and calculated using the industry standard Air density of 1.2 kg/m^{3}at this temperature.

Open Pressure Drop Characteristic Curves

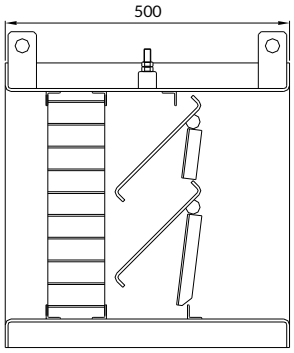


Medium Pressure Blast Damper
BLD-02

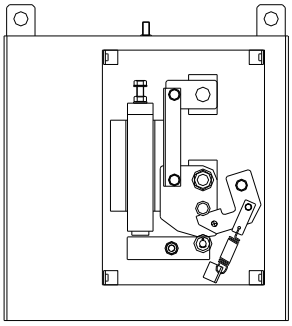
Description

The type BLD-02 Medium Pressure Blast Damper is of a high performance design suitable for the arduous conditions encountered in marine and offshore environments. The Blast Damper has been independently performance tested by Aberystwyth University and certified to 04ATEX9322 for ATEX Group II Category 2 G/D use by SIRA.

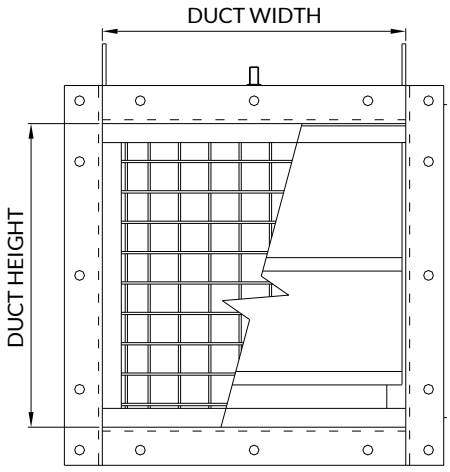
Please Note, these dampers are manufactured from 304L or 316L Stainless Steel only.



Section



End Elevation



Elevation

Specification

Casing

The damper casing is formed from 3.0 mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Damper Units in excess of 1500 mm width or height shall be manufactured as a multiple assembly. Where circular dampers or dampers with width or height dimensions less than 300 mm are required, additional spigot adaptors are used which increase the damper insertion length from 500 to 600 mm.

Blades

The blades are a formed single-skin of 3 mm sheet metal with lips formed at the leading and trailing edges. This lip strengthens the blades and additionally provides a measure of protection from direct weather/storm impingement. in the closed position the blades 'lipped edges' clip together and engage with the top and bottom duct stops to form a seal.

Shafts

Blade shafts are of the stub type design. Each shaft has a machined flat at their inner end for direct attachment to the blade, and is secured with two locked bolts. Shafts at the drive side are linked to transmit motion to the other blades.

Bearings & Housings

Bearing housings are continuously welded to the drive side (control enclosure end) and non-drive side (idle end) frame members. Each bearing housing carries a Zeron duplex stainless steel bearing bush with a thrust face. The Zeron bushes are highly resistant to sea water corrosion and form a non-galling pair with the stainless steel shaft.

Operation

The blast damper blade is designed to close by the blast pressure present in the duct and and aided by gravity. The blades are normally secured in the 'open' position by the tension of the Flamgard blast catch which can be adjusted to release the damper blades from the open position for various explosion pressures, thus shutting down the duct and and protecting the system.

When in the 'open' position the blade is held at 45° by a cam and roller mechanism, which breaks under explosive pressure. The blade remain closed until the torque is applied to the external reset shaft of the damper which will then manually reset the blades.

