Fire & Gas Dampers

Introduction

Fire & Gas Dampers are used in ventilation systems to prevent the spread of flame and/or smoke between divisions.

Wozair manufacture three types of Fire & Gas Damper depending on the application and specification. All dampers have been independently tested and have third party certification.

Each type of Fire & Gas Damper can be supplied in stainless steel grades 304L (1.4307), 316L (1.4404) and (1.4432) Mo>2.5% or carbon steel and can be provided with numerous control systems including pneumatic, electric and manual latch operation.

All dampers can be supplied to suit rectangular or circular ducts.


DET NORSKE VERITAS
TYPE APPROVAL CERTIFICATE


CERTIFICATE OF TYPE APPROVAL

FIRE DAMPERS


CERTIFICATE OF FIRE APPROVAL

Authority/Certification

FGD

The damper has been subject to a 2 hour Hydrocarbon fire test and is certified by Lloyds Register of Shipping, Det Norske Veritas ABS and Bureau Veritas for use in 'H-0'–'H-120' Bulkhead and Deck Divisions with the ducting suitably insulated.

MFD

The damper has been fully tested to the SOLAS Rules/FTP Code Resolution A754(18) together with its relevant means of operation and also BS476 Pt20 for 4 hours. The damper is certified by Lloyds Register of Shipping and carries the MED/MRA mark of conformity. The damper is suitable for use in 'A-0'–'A-60' Bulkhead and Deck Divisions with the ducting suitably insulated. For smoke clearance the damper is certified at 300°C for 1 hour for high temperature operation. The damper is also type approved by DNV, BV, ABS, GL and USCG under the Marine Equipment Directive/Mutual Recognition Agreement.

LFD

The damper has been fully tested to the SOLAS Rules/FTP Code Resolution A754(18) together with its relevant means of operation and also BS476 Pt20 for 4 hours. The damper is certified by Lloyds Register of Shipping and carries the MED/MRA mark of conformity. The damper is suitable for use in 'A-0'–'A-60' Bulkhead and Deck Divisions with the ducting suitably insulated. The damper is also type approved by DNV, BV, ABS, GL and USCG under the Marine Equipment Directive/Mutual Recognition Agreement.

Fire Ratings and Approvals

Offshore and Marine Fire Divisions are normally classified as 'A' or 'B' which relate to temperature limits that must be adhered to on the non-fire side of the division. The divisions are insulated within dimensional parameters defined in SOLAS Rules, to reduce the temperature rise to safe limits for a period of 60 minutes over both the damper case and the surface of the insulation. Where a fire damper is installed within the duct length as defined in SOLAS Rules then these safe temperature limits must be maintained, as the damper is a metal structure then the only way to control and limit temperature rise is to insulate to the same standard as the surrounding ductwork. The temperature rise being measured over the external surface of the insulation.

Installations:

Typical installation and insulation details are included in the Lloyds Certification. However, where dampers are to be installed within the dimensional parameters defined in SOLAS Rules, the following applies:

Class 'B' – For a damper to pass a class 'B' approval, it must maintain its integrity and resist the passage of flame for a period of greater than 30 minutes, the temperature rise on the external surface of the damper must not rise higher than 140°C above ambient during the time period nor should the temperature at any point on the insulation rise more than 225°C during the same time period.

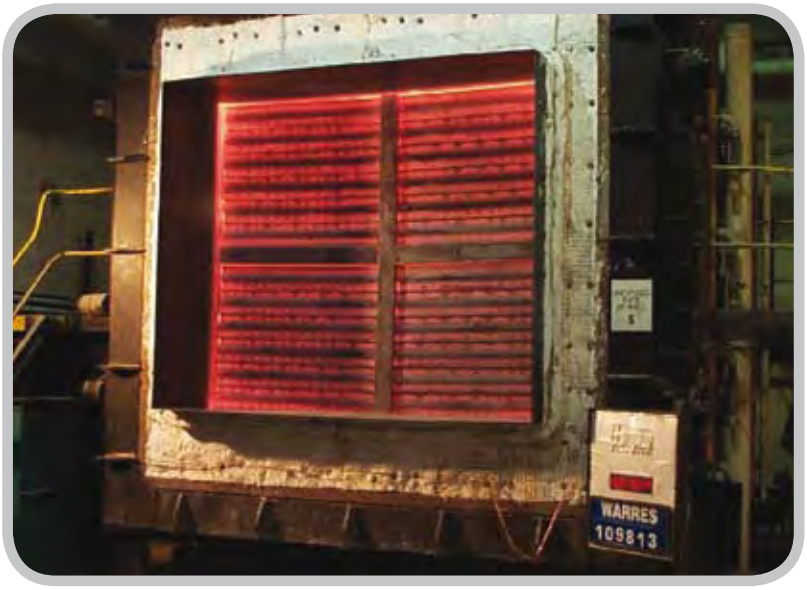
Class 'A' – Classification is common for Offshore applications: Fire Dampers rated for 'A-0' class divisions are required to pass a 1 hour fire test. Fire dampers for 'A-60' divisions must maintain integrity and resist the passage of flame for a period of greater than 60 minutes, the temperature rise on the external surface of the damper must not rise higher than 140°C above ambient during the time period nor should the temperature at any point on the insulation rise more than 180°C during the same time period.

