



# Flowseal Engineering (Pty) Ltd

## Company Profile

Flowseal Engineering, located in Wadeville Germiston, designs, manufactures and supplies Dampers, Expansion Joints, Valves, Explosion Panels and other related products.

Our Customers are Project Houses and Major Industrial Facilities such as Power Generators, Petro-chemical plants, Mines, Paper and Pulp producers, the Cement industry, Smelters and Steel Mills etc.

Although Flowseal is a relatively young company, the management team have been involved in the design, fabrication and marketing of their products and have a cumulative experience in the industry of over 80 years.

Flowseal has established a proud reputation in the market place, both locally and internationally, as a quality conscious supplier of customer specific products, and is ISO 9001 accredited.

Our design team is both experienced and innovative in their approach and in the range of products manufactured, and is backed up by a modern manufacturing facility of 1500 square metres of workshop space, equipped with a guillotine, 150 tonne press break, various rolling machines, lathes, milling machines, drilling machines, welding machines and manipulators, fabric and rubber manufacturing equipment etc.



# CERTIFICATE

## EN ISO 9001:2000



herewith certifies that the company

**FSE** **FLOWSEAL ENGINEERING** (PTY) LTD

**scope:**

Design, Manufacture and Supply of Valves, Dampers,  
Compensators and Explosion Panels

**location:**

95 Snapper Road, Wadeville, 1428  
P O Box 13142, Elspark, 1418  
South Africa

has implemented and maintains a quality management system according to the above mentioned standard (12/2000). The conformity was inspected during the certification audit documented in audit report No. EW03-04448.

Date of the first certification: 25.10.1999

This certificate is valid until: 16.04.2006

Date of the last recertification: 16.04.2003

Certificate-registration No.: 31099699/1  
duplicate

  
DEKRA-ITS Certification Services GmbH  
Stuttgart, 16.04.2003



Accredited by TGA  
in Deutschen Akkreditierungs Rat



Reg.Nr.: TGA-ZM-05-91-00



# Flowseal Engineering (Pty) Ltd

Flowseal Engineering (Pty) Ltd are specialists in the design and manufacture of isolation and control dampers, expansion joints, explosion panels and valves etc.

The following are an example of our extensive product range and field of expertise:



Metal Compensators



Fabric Compensators



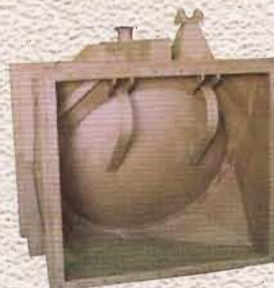
Louvre Dampers



Over/under/Swing Dampers



Explosion Panels



Dished Disc Dampers

## Product Range

- 1 Dampers
- 2 Gas Valves
- 3 Expansion Joints
- 4 Process Valves
- 5 Explosion Panels
- 6 Diverse Products



Dilution Dampers

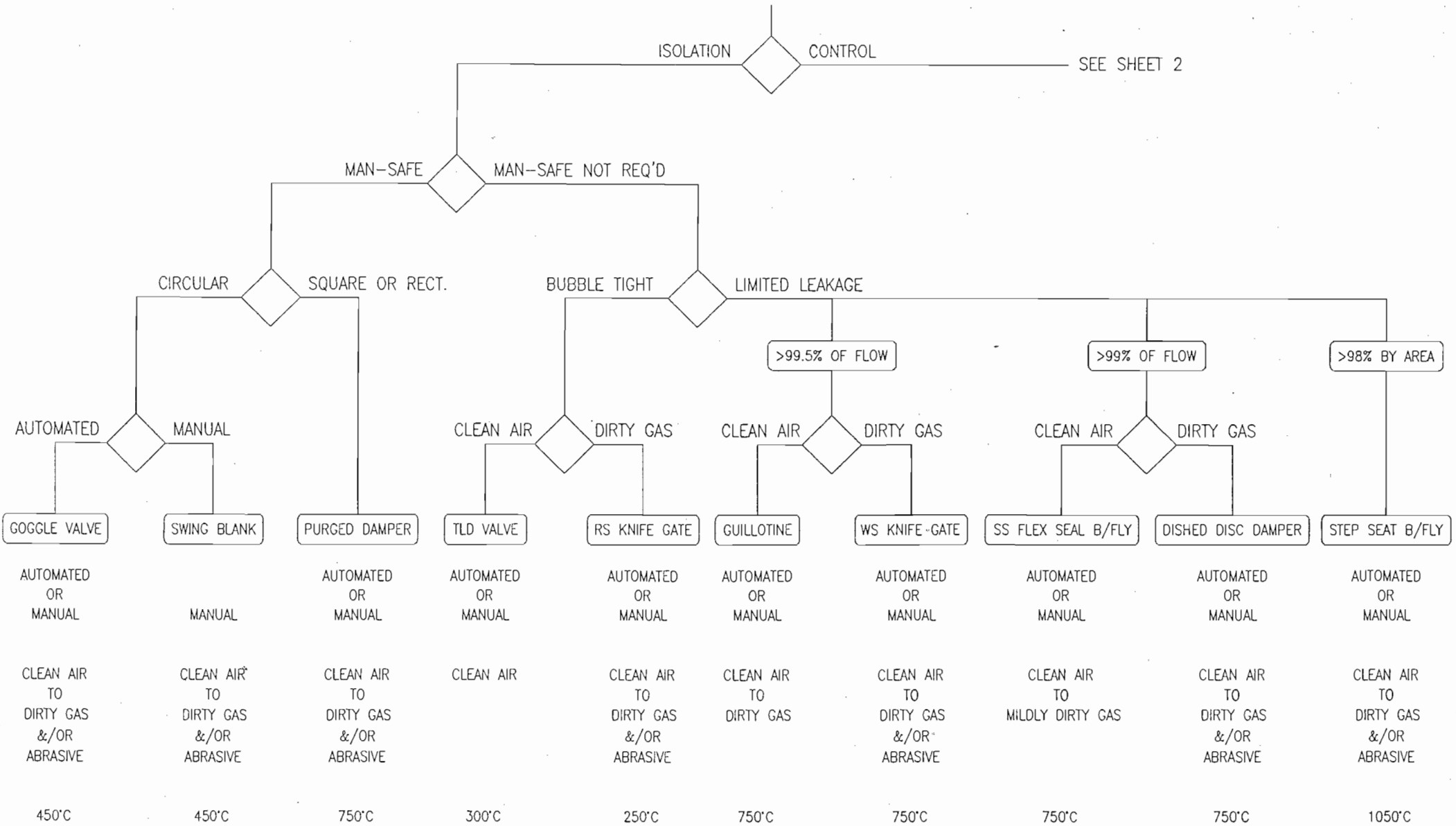


Radial Vane Control Dampers

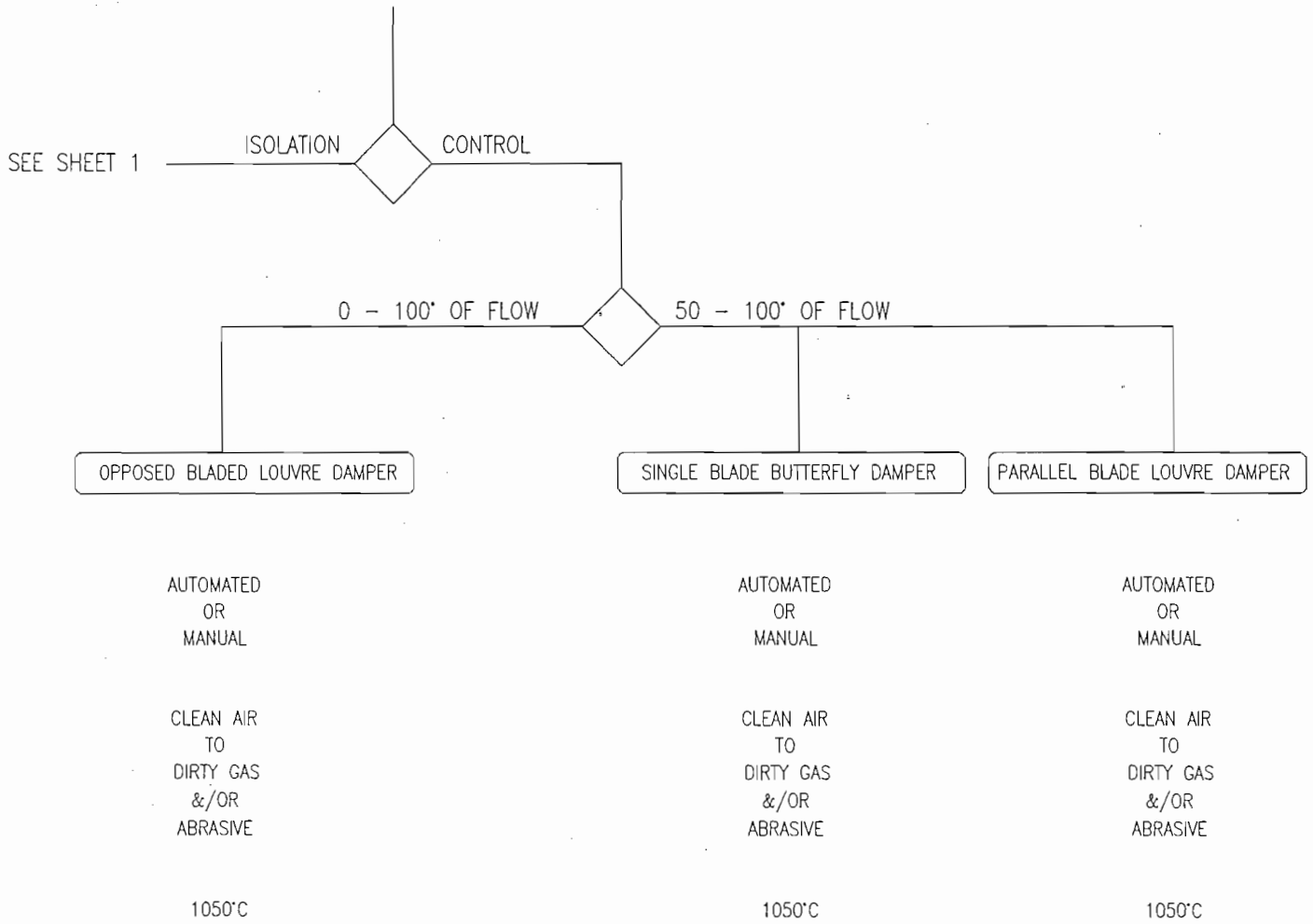


Knife Gate Dampers



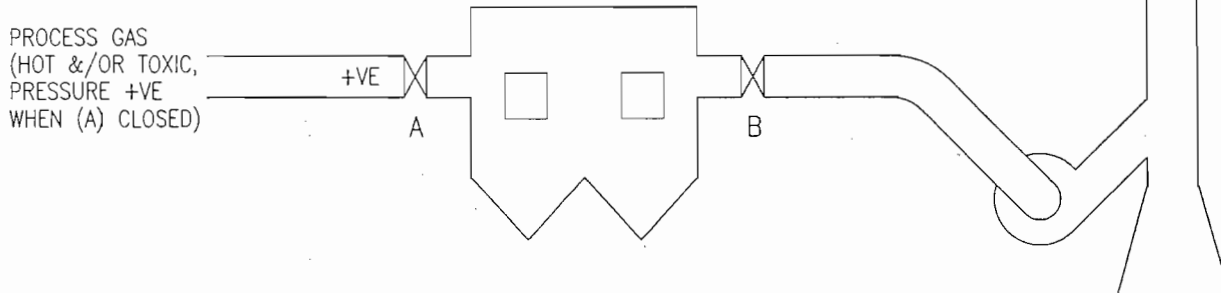


FOR CONDITIONS OUTSIDE OF THE ABOVE PARAMETERS, CONSULT FLOWSEAL FOR ADVISE



FOR CONDITIONS OUTSIDE OF THE ABOVE PARAMETERS, CONSULT FLOWSEAL FOR ADVISE

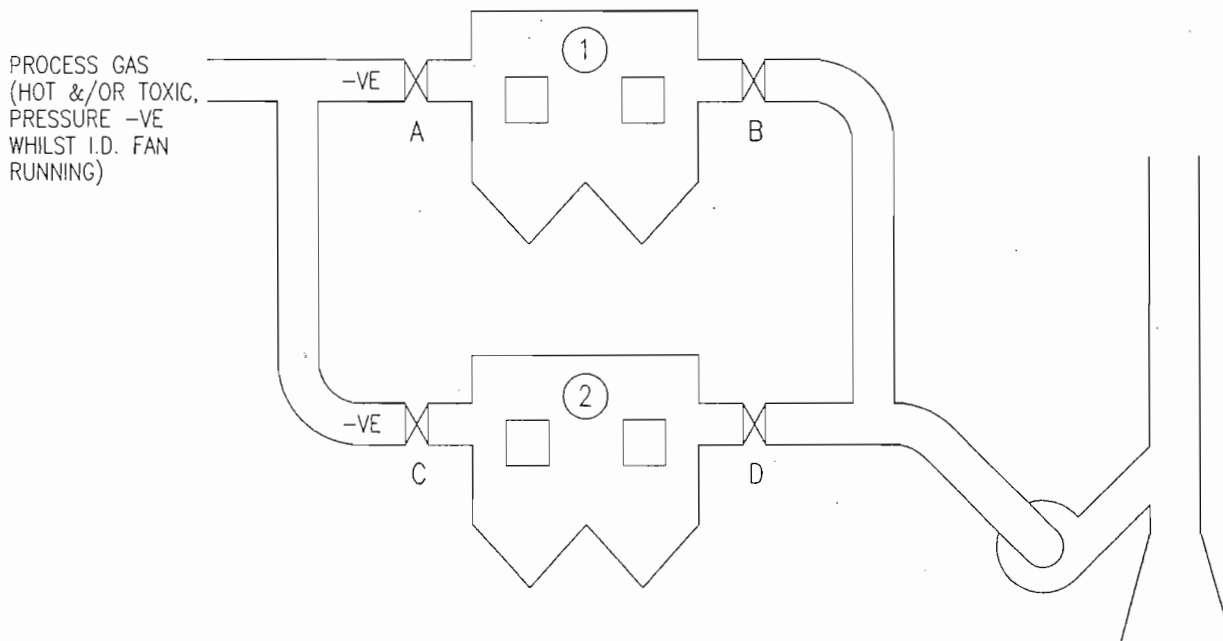
1. FILTER / PRECIP. ISOLATION



DAMPER A - LEAKAGE ACROSS DAMPER INTO PRECIP. OR FILTER - DANGEROUS - SHOULD BE MAN-SAFE ISOLATION

DAMPER B - LEAKAGE ACROSS DAMPER WOULD BE ADVANTAGEOUS, ie, WHEN ACCESS DOORS OPEN, INDRAUGHT AIR WOULD ASSIST IN PURGING & COOLING PRECIP. OR FILTER