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Flamgard-Calidair Type BLD-02 Medium Pressure Blast Damper

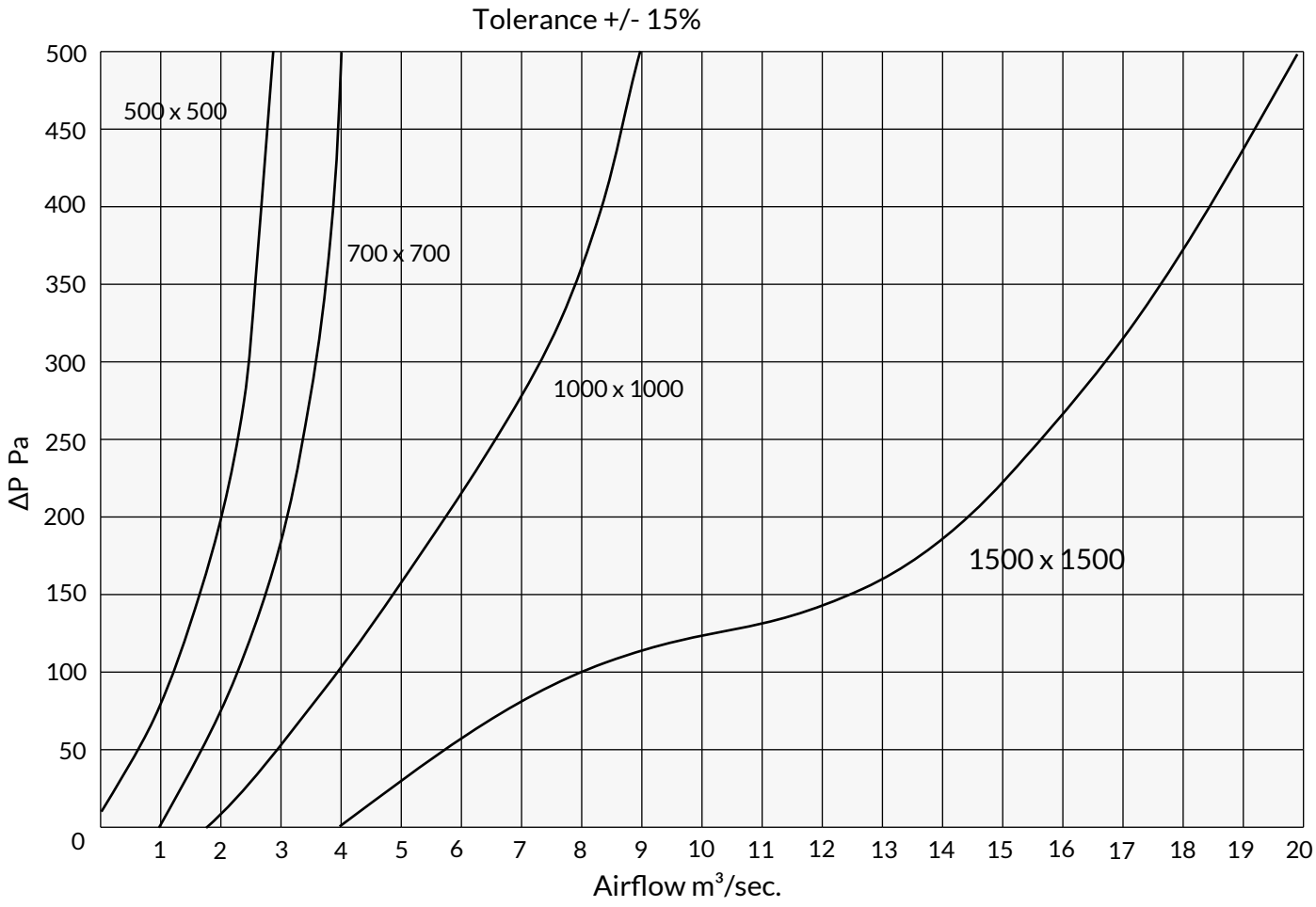
The Flamgard Calidair type BLD-02 medium pressure blast damper is of a parallel rotation, multi-blade design of exceptionally rigid construction which will withstand an explosion blast force of 0.45 barg. The damper has been designed to meet the highest specification of ventilation control equipment required for today's HVAC industry.

A single BLD-01 unit utilises both single and multi-blade designs in providing a duct height range of 300mm to 1500mm, together with a maximum width of 3000mm. Duct sizes larger than those given are manufactured as multiple assemblies.

The following pressure drop figures are for initial guidance only. Please consult the Flamgard Calidair Technical Department for individual project requirements.

The following figures were measured at ambient temperature (20°C) and calculated using the industry standard Air density of 1.2 kg/m³ at this temperature.