Wozair Fire Dampers fulfil these requirements when suitably insulated.

Class 'H-0'–'H-120' Fire Divisions – Wozair FGD Fire Dampers have been tested and approved to meet this standard which involves a 2 hour fire test to the hydrocarbon temperature curve.

It must be clearly understood that a Fire Damper can only carry an 'A-0' or 'H-0' classification by itself and on installation with suitable insulation (by others) the higher classification will be achieved.

Enclosures can be pre-insulated where required. Approval for installation must be gained from the appropriate certifying authority.



Marine Equipment Directive/Mutual **Recognition Agreement (MED/MRA)**

Marine Equipment Directive-96/98/EC(MED) and amending directives

The Marine Equipment Directive 96/98/EC(MED) as amended by directive 98/95/EC came into force on January 1st 1999 and covers the safety aspects of equipment (such as Fire Dampers for Fire Protection) carried on ships registered under the flags of the European Union Member States.

Recognition by the United States of America/USCG came into force in July 2004 under the EU-US Mutual Recognition Agreement of Marine Equipment.

The Directive has been a mandatory requirement since January 1st 2001.

For Marine vessels registered to an EU member state, Wozair Fire and Gas Dampers type MFD and LFD carry the Marine Equipment Directive/Mutual Recognition Agreement (MED/MRA) Wheelmark in conformity with Modules B and D.

FGD Fire and Gas Damper

Typical Applications

Heavy duty, aggressive process environments where integrity, strength and corrosion resistance are of primary importance.

Description

'A-0'–'A-60' and 'H-0'–'H-120' Deck and Bulkhead Applications

Casing

The 300mm deep frame is formed into rigid channel sections that are fully welded, sheet steel thickness range from 3-10mm. Damper over 1200mm wide have welded vertical mullions and dampers over 1200mm high have horizontal transoms. Flange drillings are in accordance with the Wozair standard or to specific client requirements. Where it is difficult to access the bolt holes behind the control enclosure, welded nuts will be provided. Casings are provided with 20mm diameter lifting holes as standard.

Dampers smaller than 150mm or required for circular connection are supplied with either 3mm thick studded transition plates stitch welded to each side or circular spigots 50mm deep. This increases the insertion depth by either 6 or 100mm.

Blades

The blades are double skin aerofoil type manufactured from 1.5mm thick stainless steel sheet and are synergically plug welded to 19mm diameter continuous shafts. Blade shafts rotate in high temperature, oil impregnated, sintered bronze bearings, fitted into welded housings. Other bearing options are available.

For nuclear applications where the casing penetrations need to be sealed, lip seal bearings are fitted into the bearing housing on the drive side. Blind bearing bosses are fitted on the non-drive side. Refer to catalogue section 7.

Linkage

Dampers over 300mm high have multiple blades that are linked together to provide opposed motion. Robust blade links are welded to the drive shafts and connected together by flat bar and stainless steel pins. The linkage arrangement is contained within the flanges of the damper frame.

The drive shaft is extended and fitted with a welded precision machined boss for connection to the actuating mechanism.

As an option, particularly for nuclear applications, removable linkages can be specified whereby the blade links are welded to bosses that are securely pinned to the shafts.

Removable linkage cover plates are fitted where requested.

Seals

Tight air shut off is achieved by precision roll formed sprung stainless steel grade 316L (1.4404) side seals and welded top and bottom angle blade stops.

Controls for Operation

Pneumatic Actuator, Electric Actuator, Temperature Sensitive Trigger, Manual Spring Release, Latching Mechanism. For full details see Control Section.