2. MULTIPLE FILTER / PRECIP. ISOLATION

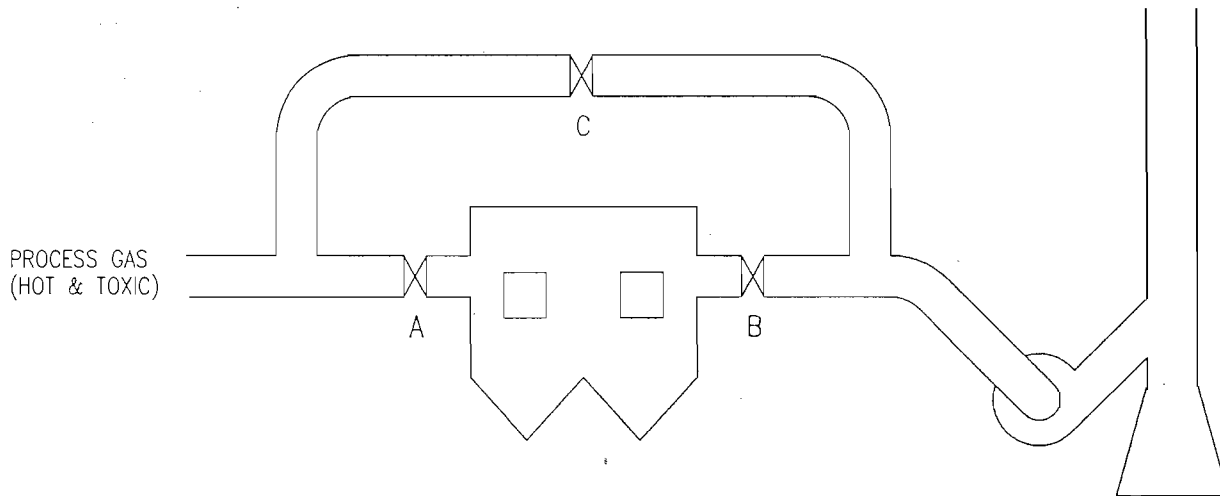


UNIT 1 ISOLATED FOR MAINTENANCE (DAMPER A & B CLOSED)

- LEAKAGE ACROSS BOTH DAMPERS WOULD BE ADVANTAGEOUS PROVIDED SYSTEM PRESSURE UPSTREAM OF DAMPER (A) IS NEGATIVE ie, INDRAUGHT AIR WHEN ACCESS DOORS ARE OPEN ASSISTS PURGING AND COOLING CASING. SIMILAR WHEN UNIT (2) IS ISOLATED AND UNIT (1) IS ON-LINE

NB!! WHEN DAMPERS (A) & (C) ARE CLOSED WITH BOTH UNITS ISOLATED, PRESSURES ON PROCESS GAS SIDE COULD BE POSITIVE

3. BYPASS DUCT ISOLATION



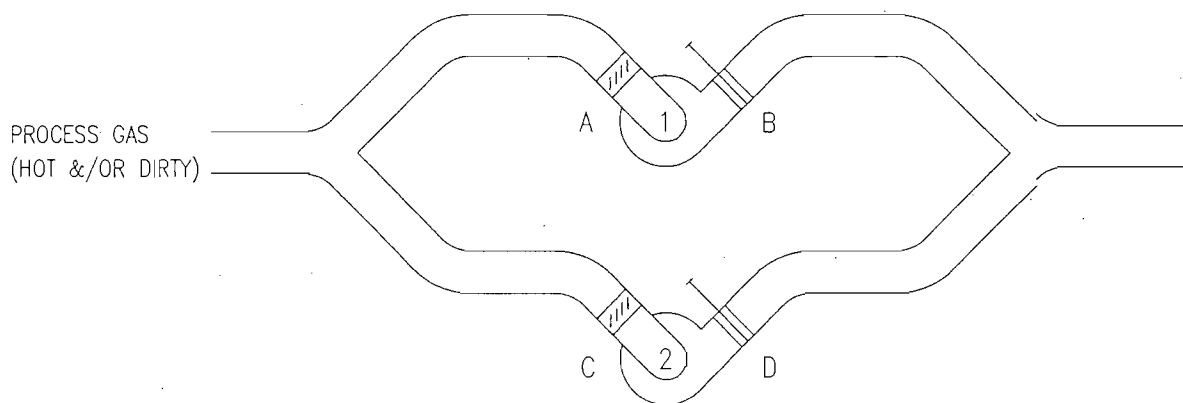
DAMPERS (A) & (B) CLOSED FOR MAINTENANCE, DAMPER (C) OPEN (SYSTEM ON BYPASS)

- INDRAUGHT LEAKAGE ADVANTAGEOUS

DAMPERS (A) & (B) OPEN, DAMPER (C) CLOSED (SYSTEM ON-LINE)

- LEAKAGE ACROSS DAMPER (C) DUE TO DIFFERENTIAL PRESSURE ACROSS CLOSED DAMPER WOULD AFFECT STACK EMISSIONS - TIGHT ISOLATION REQUIRED.

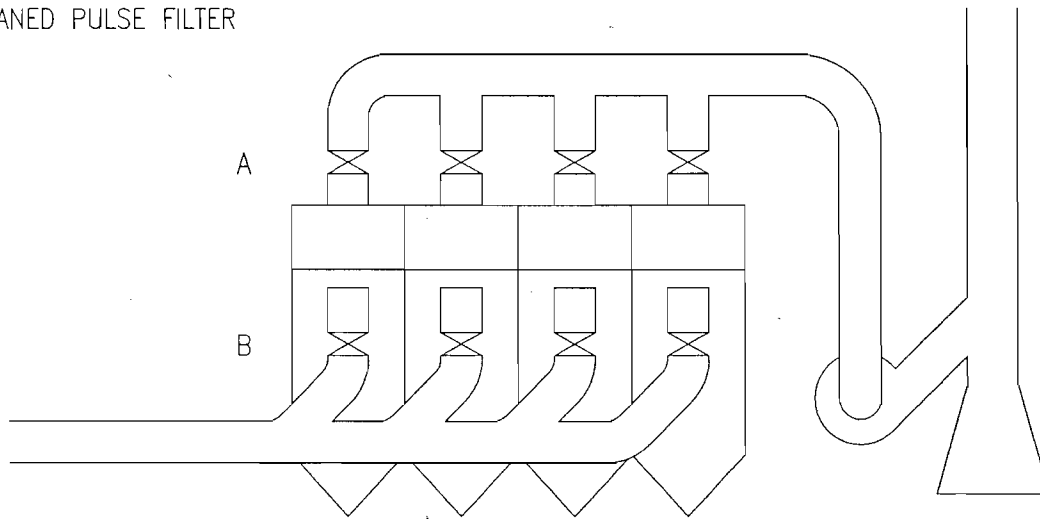
4. FAN ISOLATION



FAN (1) SHUT DOWN FOR MAINTENANCE

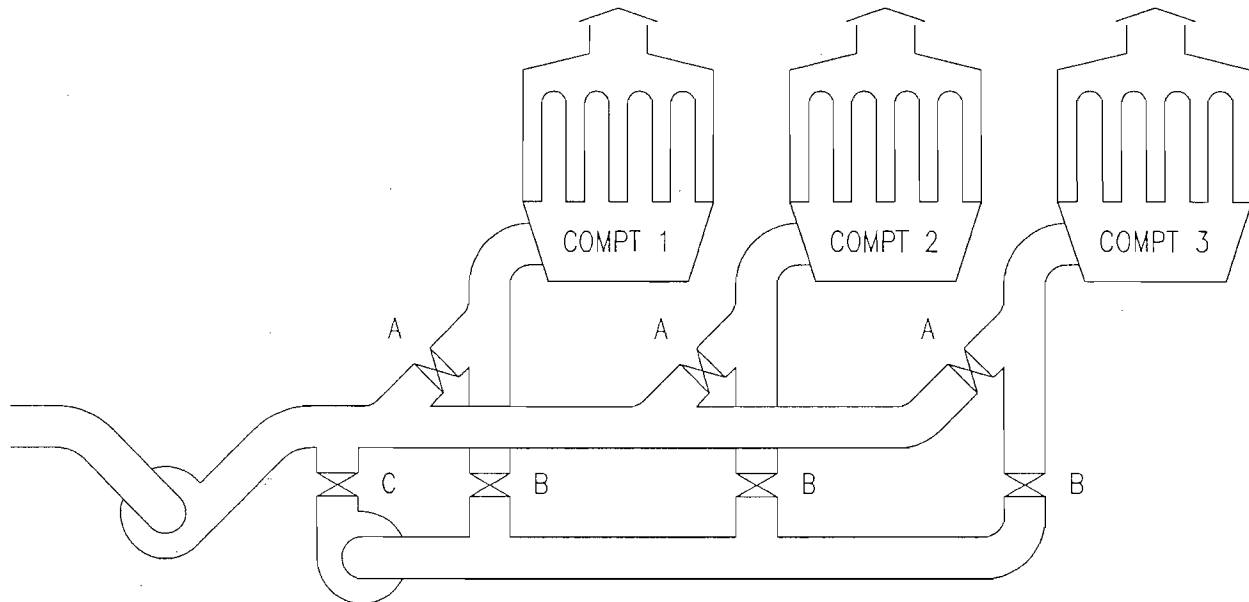
- IF OUTLET DAMPER DOES NOT PROVIDE GOOD ISOLATION (>99% OF FLOW) LEAKAGE ACROSS CLOSED DAMPER (B) WILL MAKE CONDITIONS IN FAN (1) UNTENABLE.

5. OFF LINE CLEANED PULSE FILTER



DAMPERS (A) CLOSED FOR CLEANING, 98% SEAL (TYPE STS) SUFFICIENT, PNEUMATICALLY OPERATED  
 DAMPERS (B) CLOSED FOR MAINTENANCE, 98% SEAL (TYPE STS) SUFFICIENT, MANUAL OPERATION NORMALLY OK  
 DAMPERS ON SINGLE COMPARTMENT CLOSED FOR MAINTENANCE -- ACCESS DOOR OPEN, NEGATIVE PRESSURE  
 WILL RESULT IN 'INDRAUGHT AIR' - ADVANTAGEOUS

6. REVERSE AIR BAG FILTER



A GOOD SEAL IS REQUIRED ON BOTH PRIMARY AIR DAMPERS (A) AND REVERSE AIR DAMPERS (B) TO PREVENT WASTED ENERGY AND TO PROMOTE EFFECTIVE CLEANING.  
 POPPET DAMPERS OR BUTTERFLY DAMPERS WITH ST. ST. FLEXIBLE SEALS ARE RECOMMENDED -- ALL PNEUMATICALLY OPERATED.  
 NB!! PRIMARY AIR DAMPERS SHOULD BE EQUIPED WITH 'SLOW REINFLATION' CAPABILITY.  
 REVERSE AIR DAMPER (C) IS NORMALLY A MANUALLY ADJUSTABLE BUTTERFLY DAMPER -- SET ON COMMISSIONING



# Flowseal Engineering (Pty) Ltd

## CONTROL DAMPERS

For 0 – 100% of Normal Flow – Use Opposed Action Louvre Damper.

For 50-100% of Normal Flow – Use Single Blade or Parallel Action Louvre Damper.

**Note:** Single and Parallel Blade Dampers will result in very turbulent flow patterns and could result in erosion if dust is abrasive.