Open Pressure Drop Characteristic Curves



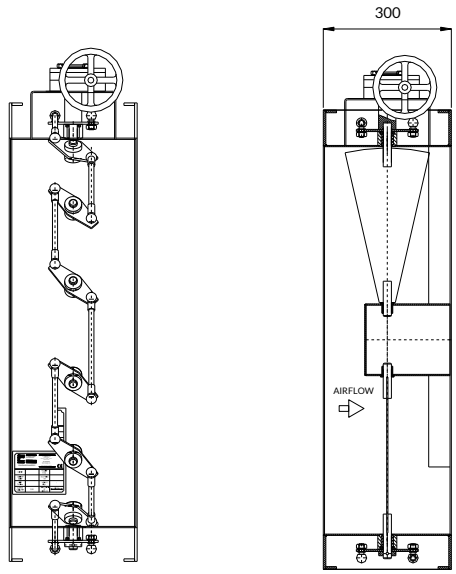
Inlet Vane Control Damper
CVC-01

Description

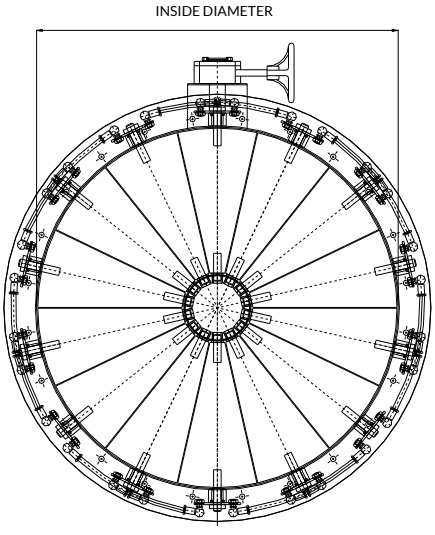
The type CVC-01 inlet vane control damper has been designed for mounting onto the inlet flanges of centrifugal fans.

To ease installation these dampers can be supplied with pre-mounted controls.

These dampers are also suitable for operation up to 150°C.



End Elevation | Section



Elevation

Specification

Casing
The damper casing is formed from 3.0 mm thick sheet steel into a drum section with flat bar or angle flanges. The damper insertion length is 300 mm and the range of diameters is from Ø300 mm to Ø2000mm

Blades
The blades are a formed single-skin plate of 3.0 mm sheet metal which operate by rotating radially to allow the flow of air into the fan inlet in the direction of rotation to increase the efficiency of the fan.

Shafts
Stub Ø 19.05 mm with blades welded at each end.

Linkage
Radial action linkage consisting of drive levers and bosses connected by flat bar link bars, driven through stainless steel ball joints. All linkage is contained within the depth of the damper casing.

Bearings
Phosphor bronze self lubricated 'Oilite' flanged bushes.

Operation
Manual Reset Mechanism, Pneumatic Actuator, Electric Actuator, Solenoid Release.

Options

- Materials can be stainless steel, galvanized mild steel or other materials to suit the clients' specific requirements.
- Earth continuity bosses.
- Lifting lugs.
- Integral or removable enclosures for housing control equipment.
- High temperature bearings.
- Shaft seals to provide airtight casings.
- Other variations to suit clients' specific requirements are also available.

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How Inlet Vane Control Dampers affect the fan performance

Inlet Vane Control Dampers are used when it is necessary to move the air entering the venturi of a centrifugal fan in the same direction as the rotation of the impeller.

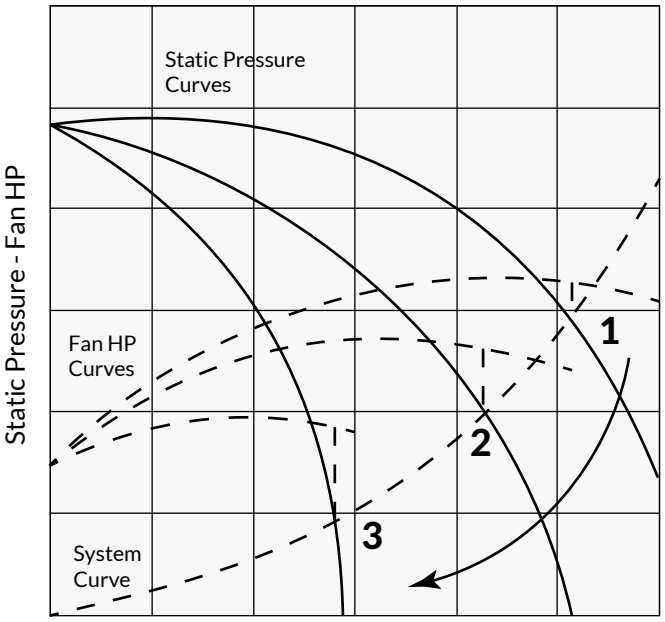
This allows the air entering the fan to increase its efficiency by reducing its energy requirements and consequently the running costs.