Options

Materials: Stainless Steel 304L (1.4307), 316L (1.4404) and (1.4432) Mo>2.5% or Galvanised Mild Steel Frames
Bearings: Roller or ball race
Earth Continuity Bosses
Lifting Lugs
Pre-insulated controls enclosure
Client specific requirements

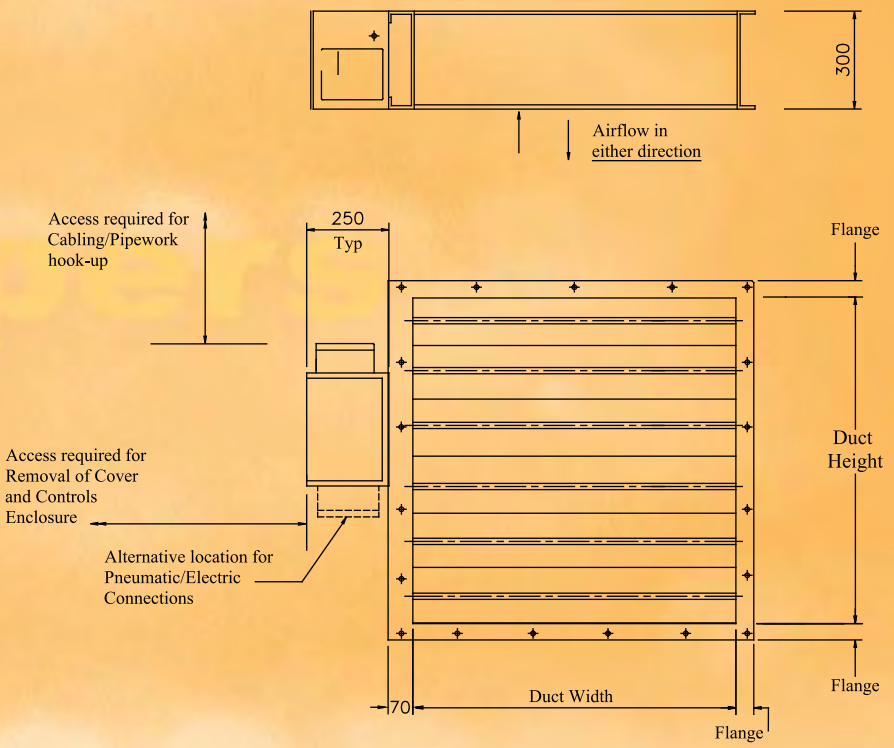
Leakage Rates

Fire and Gas dampers are designed to minimise leakage. Extensive testing on standard production single module dampers (max 1200x1200mm) has proven a maximum leakage rate of 0.060 $m^3/sec/m^2$ at a differential pressure of 2000Pa. Damper leakage meets the requirements of NORSOK and EN 1751 Class 2. The leakage rate on multi-module dampers will be higher, 0.080 $m^3/sec/m^2$ at 2000Pa for a 2 module damper and 0.100 $m^3/sec/m^2$ at 2000Pa for a 4 module damper. However, if lower leakage rates are required as a special requirement, please consult our engineering department.

Dimensional Limits

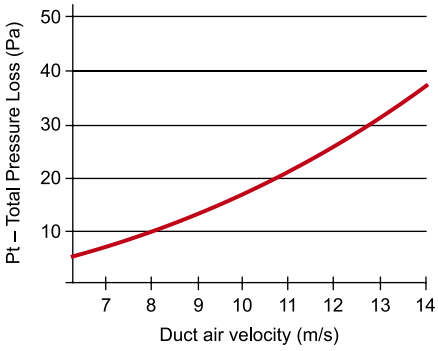
The minimum damper size is 150mm wide x 150mm high. The maximum single module size is 1200mm wide x 1200mm high. For larger sizes the addition of mullions and transoms allow a maximum size of 3950mm wide x 2500mm high for a single piece damper.

Larger sizes are subject to case by case approval by the certifying authority.



Performance

Full aerodynamic performance data is presented below and is based on tests concluded.



Total Pressure Loss (Pt)

This is the difference in pressure measured across the fire damper, when the blades are fully open.

Ordering

Quantities, control requirements and other special requirements to be stated separately.