## ISOLATION DAMPERS

<b>Man Safe:</b>	Goggle Valves, Swing Plates, Purged Dampers
<b>Bubble Tight (Not Man Safe):</b>	2 Lever Discs Valves, Knife Gates with resilient Seats
<b>&gt;99.5% Sealing Efficiency:</b>	Wedge seated Knife Gate Valves Guillotine Damper with ST ST Flexible Seals
<b>&gt;99% Sealing Efficiency:</b>	Louvre and Butterfly Damper with ST ST Flexible Seals (Type CRS)
<b>&gt;98% Sealing Efficiency:</b>	Louvre, Butterfly, Guillotine, Knife Gates with Step Seat Seals
<b>&gt;95% Sealing Efficiency:</b>	Louvre or Butterfly Dampers – No Seal (Control Dampers)



## AIR DILUTION OR IMPLOSION DAMPERS

### **Functions:**

1. Emergency Air Dilution – Opens fully in event of over temperature. Use Open/Close Flap Type Damper with Soft Seal to minimize indraught.
2. Controlled Air Bleed – Only allows sufficient air in to maintain desired temperature levels. Use Opposed Action Louvre Damper with Flexible Seals (Type CRS),  
**Note:** if suction pressure is high, noise levels may require attention.
3. Implosion Dampers – Open if suction pressure on filter casing exceeds pre – determined level. Use Flap or Poppet Type Damper

## OTHER DAMPERS

Diverter Dampers  
Swing Dampers  
Poppet Valve Dampers



## **DAMPER CONSTRUCTION CONSIDERATIONS**

Low to Medium Dust Burden - < 200°C – Negative pressure  
Inboard Bearings

Positive Pressure – Outboard Bearings and Gland Seals

>200°C, Outboard Bearings and Gland Seals

Abrasive and/or Corrosive Conditions  
Apply suitable Materials

Up to 450°C – All Carbon Steel Construction

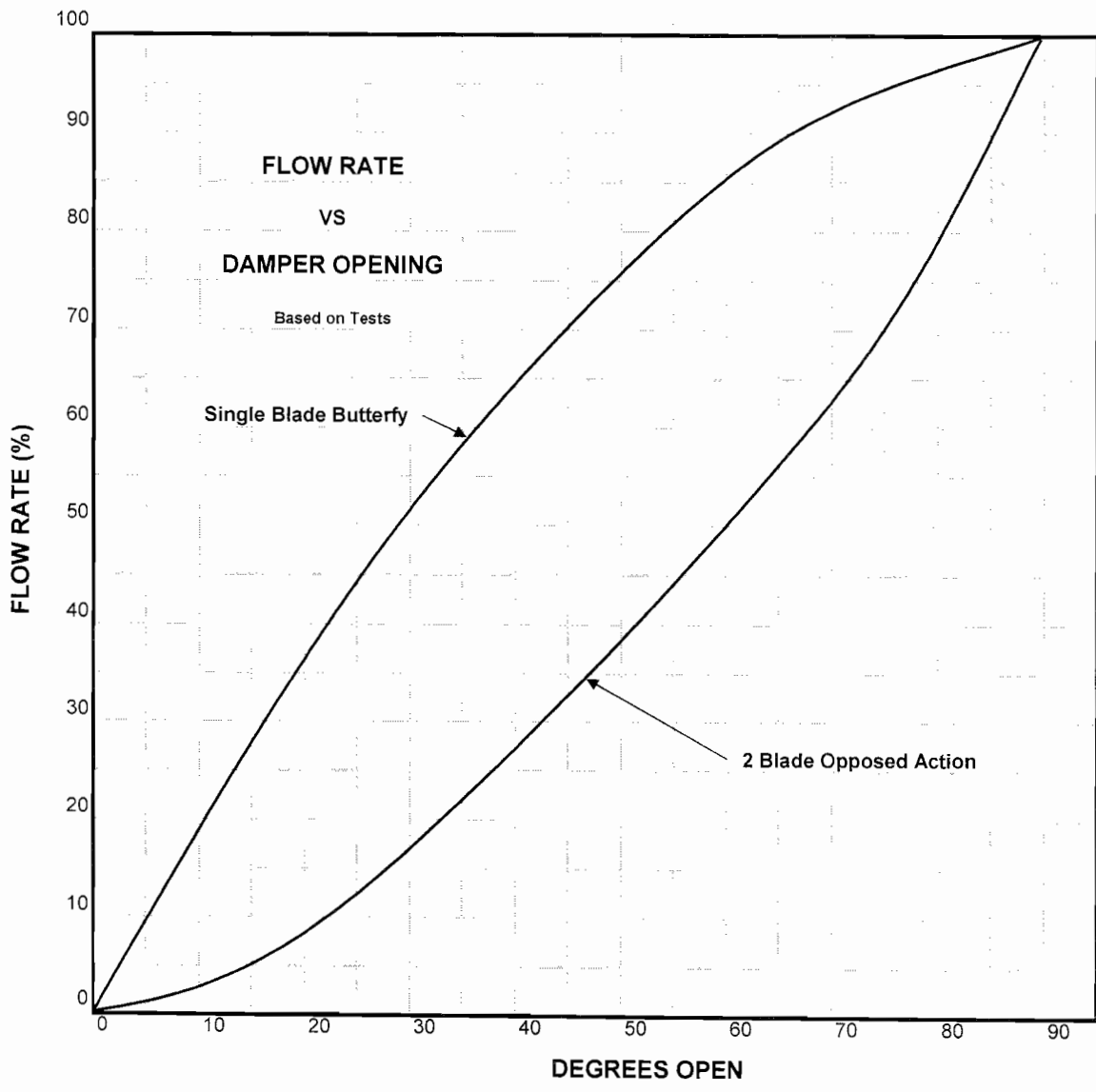
Temperature 450°C to 600°C – Uninsulated  
Carbon Steel Casing, 3CR12 Blade

600°C-750°C All 304 ST ST Construction

750°C- 1050°C Uninsulated 304 Casing, 310 Blade & Stub Shafts

>1050°C – Water Cooled Damper





Please note that this is a graphical presentation

and is true for the conditions of test only.

Variation in pressure and temperature will change

the curve.

**FLOWSEAL ENGINEERING** (PTY) LTD



# Flowseal Engineering (Pty) Ltd

## Butterfly Dampers



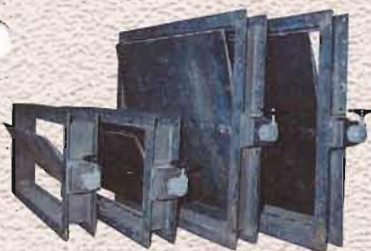
These can be manufactured circular or rectangular, in a variety of configurations to suit a multitude of applications.

Although mainly used for isolation, they can be used for control.

Sealing arrangements range from "swing through" for control only to stainless steel flexible blade seals for isolation efficiencies greater than 99% sealing efficiency.



Bearings can be mounted inboard or outboard, depending on the application, and will generally be of the maintenance free type. Dampers can be manufactured in a variety of materials and can be supplied with refractory lining if required.



Applications range from simple isolation dampers at ambient temperatures with manual lever arm operation to control dampers at temperatures as high as 2000°C (water cooled casing and blade).

Actuation can be arranged to suit customers requirements and could include any of the following:

- \* Pneumatic linear or rotary double acting with positioner and position feedback unit if required.
- \* Electric with "Matic" unit and manual override hand wheel.
- \* Hydraulic or electro-hydraulic
- \* Manual lever arm with locking quadrant or manual gearbox with hand or chain wheel.



## FLOWSEAL BUTTERFLY DAMPERS

**Flowseal** butterfly dampers are designed and fabricated to meet the requirements of power and industrial plants and to comply fully with the requirements of AMCA publication 850-84. They provide effective and reliable isolation and or control in hot, noxious, corrosive and dirty gas flow conditions.

**Flowseal** butterfly dampers are manufactured with two ply airofoil shape blades, without external ribbing or bracing, which provides smooth and laminar flow. The butterfly dampers can be manufactured circular or rectangular in shape. All butterfly dampers are fitted with spherical maintenance free bearings or maintenance free DU bushes which have proven most reliable in all conditions.

**Flowseal** butterfly dampers are designed for minimum maintenance, and that which is required is simple and can be performed while the system is on line.

The following styles of butterfly dampers are available:

### **Type NS single blade Butterfly Dampers.**

Sealing efficiency : 95% of full duct area or better.

NS is a no seal damper and is used for control where isolation is not a prerequisite.

### **Type STS step seat seal Butterfly Dampers.**

Sealing efficiency : 98% of full duct area or better.

The blade closes onto a landing bar located around the circumference of the housing. This provides a degree of isolation that is adequate for most applications.

### **Type SSF stainless steel flexible seal Butterfly Dampers.**

Sealing efficiency : 99% of full flow or better.

Similar to the type STS described above except that blade edges are fitted with stainless steel flexible seals to improve the sealing efficiency of the damper.

## **General Design**

**Flowseal** butterfly dampers can be fabricated for any duct size, circular or rectangular and can be fitted to a vertical duct or to a horizontal duct with the blade spindles vertical or horizontal.

The dampers are designed to fulfill specific application requirements and conform to the following **Minimum Specifications.**

### **Construction**

Materials of construction are selected for their suitability for the conditions of temperature and pressure, and the corrosive and abrasive environment of the system.

### **Frames**

Frames are designed to be entirely self supporting in the duct with no external mounting or anchoring required and are normally of the channel type, either welded or of a rolled structural section. The flanges are pre-drilled to customer requirements.

The frames are designed for the system pressure and temperature as well as construction and transportation loadings.

### **Blades**

Damper blades are of double ply construction and aerofoil in shape. Stub shaft connections are adequately strengthened for the bolt fastenings. Damper blades are designed so that the maximum deflection under operating conditions does not exceed  $L/360$ .

### **Packing glands**

Packing glands are continuously welded to the damper frame at each shaft clearance hole and are filled with packing suitable for ambient as well as operating conditions. The glands are designed in such a way that packing may be renewed without removal of bearings or linkages.

Live loaded packing gland seals are available for applications where maintenance is to be kept to a minimum.

### **Bearings**

Bearings are DU Bushes or of the spherical type, both types are maintenance free, under no circumstances will ball or roller bearings be considered due to their potential to brinell and seize under normal damper operating conditions. The bearings shall be located sufficiently removed from the heat source to ensure that they are operating within their design temperature rating.

### **Stub shafts**

Stub shafts will always be manufactured in grade 304 stainless steel or better. The stub shafts are designed to transmit the maximum torque potential of the drive mechanism. All lever and actuator bushes and bosses are to be fitted with parallel keys.

It is imperative that the combined geometry of blade connection, thru gland seal, to outboard mounted bearing and lever arm or actuator connection, is such that the potential for pushing the shaft out of alignment during operation is totally eliminated.

### **Actuators**

**Flowseal** butterfly dampers can be furnished with electric, pneumatic, hydraulic or manual actuators. The actuators are sized to function reliably over the full range of system temperatures and pressures with a minimum factor of safety of two. Actuators may be fitted with positioners, I/P converters, solenoid valves, manual overrides and fail safe open or fail safe closed devices if required. All actuators are fitted at the factory and fully tested prior to shipment.

Actuators can be fitted to either shaft and on either side of the Damper.