The damper rotations are normally viewed from the air inlet side of the fan and can be either clockwise or anti-clockwise.

Conversely the rotation of the fan impeller is normally viewed from the drive side, not the air inlet side, and will be the opposite of the damper. If the wrong orientation of the damper is applied there will be an increase in the pressure and energy requirement levels.

A gasket between the joining flanges must be suitable for the duty of the fan. (i.e. Temperature, pressure and contaminants)

Care must also be taken to ensure that the information Stated in the enquiry documents stipulate the correct direction of rotation of the impeller as the wrong direction of radial rotation of damper blades will affect the efficiency of the fan.



Centrifugal Fan fitted with Inlet Vane Control

Centrifugal fans fitted with inlet vane control dampers will display different characteristics depending upon the radial position of the blades. As the blade rotates between open and closed the operation of the system will create new operating points designated as 1, 2 & 3 on the graph shown on the left. Point 1 being fully open and 3 being fully closed. The static pressure and the fan horsepower will alter according to the blade position. The graph displays that the more the damper blades are closed, the less the airflow and consequently the lower the horsepower will be reducing the power requirements of the fan.

High Temperature Tunnel & Metro Damper
CFD-02T

Description

The type CFD-02T High Temperature Tunnel Damper has been designed for bolting directly onto walls and floors or bolting or welding to steel support frames. The damper has been successfully tested and operated up to 400ºC for 2 hours. To ease installation these dampers can be supplied with pre-drilled flanges and mounting frames.

When any damper projects are initially proposed it is imperative that all relevant technical data is available for the purpose of quoting the correct equipment.

The following information will be required:

i Volume air flow in m/s
ii Maximum temperature in ºC
iii Electrical supply if applicable
iv Pneumatic supply if applicable
v Static pressure in pascals
vi Expected leakage in m/s
vii Expected damper free area in m

Specification

Casing

The damper casing is formed from 3.0mm thick sheet steel into a rigid channel section to ensure proper alignment of blades and shafts. Damper units in excess of 1275mm width or height shall be manufactured as a multiple assembly. Where circular dampers or dampers with width or height dimensions less than 150mm are required.

Additional spigot adaptors are used which increase the damper insertion length from 300 to 400mm.