Type **FGD**	Duct Width 500W
Material 316L	**Duct Height** 300H
Case Thickness 3.0	Case Depth 300D
Type Wozair:	High Integrity Fire and Gas Damper

Case Material:
Stainless Steel
Low Carbon 1.4307 (SS304L) = 304L
Low Carbon 1.4404 (SS316L) = 316L
Mo>2.5% 1.4432 (SS316L) = 316L

Mild Steel Sheet
Pre-Galvanised FeP02 nac = GSS
Galvanised after Manufacture = GAM

Case Thickness: 3-10 mm upwards

Nominal Duct Size: Clear inside duct dimensions 'Quote' (Width x Height)

Order Code Example:
FGD/316L/3.0/500W/300H/300D

MFD Fire and Gas Damper

Typical Applications

Oil and Gas, Marine, Nuclear, Process and General Ventilation Systems.

Description

'A-0'–'A-60' Deck and Bulkhead Applications

Casing

The damper frame is formed from sheet steel into rigid channel sections that are either fully welded or welded and riveted together. Dampers over 1200mm wide have welded vertical mullions and dampers over 1200mm high have horizontal transoms. Flange drillings are in accordance with Wozair's standard or to specific client requirements. Where it is difficult to access the bolt holes behind the control enclosure, welded nuts will be provided. Casings are provided with 20mm diameter lifting holes as standard.

For circular ducts, mounting transition pieces are supplied with either case thickness transition plates stitch welded to each side of the damper or circular spigots 50mm deep. This increases the insertion depth by twice the case thickness or 100mm.

Blades

The blades are double skin aerofoil type from minimum 1.2mm thick steel and are plug welded or bolted to 19mm diameter solid shafts. Blade shafts rotate in high temperature, oil impregnated, sintered bronze bearings, fitted into the damper frame. For nuclear applications, where the casing penetrations need to be sealed, lip seal bearings are fitted into a bearing housing on the drive side. Blind bearing bosses are fitted on the non-drive side.

Linkage

Dampers with multiple blades that are fitted with a linkage to provide an opposed motion. Robust blade links are welded to the drive shafts and connected together by flat bar and stainless steel pins. The linkage arrangement is contained within the flanges of the damper frame.

The drive shaft is extended and fitted with a welded precision machined boss for connection to the actuating mechanism. As an option, particularly for nuclear applications, removable linkages can be specified whereby the blade links are welded to bosses that are securely pinned to the shafts.

Removable linkage cover plates are fitted where required.

Seals

Tight air shut off is achieved by precision roll formed sprung stainless steel grade 316L (1.4404) side seals and welded top and bottom angle blade stops.

Controls for Operation

Manual Spring Release, Latching Mechanism, Pneumatic Actuator, Electric Actuator, Temperature Sensitive Trigger. For full details see Control Section.

Options

Materials: Stainless Steel 304L (1.4307), 316L (1.4404) and (1.4432) Mo>2.5% or Galvanised Mild Steel
Frames in a range of thickness from 2-10mm
Case depth: 200-300mm
Removable linkage
Continuous blade shafts
Bearings: Roller or ball race
Earth Continuity Bosses
Lifting Lugs
Pre-insulated controls enclosure
Client specific requirements