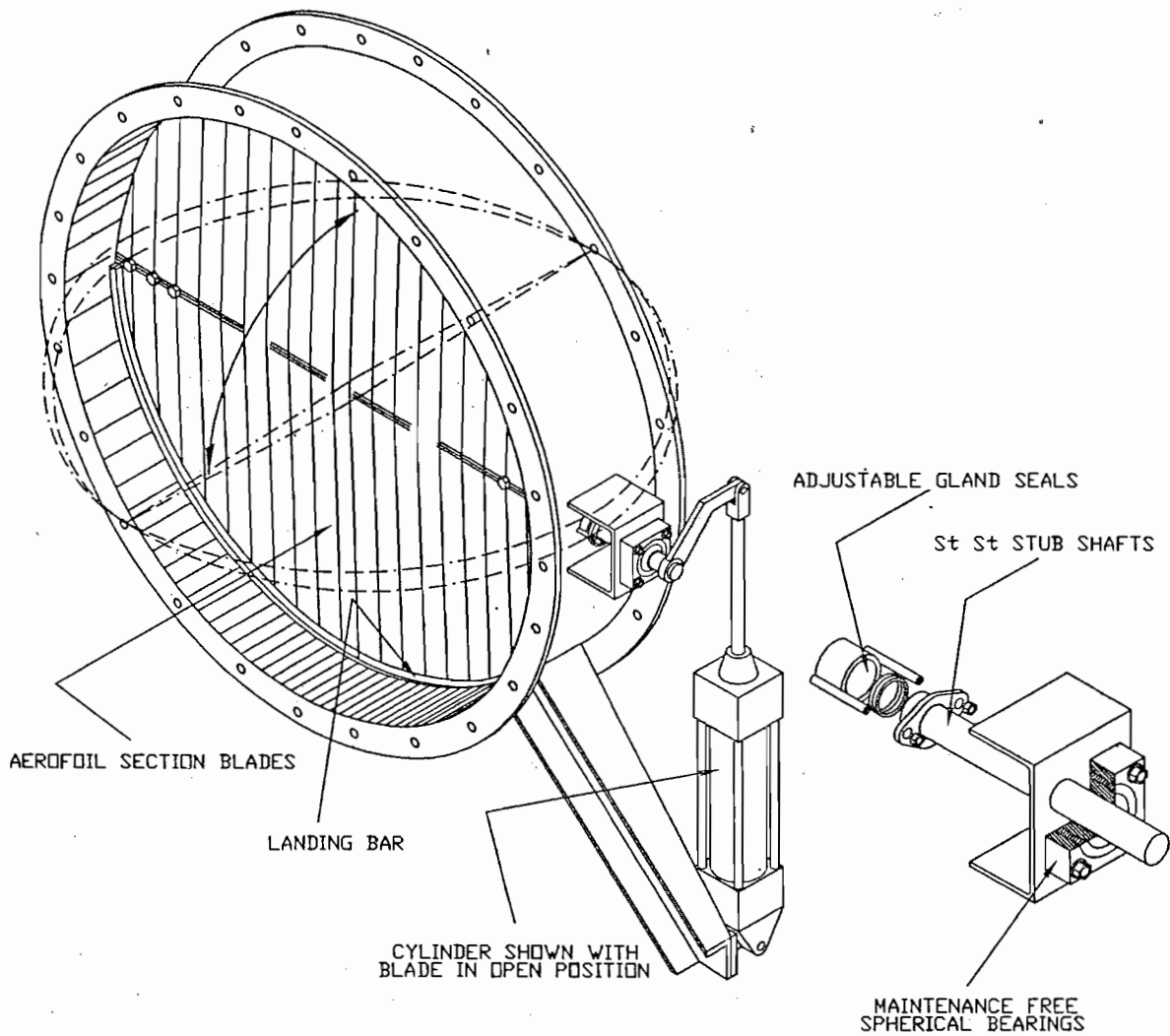
**FSE FLOWSEAL ENGINEERING (PTY) LTD**

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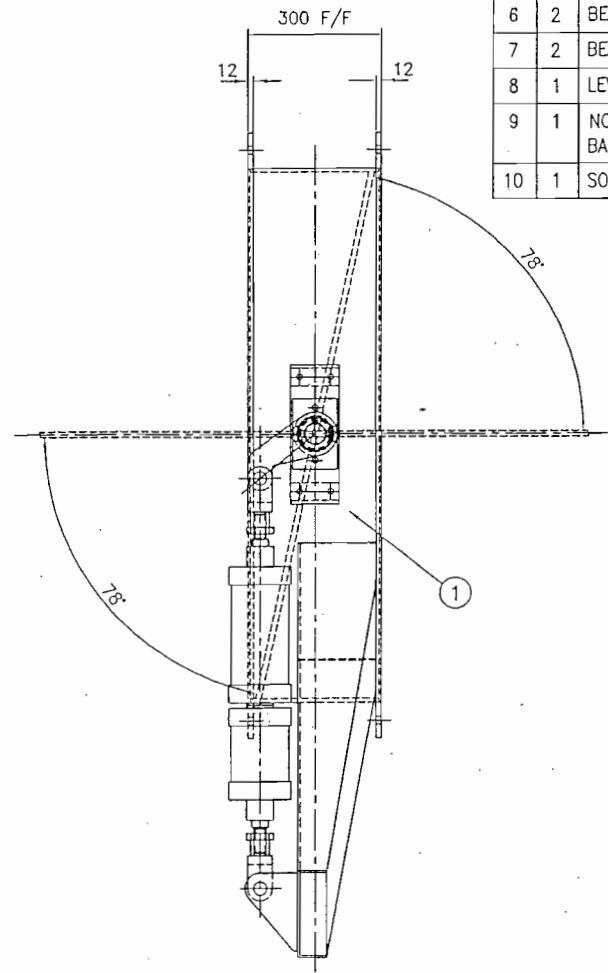
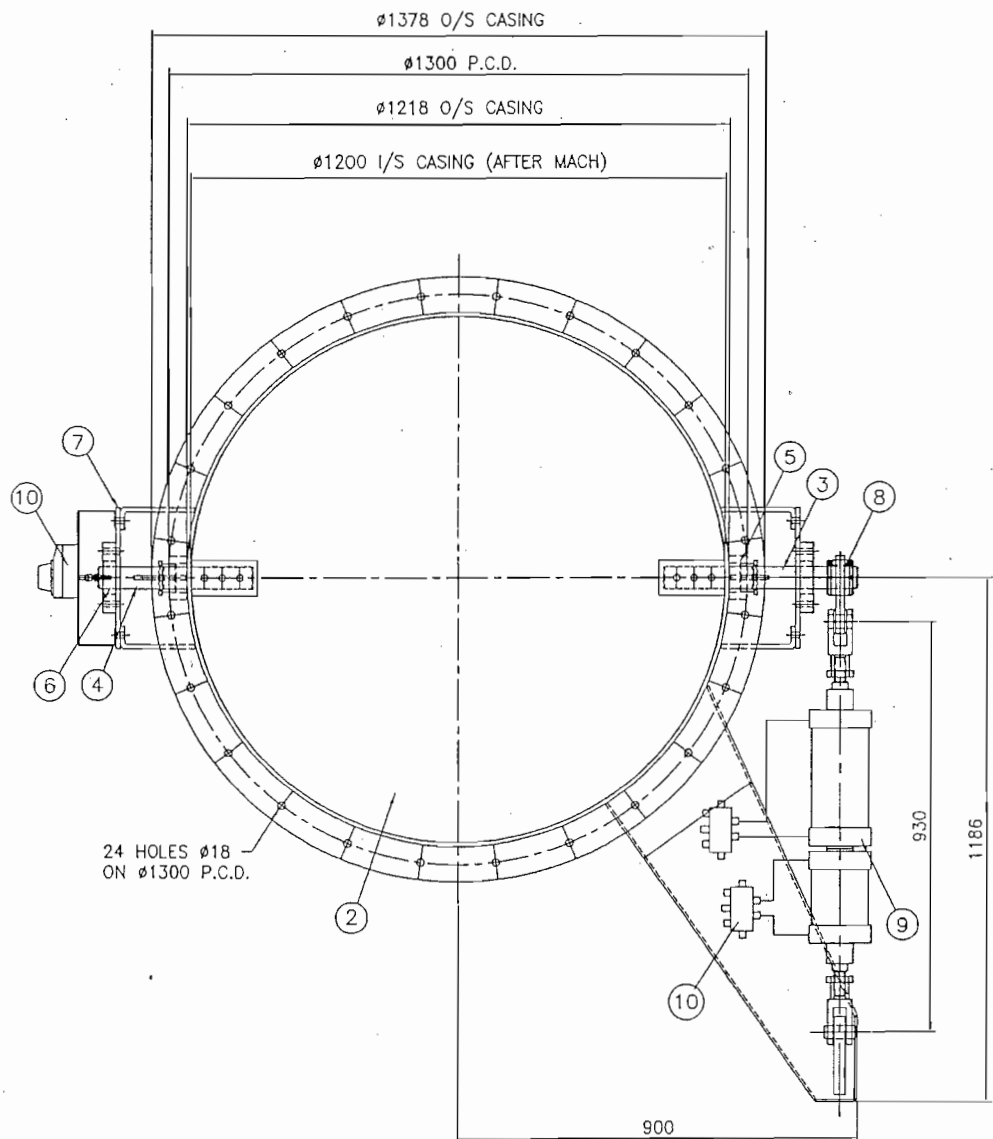
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ELSPARK 1418

## BUTTERFLY DAMPER

TYPES OF OPERATOR : PNEUMATIC CYLINDER (SHOWN)  
ELECTRIC ACTUATOR  
HYDRAULIC ACTUATOR  
MANUAL GEARBOX







ITEM	QTY	DESCRIPTION	DRG/PART N.o
1	1	DAMPER CASING	1227-02-01
2	1	DAMPER BLADE.	1227-02-02
3	1	DRIVE SHAFT ø50.	1227-02-03
4	1	FREE END SHAFT ø50.	1227-02-03
5	2	GLAND SEAL ASSEMBLY.	GSH&GSF-50
6	2	BEARING BLOCK	SBH 50-CS
7	2	BEARING MOUNT	1227-02-01
8	1	LEVER ARM	1227-02-04
9	1	NORGREN LINEAR CYLINDERS BACK TO BACK.	RA/8125/150 & RA/8125/50
10	1	SOLENOID VALVE	5/2 1/4"

NOTES:  
 1. MATL:- FLANGES: GR300 WA  
 CASING: HARDOX  
 BLADE: BENNOX  
 SHAFTS 304 ST.ST  
 2. DESIGN PRESSURE: 6 kpa  
 3. DESIGN TEMPERATURE: 200°C  
 4. MAX. DUCT VELOCITY: 25 m/s  
 5. SEALING EFFICIENCY: >98% BY AREA  
 6. 1 LEFT & 1 RIGHT

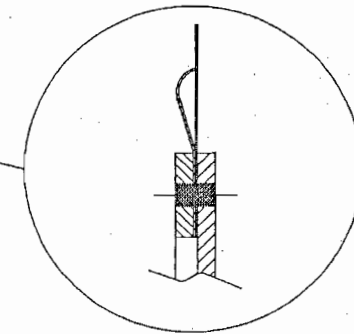
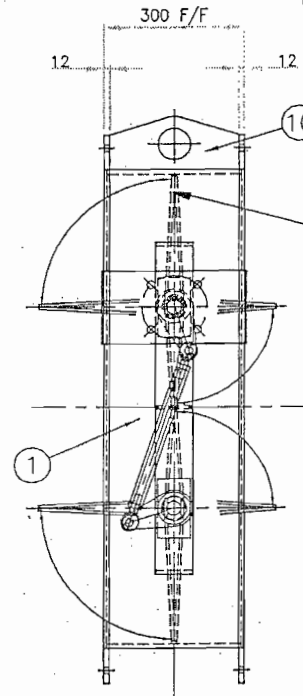
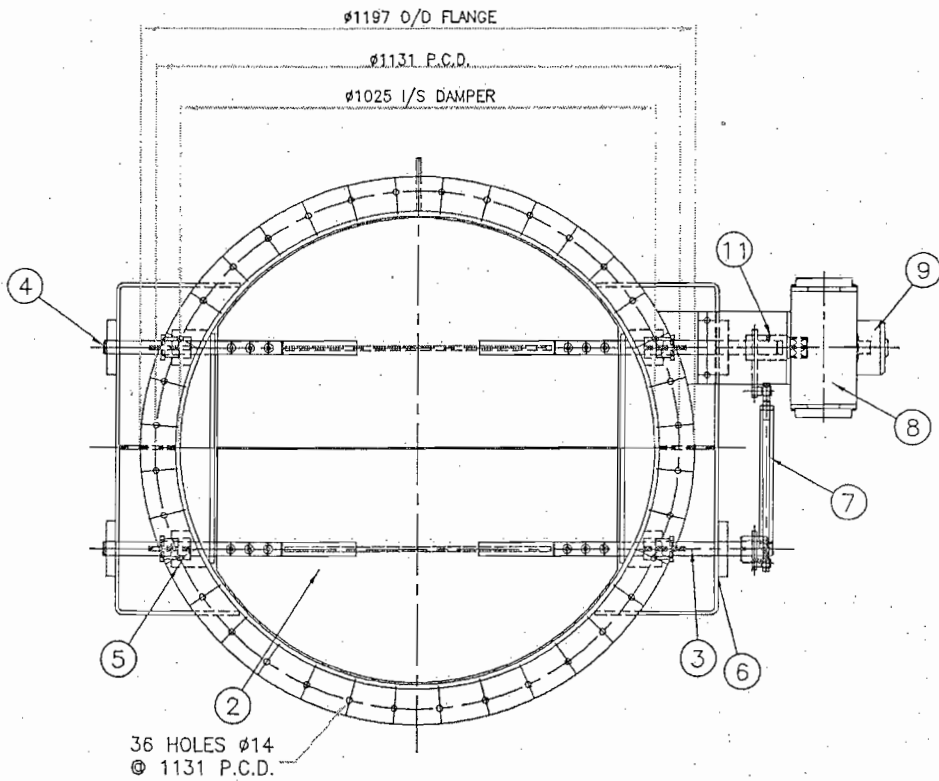
REV	BY	DATE	CHECK
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 DRAWING NUMBER  
 FSE-1227-00

DRAWN DATE	TITLE
TMS 23/04/03	G.A. OF ø1200 12' DAMPER
CHECKED DATE	

NO.	QTY	DESCRIPTION	M.O.C	DRG/PART NO.
1	1	DAMPER CASING - 10mm	GR 300 WA	
2	2	DAMPER BLADE.	GR 300 WA	
3	2	DRIVE SHAFT $\phi 40$ .	GR 304 SS	
4	2	FREE END SHAFT $\phi 40$ .	GR 304 SS	
5	4	GLAND SEAL ASSEMBLY.	GR 300 WA	
6	4	BEARINGS	MILD STEEL	SBH 40-CS
7	1	LINKROD	MILD STEEL	1222-01-06
8	1	PROVAL 1/4 TURN. PNEU ACT.		SA200D
9	1	POSITIONER - NELES		ND 800
10	1	LIFTING LUG	GR 300 WA	
11	1	LEVER ARM & COUPLING	MILD STEEL	1222-01-04



TYPICAL SECTION THROUGH ST. ST. FLEXIBLE SEAL

NOTES:

1. DESIGN PRESSURE: 8 kpa
2. DESIGN TEMPERATURE: 800°C
3. MAX. DUCT VELOCITY: 27 m/s
4. SEALING EFFICIENCY: 99.5% ON FLOW
5. QTY 1 OFF
6. BI-DIRECTIONAL FLOW.
7. WEIGHT - 227 kg

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DRAWN DATE  
 TMS 03/04/03  
 CHECKED DATE