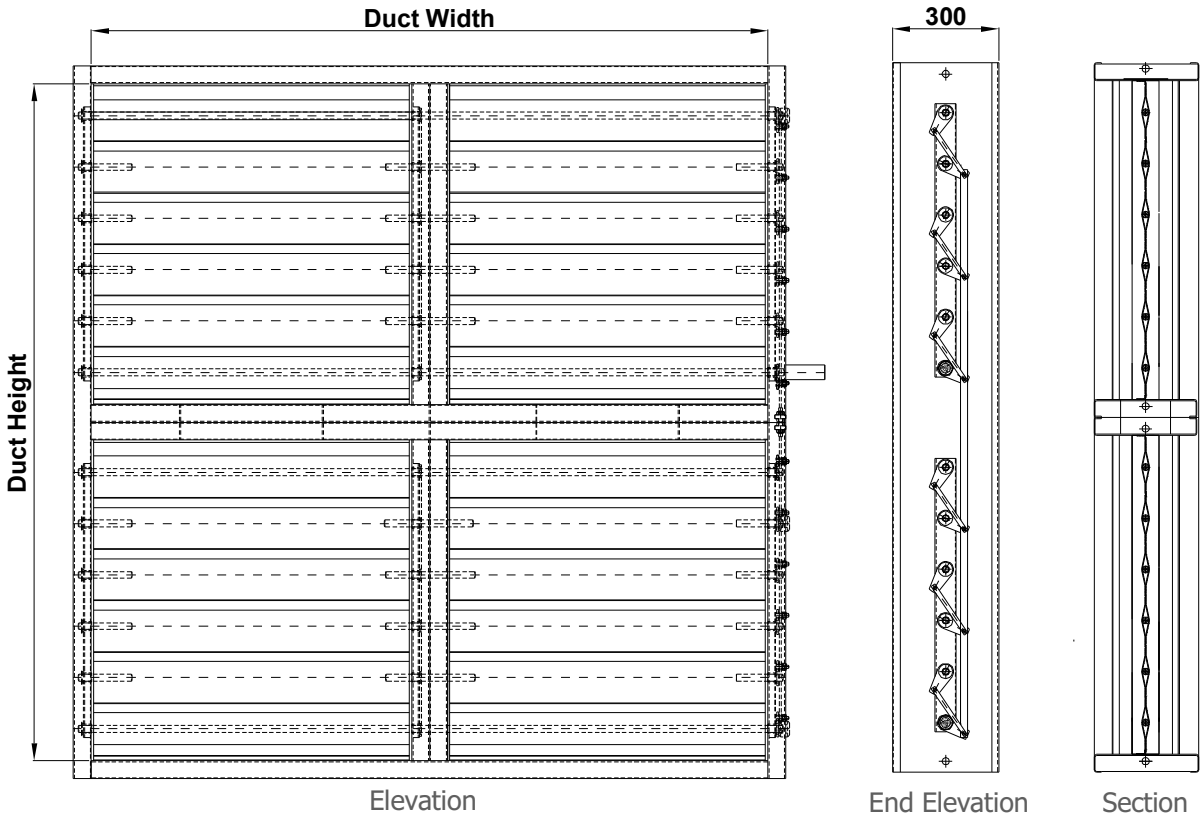
Blades

The blades are a formed double-skin aerofoil section of 2.0mm sheet metal.

Blade stops at the top and bottom of the casing and sprung side seals provide excellent low leakage characteristics.

Shafts

Stub shafts 19.05mm with stub type intermediate shafts and continuous drive shafts. The blades are plug welded at each end.



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Installation & Assembly

Linkage

Opposed or parallel action linkage consisting of drive levers connected by flat bar link bars, driven through stainless steel pins. All linkage is contained within the depth of the damper casing.

Bearings

Phosphor bronze self lubricated 'Oilite' flanged pneumatic or manual gearbox.

Options

Materials can be stainless steel, galvanized mild steel or other materials to suit the clients' specific requirements.

Other variations to suit clients' specific requirements are also available.

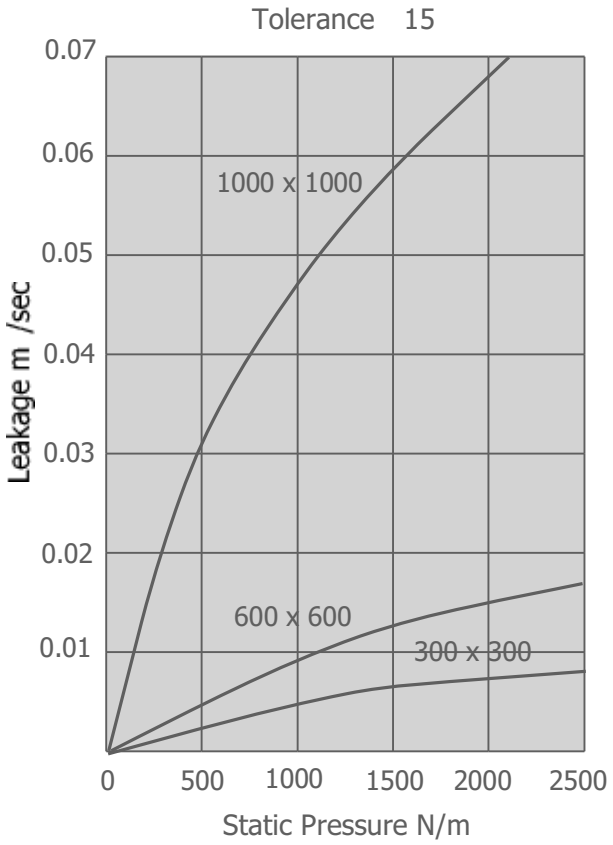
Installation and assembly

Larger dampers can be constructed by joining multiple assemblies together.