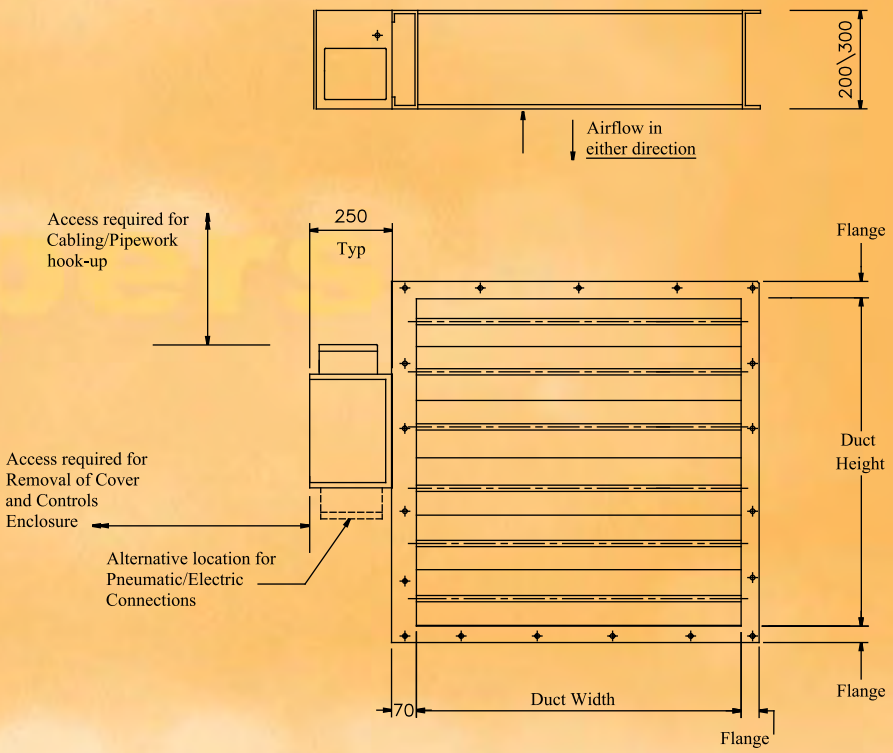
Leakage Rates

Fire and Gas dampers are designed to minimise leakage. Extensive testing on standard production single module dampers (max 1200x1200mm) has proven a minimum leakage rate of 0.060 $m^3/sec/m^2$ at a differential pressure of 2000Pa. Damper leakage meets the requirements of NORSOK and EN 1751 Class 2. The leakage rate on multi-module dampers will be higher, 0.080 $m^3/sec/m^2$ at 2000Pa for a 2 module damper and 0.100 $m^3/sec/m^2$ at 2000Pa for a 4 module damper. However, if lower leakage rates are required as a special requirement, please consult our engineering department.

Dimensional Limits

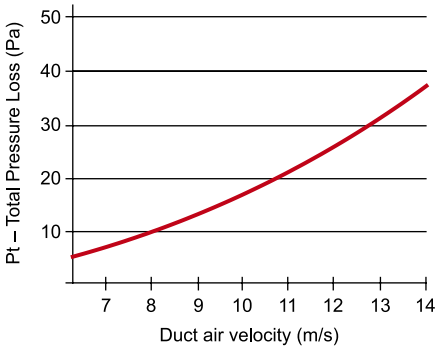
Bulk Head Applications: The minimum size is 100mm wide x 100mm high. The maximum single module size is 1200mm wide x 1200mm high. For larger sizes the addition of mullions and transoms allow a maximum size of 2500mm wide x 2100mm high.

Deck Application: The minimum size is 100mm wide x 100mm high. The maximum single module size is 1200mm wide x 1200mm high. For larger sizes the addition of a mullion allows a maximum size of 2500mm wide x 1000mm high for a single piece damper. Larger sizes are subject to case by case approval by the certifying authority.



Performance

Full aerodynamic performance data is presented below and is based on tests conducted.



Total Press Loss (Pt)

This is the difference in pressure measured across the damper, when the blades are in the fully open position.

Ordering

Quantities, control requirements and other special requirements to be stated separately.

Type **MFD**	Duct Width 500W
Material 316L	**Duct Height** 300H
Case Thickness 2.0	Case Depth 200D
Type Wozair:	High Integrity Fire and Gas Damper

Case Material:
Stainless Steel
Low Carbon 1.4307 (SS304L) = 304L
Low Carbon 1.4404 (SS316L) = 316L
Mo>2.5% 1.4432 (SS316L) = 316L

Mild Steel Sheet
Pre-Galvanised FeP02 nac = GSS
Galvanised after Manufacture = GAM

Case Thickness: 2-10mm

Nominal Duct Size: Clear inside duct dimensions 'Quote' (Width x Height)

Order Code Example:
MFD/316L/2.0/500W/300H/200D

LFD Fire and Gas Damper

Typical Applications

Marine, Process and DW144 General Ventilation Systems.

Description

'A-0'–'A-60' Deck and Bulkhead Applications

Casing
The damper frame is a welded and riveted construction with integral 50mm folded flanges from 1.5mm thick steel. The drive side casing section is provided with a return flange to facilitate the mounting of the actuator bracket. For dampers to be connected to circular ductwork, transition plates with 20mm spigot connectors are provided.

Blades
Single skin 1.5mm thick steel interlocking blades are securely riveted to continuous 19mm diameter tubular shafts. Shafts rotate in flared bearing holes within the damper case and are linked externally to provide a parallel motion. The drive shaft is extended for connection to the actuator.

Seals
Tight air shut off is achieved by precision roll formed sprung stainless steel grade 316L (1.4404) side seals and welded top and bottom angle blade stops.