TITLE

G.A. OF  $\phi 1025$  FURNACE DRAFT  
 CONTROL DAMPER

DRAWING NUMBER

FSE-122/01

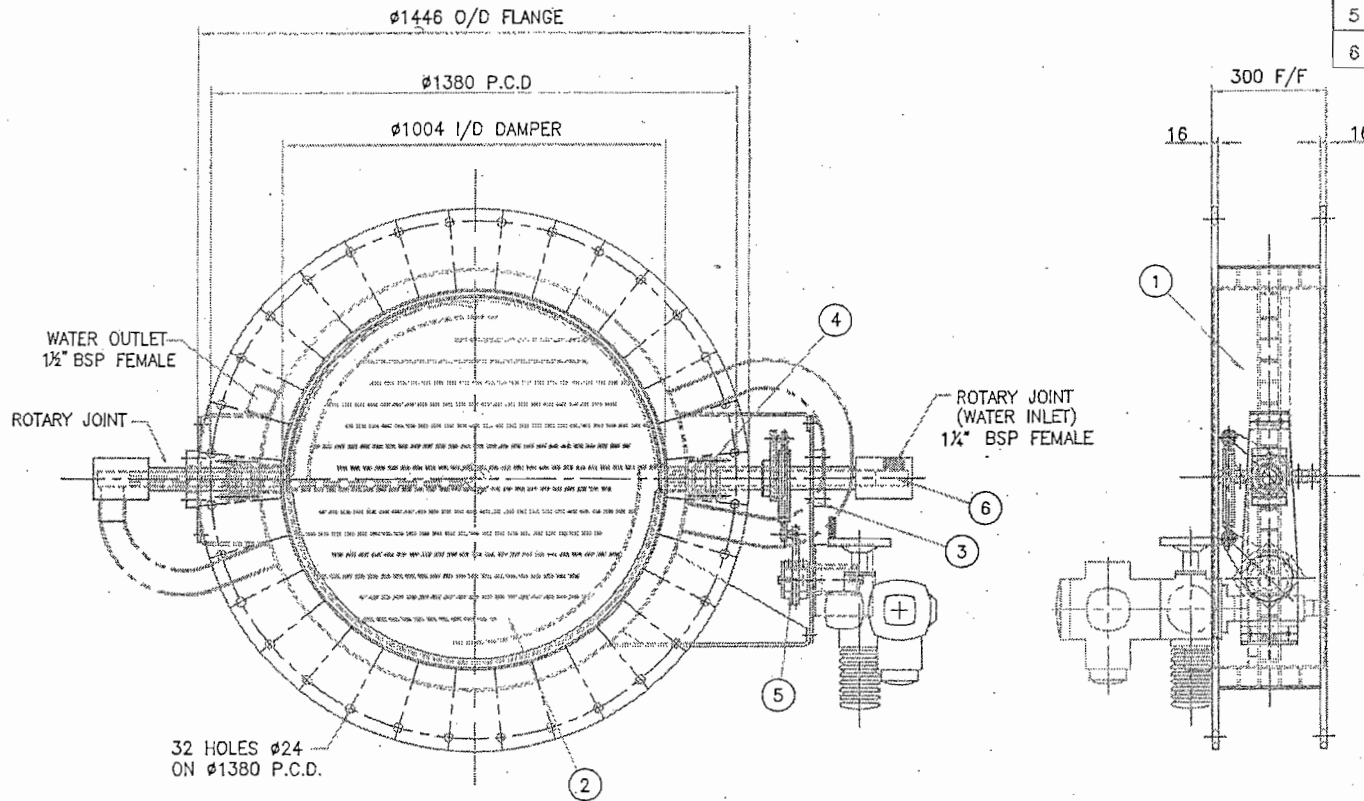
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BY

DATE

CHECK

ITEM	QTY	DESCRIPTION	REMARKS
1	1	CASING	1204-01-01
2	1	BLADE	1204-01-02
3	2	BEARING BLOCKS	1204-01-03
4	2	GLAND SEAL ASSEMBLY	1204-01-04
5	2	LEVER ARM	1204-01-05
6	2	ROTARY JOINT 1 1/4" BSP	PLT-20



**ACTAUTOR DETAILS**

SARM 10.1-B3-32RPM-TP 104/001 Positioner Version  
 C/W Auma Worm Gearbox GS 100.2  
 220V 1PH 50 Hz (M000.410, 0.75kW)  
 O/Time-abt. 16sec / 90°.

**NOTES:**

1. QTY - 1 OFF REQ'D
2. DESIGN TEMP - 1000° MAX
3. GAS SEALING EFFICIENCY - >99%
4. CONSTR. MATL - GR 430A BOILER PL.(CASING & BLADE)
5. COOLING WATER REQ. - 5.1 m<sup>3</sup>/h
6. WATER PRESSURE REQ'D - 120 kPa
7. WATER PRESSURE DROP - 60 kPa

TLC283-30-31-029  
 SHEET 1 OF 2

EQUIP. No - F4-YA-11

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DRAWN DATE TITLE  
 TMS 28/02/03  
 CHECKED DATE

G/ OF 1004NB WATER COOLED DAMPER

DRAWING NUMBER  
 FSE-1204-01  
 SHEET 1 OF

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# Flowseal Engineering (Pty) Ltd

## Louvre Dampers

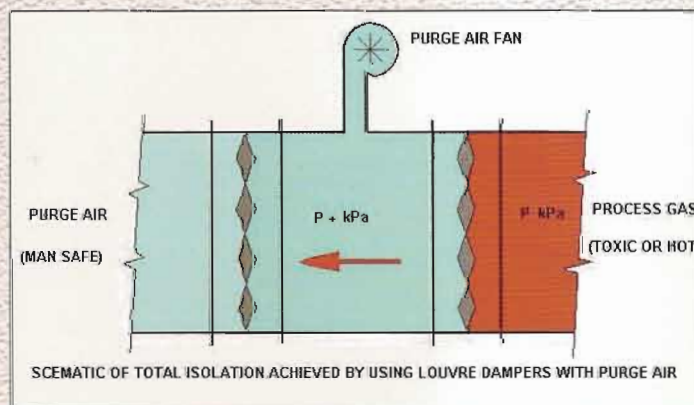
Louvre Dampers can be manufactured circular or rectangular, and in a variety of configurations.



Generally, multi-blade louver dampers are used as control dampers - or as isolation dampers in rectangular or square ducts of a large cross sectional area, where use of a single blade would be impractical.

Due to the multiple blade arrangement, sealing efficiencies are lower than in single blade butterfly dampers.

However, by placing two louver dampers adjacent to each other and purging the cavity between the two sets of blades when closed, with air at a higher pressure than the system pressure, total isolation of process gas may be achieved.



When used as control dampers, the blades are normally arranged to counter rotate, this provides very good control characteristics through the entire range of operation.

Materials of construction, gland seal and bearing arrangements and drive configurations are selected and designed to suit the application and customer requirements.



## FLOWSEAL LOUVRE DAMPERS

**Flowseal** multi louvre dampers are designed and fabricated to meet the requirements of power and industrial plants and to comply fully with the requirements of AMCA publication 850-84. They provide effective and reliable control and or shutoff in hot, noxious, corrosive and dirty gas flow conditions.

**Flowseal** louvre dampers can be manufactured with either parallel blade or opposed blade configurations. The blades are of a two ply construction and are aerofoil in shape thus providing smooth and laminar flow. In all cases the blades are driven by a series of lever arms and adjustable link rods. All louvre dampers are fitted with spherical maintenance free bearings or maintenance free DU bushes, which have proven most reliable in all conditions.

**Flowseal** louvre dampers are designed for minimum maintenance and that which is required is simple and can be performed while the system is on line.

The following styles of louvre dampers are available:

### **Type NS multi blade Louvre Dampers.**

Sealing efficiency : 95% of full duct area or better.

NS is a no seal damper and is used for control where isolation is not a prerequisite.

### **Type STS step seat seal multi blade Louvre Dampers.**

Sealing efficiency : 98% of full duct area or better.

Each blade closes onto a landing bar located at all blade tips and along the blade sides. This provides a degree of isolation that is adequate for most applications with no impairment to the control characteristics of the damper.

### **Type SSF st st flexible seal multi blade Louvre Dampers.**

Sealing efficiency : 98% of full flow or better.

Similar to the type STS described above except that blade edges are fitted with stainless steel flexible seals to improve the sealing efficiency of the damper.

### **Tandem Louvre Dampers.**

The tandem louvre damper is used where total, 100% isolation is required. Tandems are the same as the type SSF damper but has two rows of blades built into one casing with the cavity between the blades being purged at a higher pressure than the maximum system pressure using an air blower.

### **General Design**

**Flowseal** louvre dampers can be fabricated for any duct size, circular or rectangular and can be fitted to a vertical duct or to a horizontal duct with the blade spindles vertical or horizontal.

The dampers are designed to fulfill specific application requirements and conform to the following minimum specifications.

### **Construction**

Materials of construction are selected for their suitability for the conditions of temperature and pressure, and the corrosive and abrasive environment of the system.

## **Frames**

Frames are designed to be entirely self supporting in the duct with no external mounting or anchoring required and are normally of the channel type, either welded or of a rolled structural section. The flanges are pre-drilled to customer requirements.

The frames are designed for the system pressure and temperature as well as construction and transportation loadings.

## **Blades**

Damper blades are of double ply construction and aerofoil in shape. Stub shaft connections are adequately strengthened for the bolt fastenings. Damper blades are designed so that the maximum deflection under operating conditions does not exceed  $L/360$ .

## **Packing glands**

Packing glands are continuously welded to the damper frame at each shaft clearance hole and are filled with packing suitable for ambient as well as operating conditions. The glands are designed in such a way that packing may be renewed without removal of bearings or linkages.

Live loaded packing gland seals are available for applications where maintenance is to be kept to a minimum.

## **Bearings**

Bearings shall be of the spherical maintenance free type or DU Bushes, under no circumstances will ball or roller bearings be considered due to their potential to brinell and seize under normal damper operating conditions. The bearings shall be located sufficiently removed from the heat source to ensure that they are operating within their design temperature rating.

## **Lever arms and link rods**

The geometry of the lever arms and link rods is to be such that forces are evenly transmitted throughout the arc of travel, and in the case of opposed blade dampers, care is to be taken to prevent toggle action becoming possible. All link rods are to be adjustable. Under no circumstances can any clearances or loose connections be permitted in the link rod geometry as this would adversely affect the operation of the damper. Rod ends are to be of the spherical low maintenance type.

## **Stub shafts**

Stub shafts will always be manufactured in grade 304 stainless steel or better. The stub shafts are designed to transmit the maximum torque potential of the drive mechanism. All lever and actuator bushes and bosses are to be fitted with parallel keys.

It is imperative that the combined geometry of blade connection, thru gland seal, to outboard mounted bearing and lever arm or actuator connection, is such that the potential for pushing the shaft out of alignment during operation is totally eliminated.

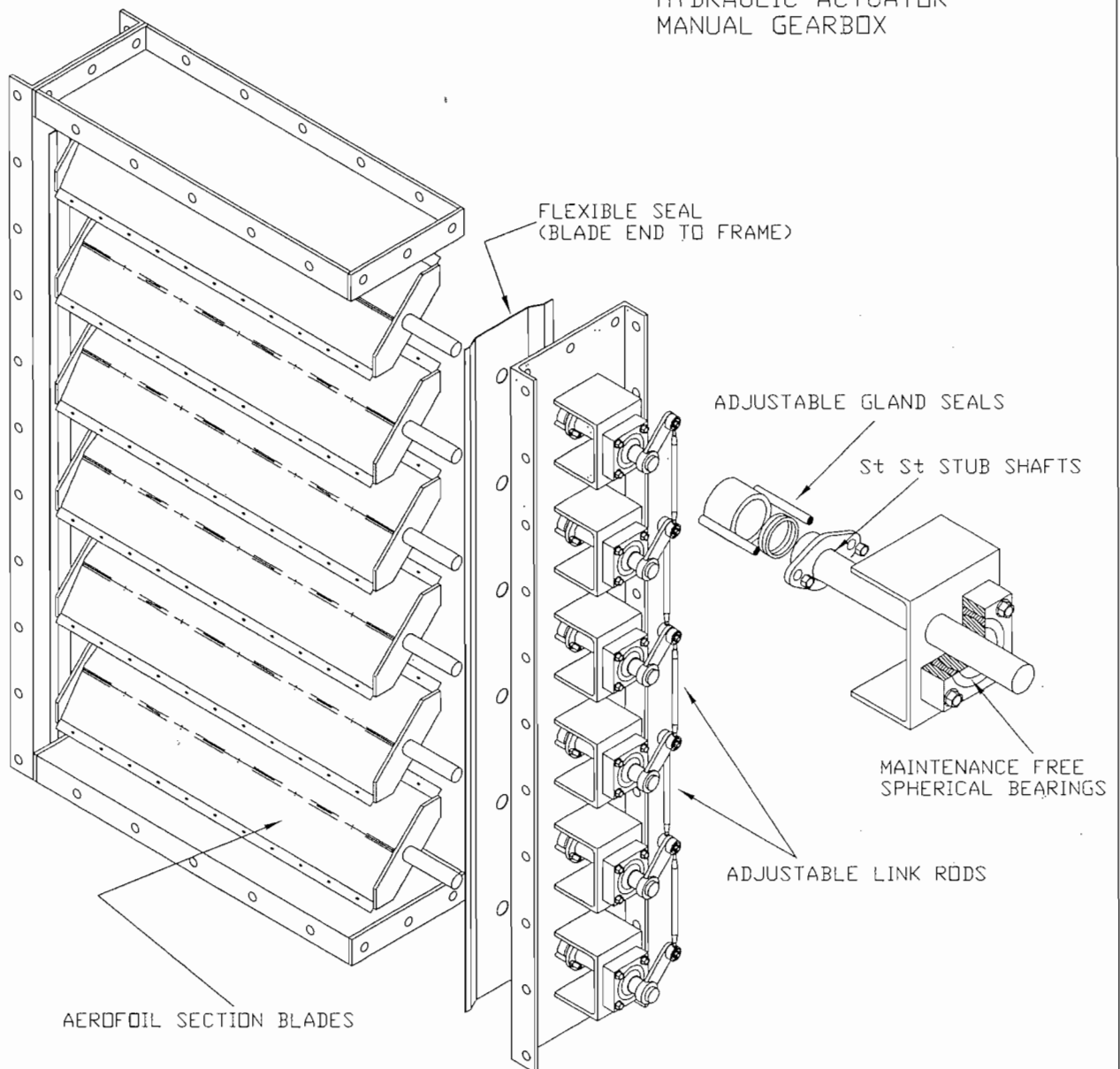
## **Actuators**

**Flowseal** louvre dampers can be furnished with electric, pneumatic, hydraulic or manual actuators. The actuators are to be sized to function reliably over the full range of system temperatures and pressures. Actuators may be fitted with positioners, I/P converters, solenoid valves, manual overrides and fail safe open or fail safe closed devices if required. All actuators are to be fitted at the factory and fully tested prior to shipment.