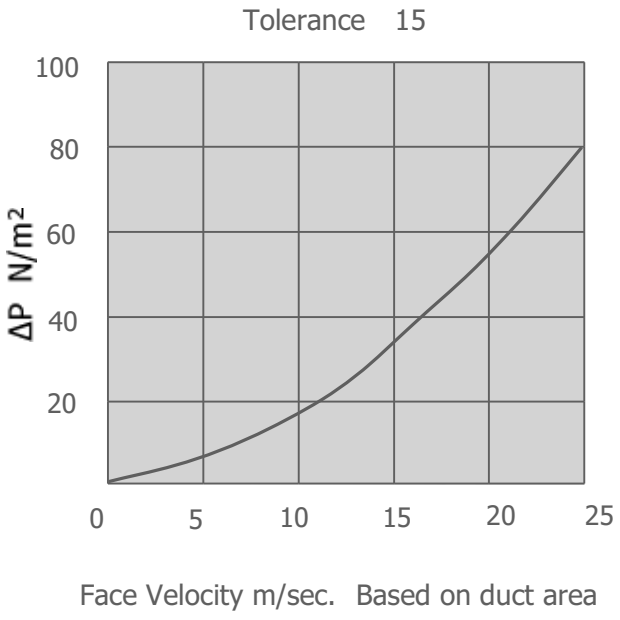
An approved fire-resistant sealant should be inserted between the damper and duct to ensure a good seal.

Each section shall have a drive spindle which can be linked together externally or driven independently.

LEAKAGE CHARACTERISTIC CURVE



OPEN PRESSURE DROP CHARACTERISTIC CURVE



Bespoke Special Dampers & Associated Equipment

All of Flamgard Calidair's dampers and controls are manufactured to order, and tailored to suit the specific needs of the customer. Our skills in design, modelling, testing and manufacture mean we can design and build bespoke dampers for any application, and our production has been shipped and installed worldwide.

We can also supply all necessary supporting infrastructure including spigots and adaptors, and structural supporting frames to hold damper assemblies. Should surveys or testing be required, we have fully trained and certified teams available to carry out site visits onshore or offshore, around the globe.

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Adaptor Plates

Description

Adaptor plates are used where the damper unit is to be attached to ductwork flanges where space to fit the unit is limited.

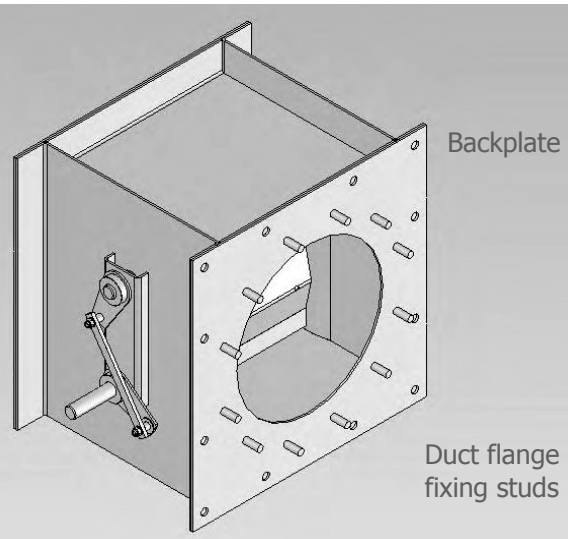
The damper width and height should be increased to accommodate the duct flange size to avoid interfering with bolts attaching the adaptor plate to the damper casing.

The adaptor plates are normally 3 mm thick which has the effect of increasing the damper insertion depth to 306 mm on a 300 mm deep damper and similarly to 206 mm deep on a 200 mm deep damper.

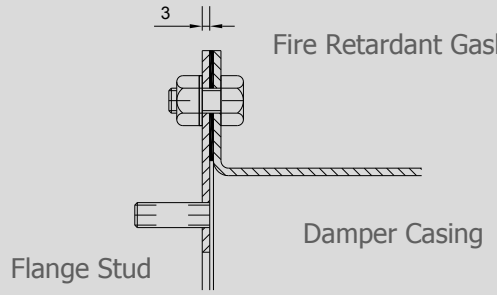
A fire retardant gasket must be inserted between the damper casing and the adaptor plate to ensure that no leakage through the joint occurs.