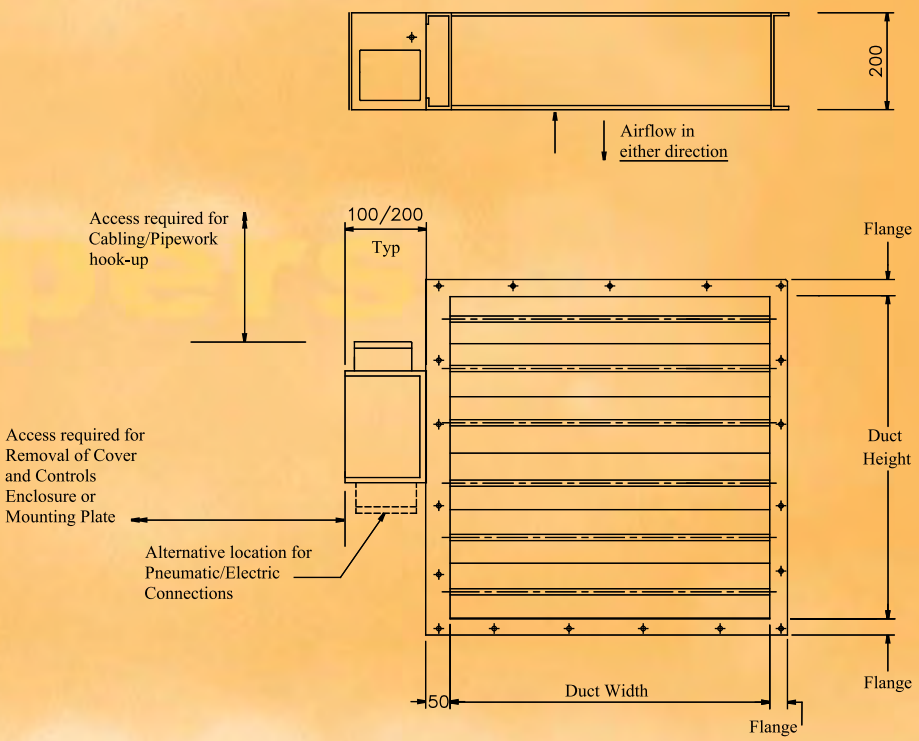
Controls for operation
Pneumatic Actuator
Electric Actuator
Temperature Sensitive Trigger
Manual Spring Release
Latching Mechanism
For full details see Control Section Page 11.

Options
Materials: Stainless or Galvanised Mild Steel Frames in a range of thickness (minimum 1.5mm)
Case depth: 150mm (Bulkhead only)
200mm (Deck & Bulkhead)
Earth Continuity Bosses
Lifting Lugs
Pre-insulated controls enclosure
Client specific requirements

Leakage rates
Fire and Gas dampers are designed to minimise leakage. Extensive testing on standard production single module dampers has proven a maximum leakage rate of 0.080 $m^3/sec/m^2$ at a differential pressure of 2000Pa.

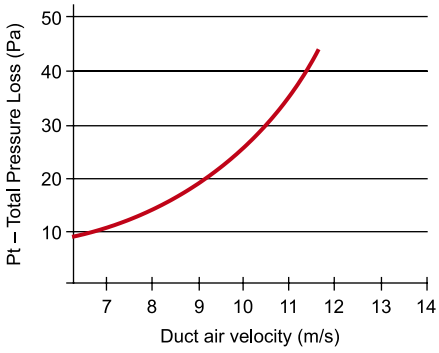
Dimensional Limits

The minimum damper size is 150mm wide x 150mm high. The maximum single module size is 800mm wide x 800mm high.



Performance

Full aerodynamic performance data is presented below and is based on tests conducted.



Total Press Loss (Pt)

This is the difference in pressure measured across the damper, when the blades are in the fully open position.

Ordering

Quantities, control requirements and other special requirements to be stated separately.

Type **LFD**	Duct Width 500W
Material 316L	**Duct Height** 300H
Case Thickness 1.5	Case Depth 200D
Type Wozair:	Light Duty Fire and Gas Damper

Case Material:
Stainless Steel

Low Carbon	1.4307 (SS304L) = 304L
Low Carbon	1.4404 (SS316L) = 316L
Mo>2.5%	1.4432 (SS316L) = 316L

Mild Steel Sheet

Pre-Galvanised	FeP02 nac = GSS

Case Thickness: 1.5mm

Nominal Duct Size:	Clear inside duct dimensions 'Quote' (Width x Height)

Order Code Example:
LFD/316L/1.5/500W/300H/200D