Actuators can be fitted to either shaft and on either side of the Damper.

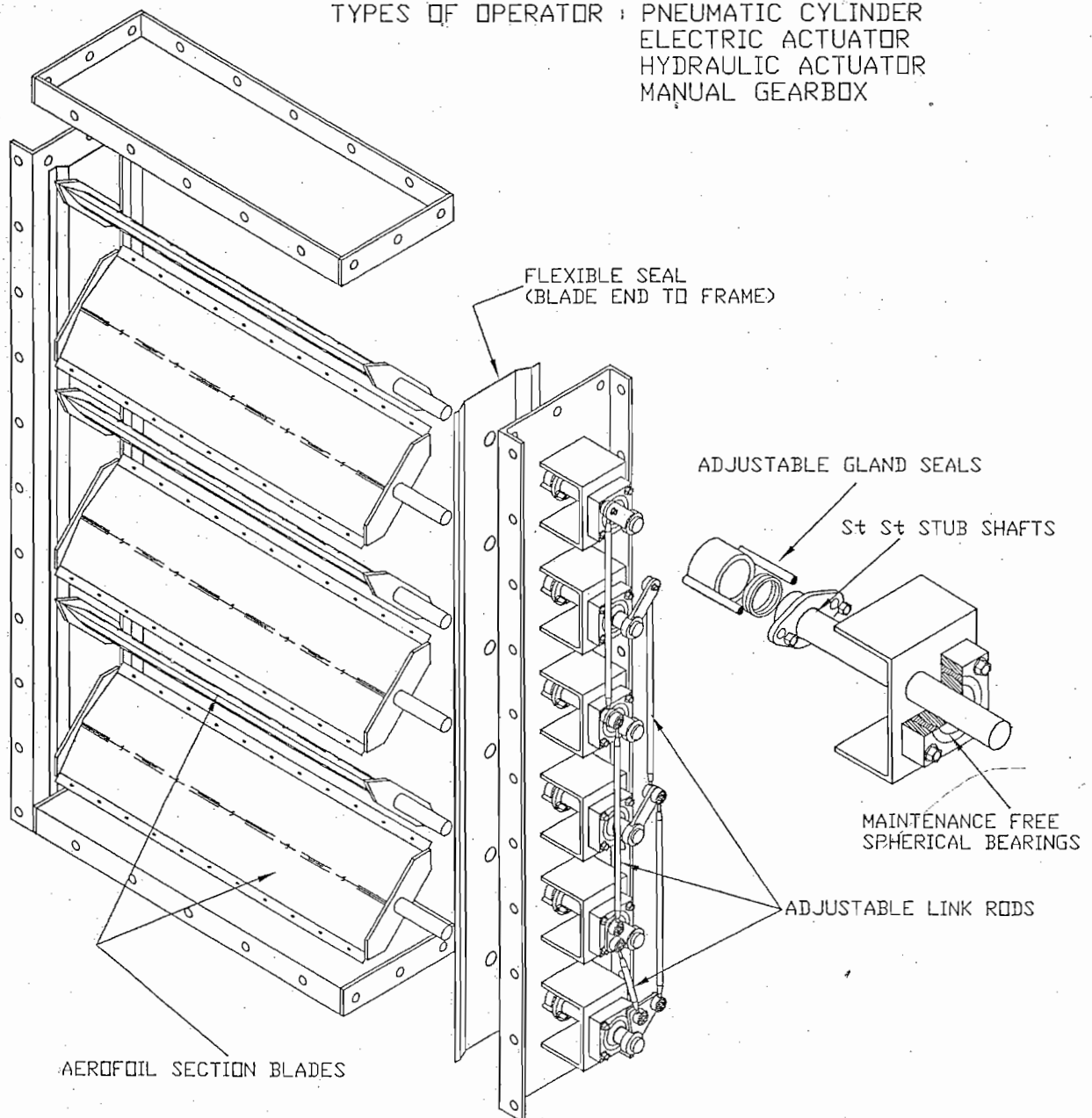
## PARALLEL BLADED LOUVRE DAMPER

TYPES OF ACTUATOR : PNEUMATIC CYLINDER  
ELECTRIC ACTUATOR  
HYDRAULIC ACTUATOR  
MANUAL GEARBOX



PARALLEL BLADED OPPOSED  
LOUVRE CONTROL DAMPER

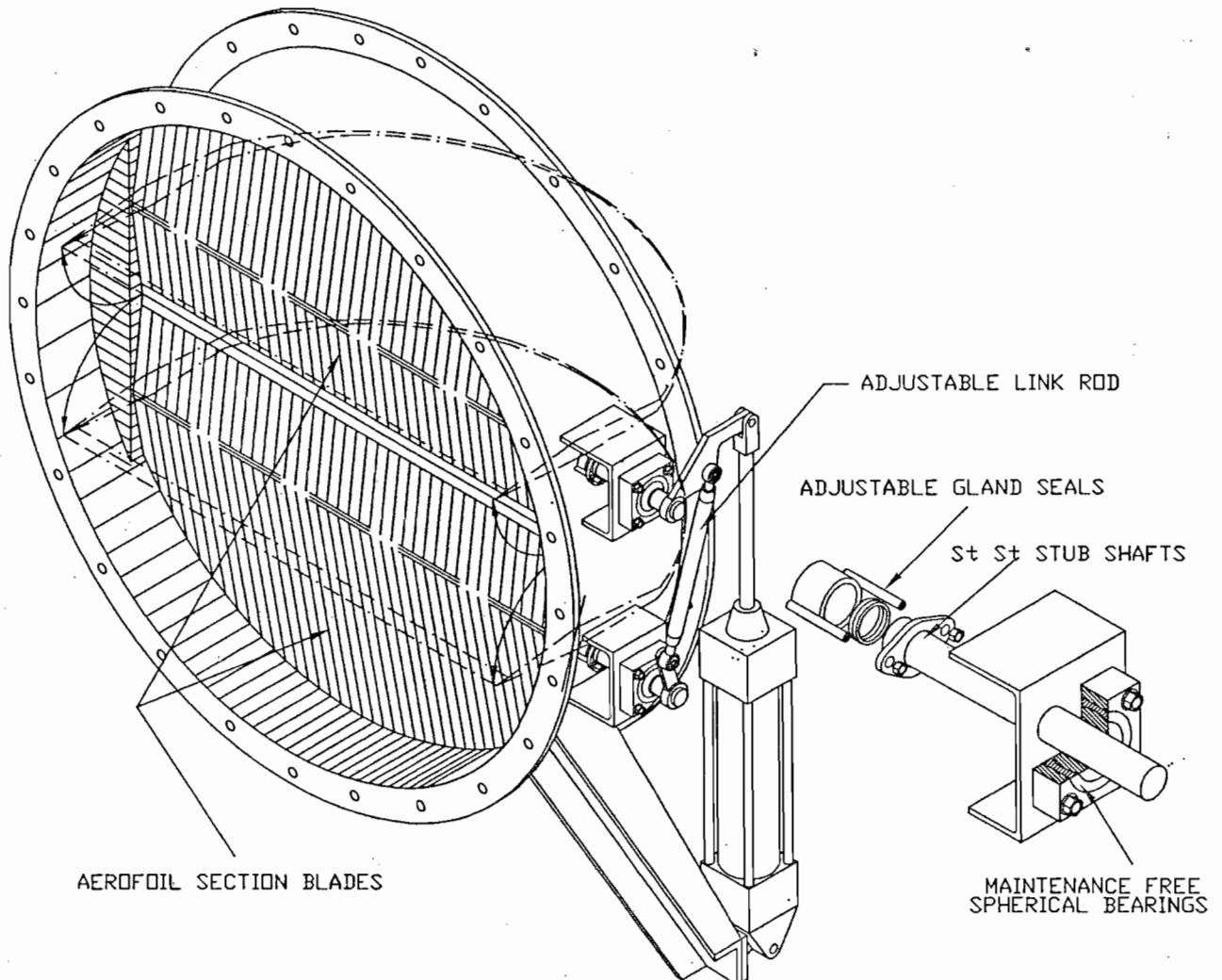
TYPES OF OPERATOR : PNEUMATIC CYLINDER  
ELECTRIC ACTUATOR  
HYDRAULIC ACTUATOR  
MANUAL GEARBOX