The flanged spigots can be manufactured in Grades 316 and 304 Stainless Steel and Mill Galvanised Mild Steel. Where Mill Galvanised Mild Steel is used all welds and cut edges are treated with two coats of zinc rich paint after manufacture.

The adaptor plate thickness can be to the Flamgard Calidair standard 3mm or to the clients special plate details.



Adaptor Plate Assembly



Typical Section Through Spigot Joint

Flanged Spigots

Description

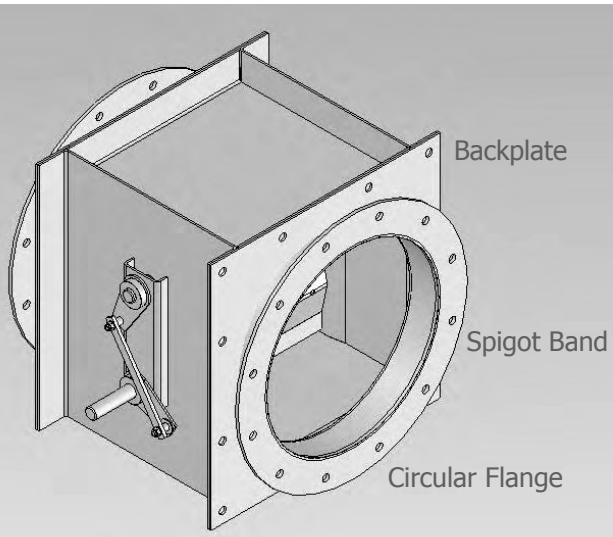
Flanged spigots are used where the damper unit is to be attached to circular ductwork or ductwork of sizes below that of the certified parameters.

The flanged spigots are 50 mm wide which has the effect of increasing the damper insertion depth to 400 mm on a 300 mm deep damper and similarly to 300 mm deep on a 200 mm deep damper.

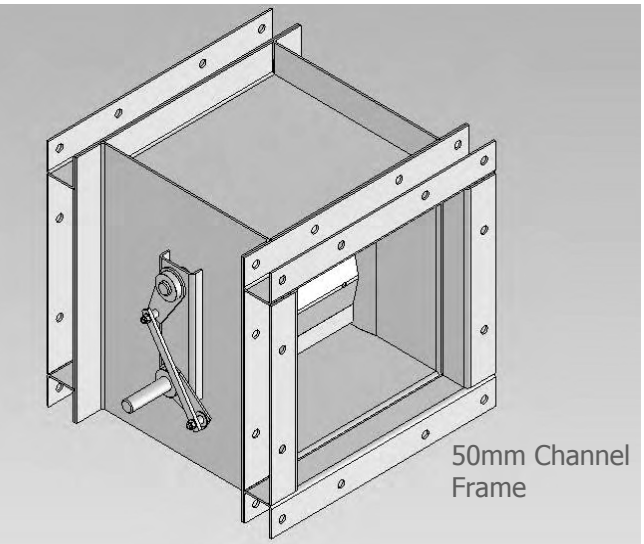
A fire retardant gasket must be inserted between the damper casing and the spigot connection to ensure that no leakage through the joint occurs.

The flanged spigots can be manufactured in Grades 316 and 304 Stainless Steel and Mill Galvanised Mild Steel. Where Mill Galvanised Mild Steel is used all welds and cut edges are treated with two coats of zinc rich paint after manufacture.

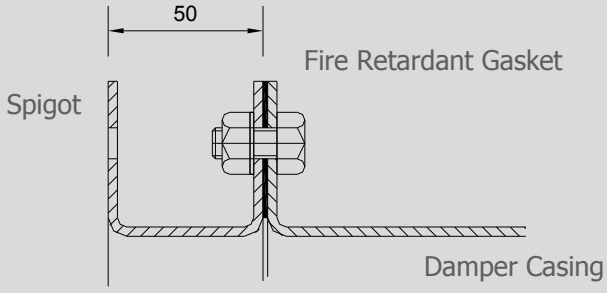
The flange sizes and hole pattern can be to the Flamgard Calidair standard pitching or to the clients special drilling details.