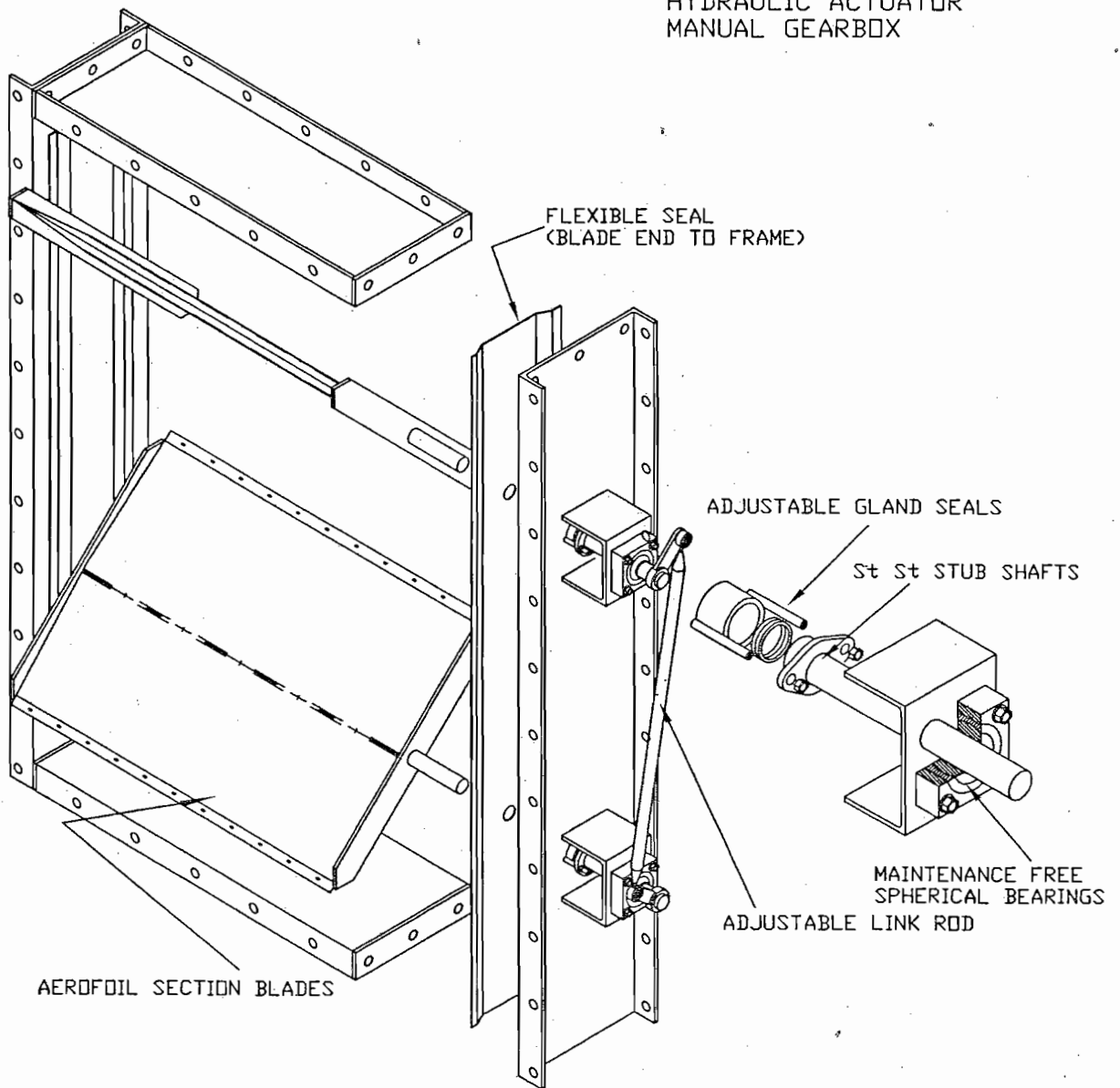
## DOUBLE BLADED CONTROL DAMPER

TYPES OF OPERATOR : PNEUMATIC CYLINDER (SHOWN)  
ELECTRIC ACTUATOR  
HYDRAULIC ACTUATOR  
MANUAL GEARBOX



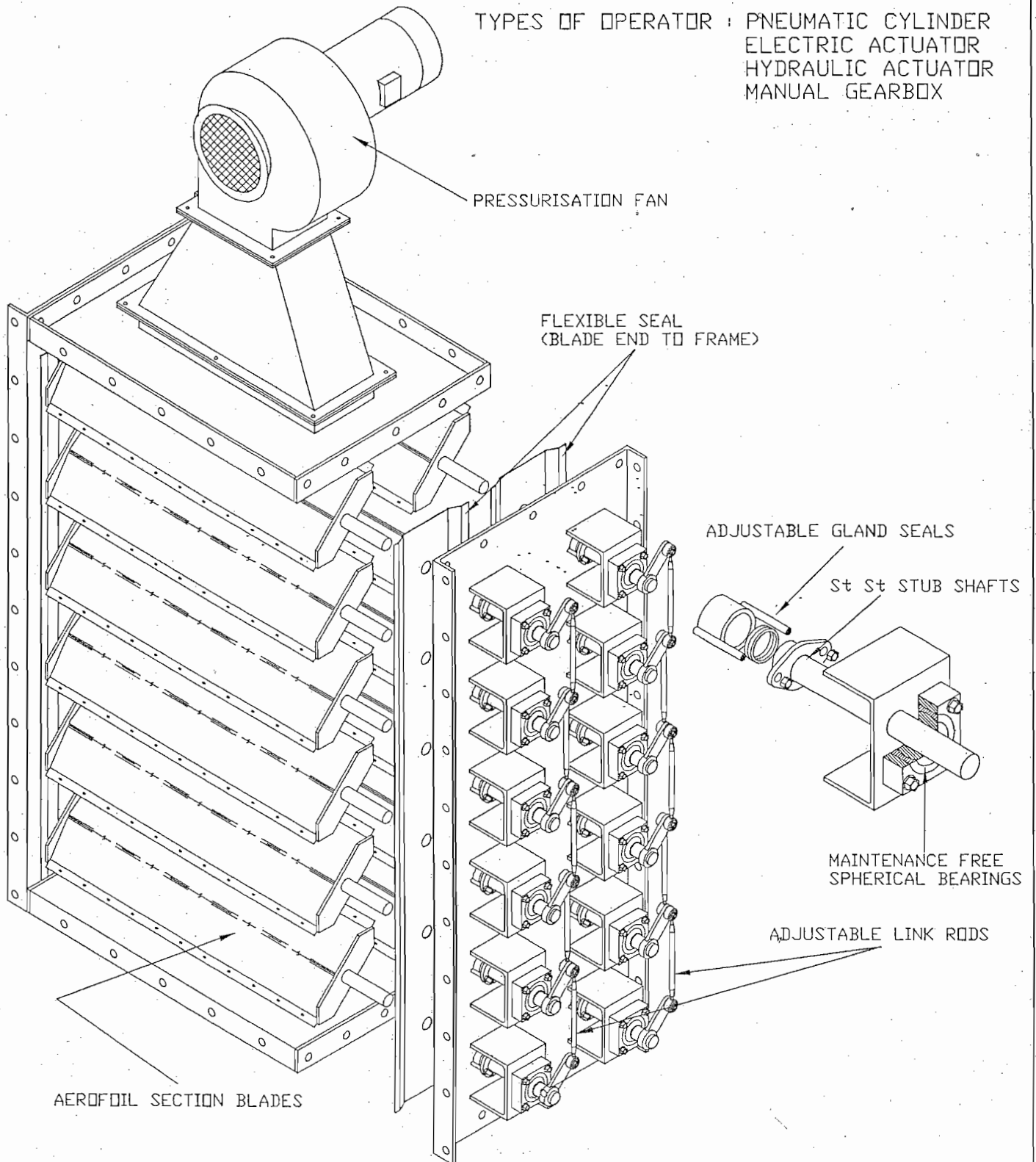
## DOUBLE BLADED LOUVRE CONTROL DAMPER

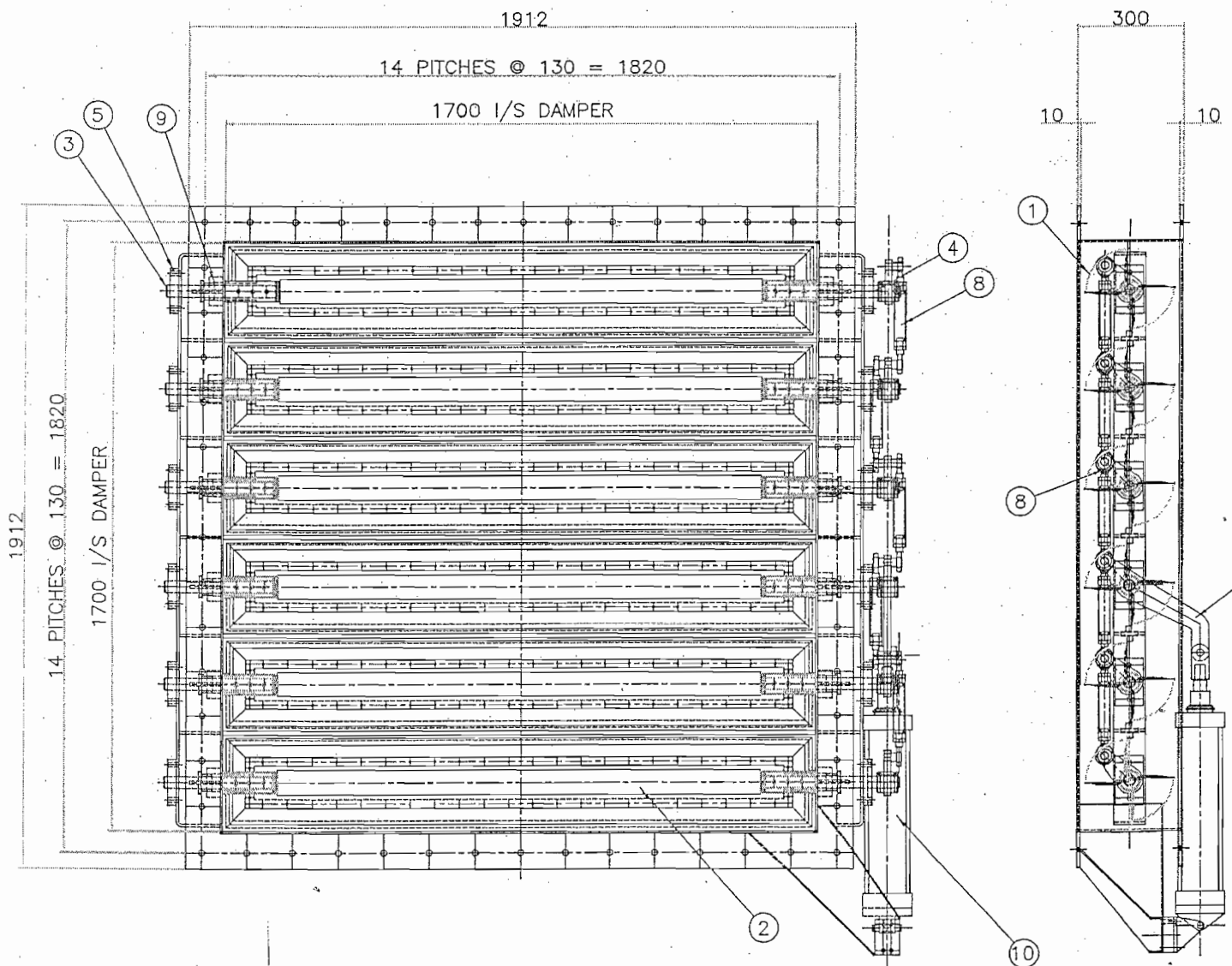
TYPES OF OPERATOR : PNEUMATIC CYLINDER  
ELECTRIC ACTUATOR  
HYDRAULIC ACTUATOR  
MANUAL GEARBOX



**DOUBLE PARALLEL BLADED  
PRESSURISED LOUVRE DAMPER**

TYPES OF OPERATOR : PNEUMATIC CYLINDER  
ELECTRIC ACTUATOR  
HYDRAULIC ACTUATOR  
MANUAL GEARBOX





ITEM	QTY	DESCRIPTION	MARKS
1	1	DAMPER CASING	0844-10-1
2	6	DAMPER BLADE	0844-10-2
3	6	STUB SHAFT (NON DRIVE)	0844-10-3
4	6	STUB SHAFT (DRIVE)	0844-10-3
5	12	BEARING BLOCKS c/w SPH. BRGS	SBH-35
6	5	LEVER ARMS	0844-10-4
7	1	DRIVE LEVER ARM	0844-10-5
8	5	ADJUSTABLE LINK RODS	0844-10-6
9	12	GLAND SEAL ASSEMBLIES	0844-10-7
10	1	NORGREN PHNEUMATIC ACTUATOR.	M950/400

NOTE:-  
 1. MATL: CASING & FLANGES MILD STEEL  
 - STUB SHAFTS : GR 304 ST. ST.  
 2. QTY - 1 OFF REQUIRED  
 3. PRESSURE - 3kPa  
 4. TEMPERATURE - 38°C  
 5. VELOCITY - 25 m/sec  
 6. MINIMUM 5 Bar SUPPLY PRESS. REQ'D  
 7. SEALING EFFICIENCY - 99% ON FLOW

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P.O. BOX 13142  
 ELSPARK 1418

DRAWN DATE TITLE  
 TMS 28/06/97  
 CHECK DATE

GA. OFF 6 BLADED LOUVRE DAMPER.

DRAWING NUMBER  
 0844-01

REV	BY	DESCRIPTION	DATE	CHECK



# Flowseal Engineering (Pty) Ltd

## Guilotine Dampers

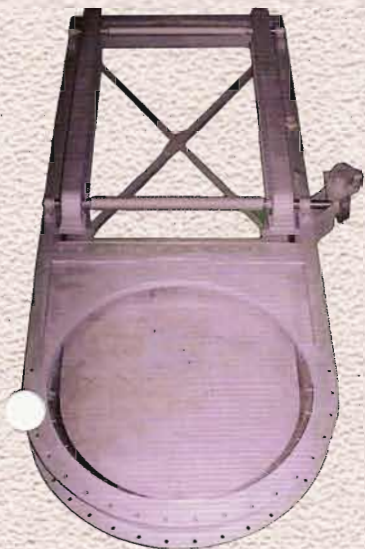
Guilotine Dampers are generally used where high efficiency isolation is required, or in cases where it is inadvisable to have any blades in the gas stream, due to abrasion - they are not suitable as control dampers.

Various sealing arrangements are available, including purge air arrangements to provide total isolation of process gas.

These dampers are of extremely robust construction, with all components requiring maintenance placed on the outside, permitting maintenance to take place whilst the plant is on line.

The preferred blade drive mechanism is by heavy duty chains and sprockets, which have proved to be totally reliable-even in instances when the dampers are only operated once per year during maintenance shut downs.

Materials of construction, refractory lining, if required, and drive configurations are selected and designed to suit the application and customer requirements.



## FLOWSEAL GUILLOTINE DAMPERS

**Flowseal** Guillotine Dampers are designed and fabricated to meet the requirements of power and industrial plants and comply fully with the requirements of AMCA publication 850-84. They provide effective and reliable isolation in hot, noxious, corrosive and dirty gas flow conditions.

All **Flowseal** Guillotine Dampers utilize a rugged and heavy duty chain and sprocket drive system to provide a positive drive to the gate in both directions. The reliability of this system has been amply proved through years of use.

**Flowseal** Guillotine Dampers are designed so that all parts are field replaceable without removing the frame from the duct. Chain drive maintenance is simple and can be performed whilst the system is on line.

The following styles of guillotine dampers are available:

### **Type AS single blade Guillotine Dampers.**

Sealing efficiency : 99% of full flow or better.

A single thickness solid plate gate seats on a landing bar on the upstream side of the gate with a series of pins providing the guides on the downstream side. This design provides for effective self cleaning.

### **Type SS spring seal single blade Guillotine Dampers.**

Sealing efficiency : 99.9% of full flow or better.

A stainless steel leaf spring bears against the upstream side of the gate with the downstream side being guided by a landing bar.

### **General Design**

**Flowseal** guillotine dampers can be fabricated for any duct size, circular or rectangular and can be fitted to a vertical duct or to a horizontal duct with the gate entry from the top or bottom of duct.

The dampers are designed to fulfill specific application requirements and conform to the following minimum specifications.

### **Construction**

Materials of construction are selected for their suitability for the conditions of temperature and pressure, and the corrosive and abrasive environment of the system.