Circular Flanged Spigot Assembly



Square Flanged Spigot Assembly



Typical Section Through Spigot Joint

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Plain Spigots

Description

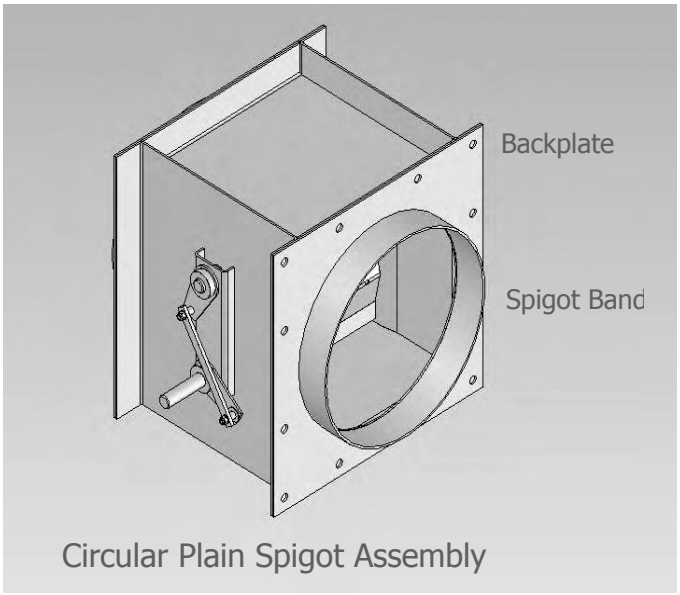
Plain spigots are used where the damper unit is to be attached to spiral, circular or ductwork of sizes below that of the certified parameters.

The plain spigots are 50 mm wide which has the effect of increasing the damper insertion depth to 400 mm on a 300 mm deep damper and similarly to 300 mm deep on a 200 mm deep damper.

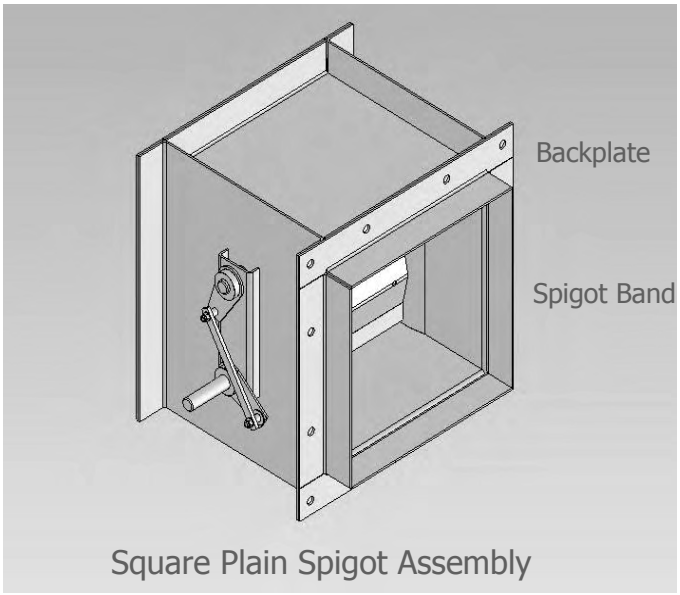
A fire retardant gasket must be inserted between the damper casing and the spigot connection to ensure that no leakage through the joint occurs.

The flanged spigots can be manufactured in Grades 316 and 304 Stainless Steel and Mill Galvanised Mild Steel. Where Mill Galvanised Mild Steel is used all welds and cut edges are treated with two coats of zinc rich paint after manufacture.

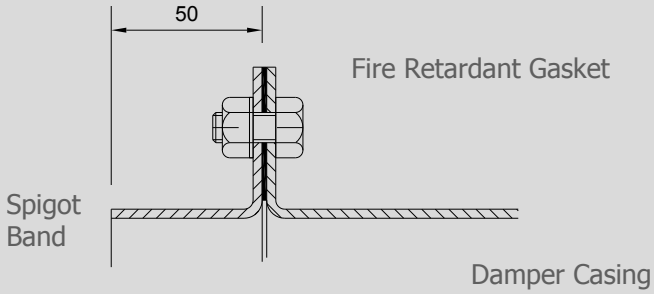
The spigot band sizes can be to the Flamgard Calidair standard 50mm or to the clients special band details.



Circular Plain Spigot Assembly



Square Plain Spigot Assembly



Typical Section Through Spigot Joint

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