### **Frames**

Frames are designed to be entirely self-supporting in the duct with no external mounting or anchoring required and are normally fabricated from carbon steel channel sections. The flanges are pre-drilled to customer requirements. On duct openings wider than 2000 mm, one or more pipe blade guides are installed on the downstream side of the gate in the plane of travel.

The frames are designed for the system pressure and temperature as well as construction and transportation loadings.

## **Gate**

The gates are fabricated from a single thickness solid plate in Corten A, 3CR12 or other exotic material as may be required. The thickness of the gate is designed so that deflection under full differential pressure, when closed, is less than  $1/360^{\text{th}}$  of the duct width. The gate is fully retracted from the duct when in the open position, thus completely eliminating thermal distortion of the gate.

## **Gate entry seals**

Sealing to atmosphere at the gate port is accomplished by stainless steel spring leaf type seals or pneumatically operated top hat seals. The latter is recommended when the system is under positive pressure.

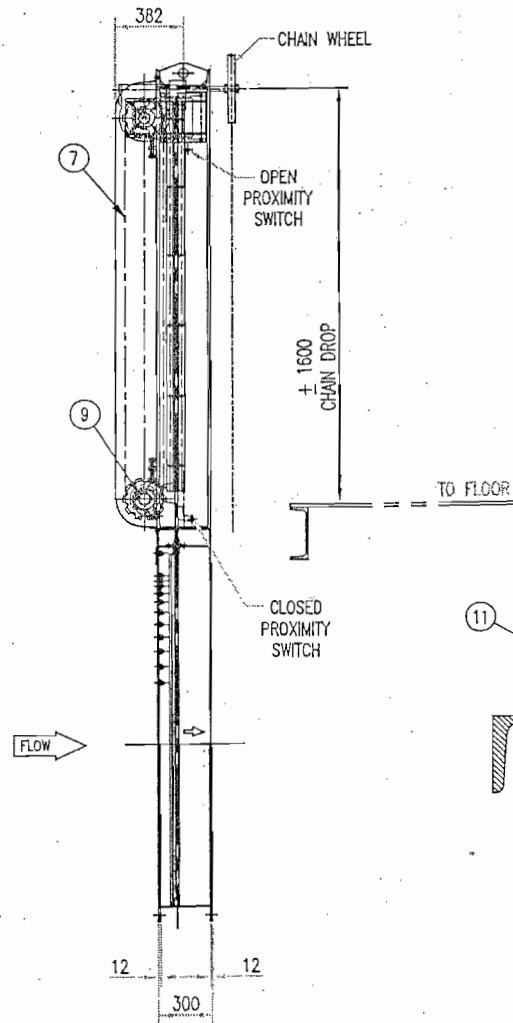
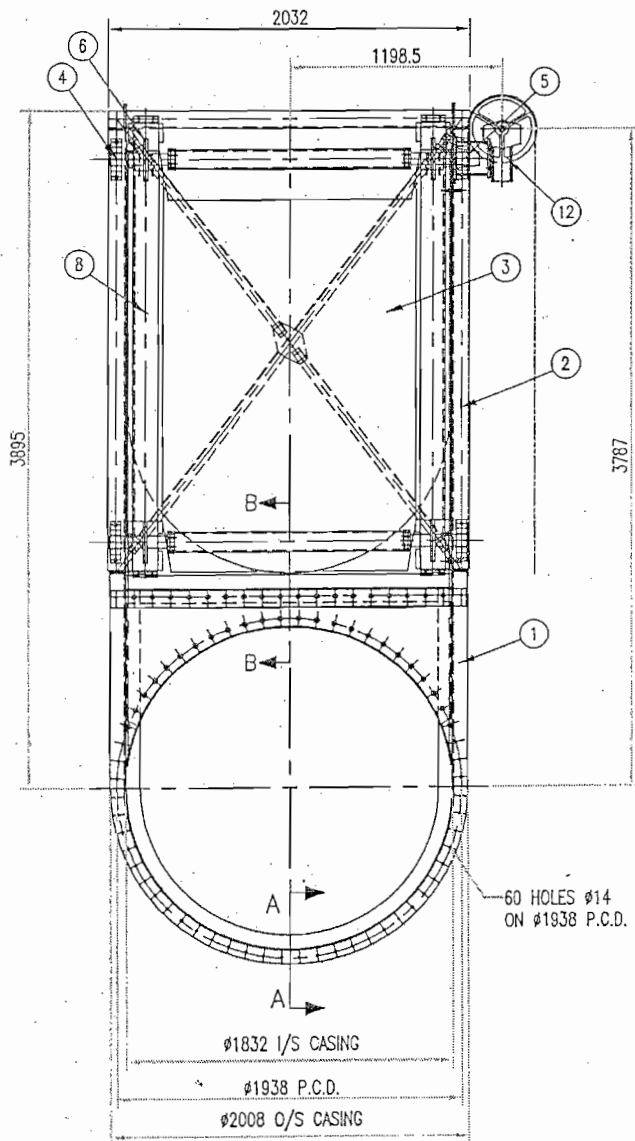
## **Chain drive**

The dampers utilize a dual chain drive using WH78 chain and with sprockets fitted to a drive and an idler shaft. The chain is to be capable of driving the gate with only one chain working and this is to be tested in the works prior to dispatch. The shaft bearings are to be of the maintenance free type.

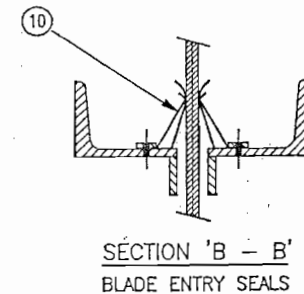
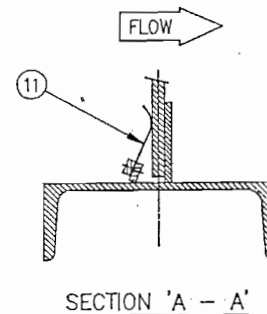
## **Actuators**

**Flowseal** guillotine dampers can be furnished with electric, hydraulic or manual actuators. The actuators are sized to function reliably over the full range of system temperatures and pressures with a minimum factor of safety of two. Actuators may be fitted with manual overrides and fail safe open or fail safe closed devices if required. All actuators are fitted at the factory and fully tested prior to shipment.

Actuators can be fitted to either shaft and on either side of the guillotine.



ITEM	QTY	DESCRIPTION	REMARKS
1	1	CASING	1165-01-01
2	1	GUILLOTINE FRAME	1165-01-02
3	1	GUILLOTINE BLADE	1165-01-03
4	1	IDLER SHAFT	1165-01-04
5	1	DRIVE SHAFT	1165-01-04
6	4	SPROCKETS	1165-01-05
7		WH78 CHAIN	WH78
8	2	CHAIN GUARDS	1165-01-06
9	4	BEARINGS	1165-01-07
10	1	BLADE ENTRY SEAL	1165-01-08
11	1	BLADE SEAL	1165-01-09
12	1	FW130SP GEARBOXES	



- NOTES:
1. MATL - CASING, BLADE :3CR12  
SUPPORT FRAME :GR 300 WA  
SHAFTS & FLEXIBLE SEALS :GR 304 ST.ST  
ALL BOLT ON EXTERNAL PARTS : MILD STEEL
  2. QTY - 1 OFF REQ'D
  3. MAX TEMPERATURE - 178°C
  4. MAX PRESSURE - 22 kPa
  5. SEALING EFFICIENCY - >99.5% FULL FLOW
  6. MILD STEEL PARTS TO BE PAINTED TO SPEC: S00990 "SCRUBBING AREA"

TOTAL MASS OF DAMPER ASSEMBLY:	1980kg
LONMIN P.O. NO:	147529X
HATCH PACKAGE NO:	D0318-PM-014
HATCH DRG NO :	D0318-EO-V-048 REV A

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FAX P.O. BOX 13142  
ELSPARK 1418

DRAWN TMS DATE 13/11/02 CLIENT

LONMIN PLATINUM  
MARIKANA, SOUTH AFRICA

DRAWING NUMBER  
FSE-1165-01

A	TMS	GEARBOX MOVED TO UPPER SHAFT & ROTATED 180°.	09-12-02	DJL
REV	BY	DESCRIPTION	DATE	CHECK

CHECKED DATE TITLE

GA. OF SULPHUR FIXATION SYSTEM BYPASS DAMPER  
EQPT NO's : 47DPR107

REV  
A



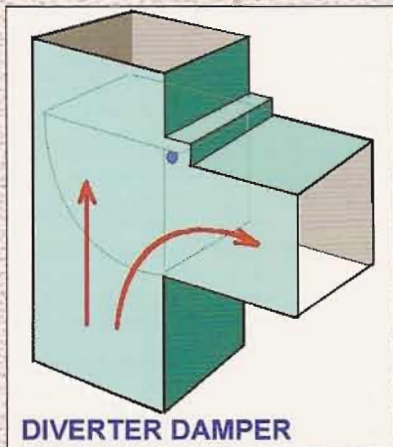


# Flowseal Engineering (Pty) Ltd

## Diverter, Dilution & Swing Dampers

The variations possible for these dampers are virtually infinite.

All types can be manufactured as either "open / close" or as control dampers, and in the case of diverter dampers, the blades may be linked and operated by a single actuator or they may be operated individually.



Dilution dampers could be of the flap type round or rectangular, and with resilient seats or rectangular louver construction with special seal arrangement to reduce indraught air leakage.



Swing dampers provide a means of keeping the blade out of the gas stream when in the open position and are particularly suitable for cases where the gas stream contains abrasive particulate.

Materials of construction and drive configurations are selected and designed to suit the application and customer requirements.





# Flowseal Engineering (Pty) Ltd

## Radial Vane Control Dampers



These are primarily intended as fan inlet control dampers where, by introducing swirl into the inlet of the fan in the direction of rotation, the fan curve is changed as the damper moves, thus maintaining operation at an efficient point on the fan curve and eliminating the possibility of stalling at low volumes.



The dampers can be designed to suit overhung impellers or impellers with through shafts and can be built for double inlet fans and operated by a single drive mechanism.

Materials of construction and drive configurations are selected and designed to suit the application and customer requirements.



## **FLOWSEAL RADIAL VANE CONTROL DAMPERS (RVC's)**

**Flowseal** RVC dampers are designed and fabricated to meet the requirements of power and industrial plants and to comply fully with the requirements of AMCA publication 850-84. They provide effective and reliable control in hot, noxious, corrosive and dirty gas flow conditions.

**Flowseal** RVC dampers can be manufactured with either a Cylindrical or Conical housing configuration to suit overhung fan impellers or fans with impellers between bearings. The blades are of single thickness plate construction with aerofoil shape stiffeners. In all cases the blades are driven by a series of lever arms arranged around the outside of the housing, connected to adjustable link rods, which are in turn connected to an external control ring. All RVC's dampers are fitted with maintenance free DU bushes or similar, which have proven most reliable in all conditions.

**Flowseal** RVC dampers are designed for minimum maintenance and that which is required is simple and can mostly be performed while the system is on line.

The following styles of RVC dampers are available:

### **Type CL Radial Vane Control Dampers.**

The type CL RVC is a damper with cantilever blades, supported by a series of double bushed bearings arranged around the outside of the housing and is intended for use on small fans and fans with through shafts.

### **Type CH Radial Vane Control Dampers.**

These dampers are fitted with central hubs which are equipped with bushes. The blades have stub shafts on both ends which fit into bushes located in the central hub and around the outside of the housing. This arrangement is suited to larger fans and can also be used on fans with through shafts. In some cases straightening vanes can be fitted to the central hub to enhance fan performance.

### **General Design**

**Flowseal** RVC dampers can be fabricated for any fan size, and can be designed to fit inside the body of the fan casing, built into the fan inlet cone, or external to the fan casing. Actuators can be direct mounted or pedestal mounted with a control rod linking the actuator and RVC control ring. RVC's can be built for double inlet fans and operated by a single drive mechanism.

### **Construction**

Materials of construction are selected for their suitability for the conditions of temperature and pressure, and the corrosive and abrasive environment of the system.

### **Housings**

Housings are designed to be entirely self supporting in the duct or fan casing with no external mounting or anchoring required. The flanges are pre-drilled to customer requirements. The housings are designed for the system pressure and temperature as well as construction and transportation loadings.

### **Blades**

Damper blades are of single thickness plate construction, stiffened if necessary. Stub shaft connections are adequately strengthened for the bolt fastenings. Damper blades are designed so that the maximum deflection under operating conditions does not exceed L/360.

### **Bearings and bearing housings**

Bearings are maintenance free DU or Vesconite Bushes, under no circumstances will ball or roller bearings be considered due to their potential to brinell and seize under normal damper operating conditions. The bearings are located sufficiently removed from any potential heat source to ensure that they are operating within their design temperature rating.

### **Lever arms and link rods**

The geometry of the lever arms and link rods is such that forces are evenly transmitted throughout the arc of travel, and care taken to prevent toggle action becoming possible. All link rods are adjustable. Under no circumstances can any clearances or loose connections be permitted in the link rod geometry as this would adversely affect the operation of the damper. Rod ends are of the spherical low maintenance type.

### **Control Ring**

The control ring, to which individual link rods are attached, is designed to absorb all the forces exerted by the actuator and the individual link rod attachments without deflection. The inside of the ring is machined to ensure smooth travel over the guide wheels. Stops are fitted to the guide ring, during assembly and testing, to ensure that over travel is not possible.

### **Guide Wheels**

These support the control ring and are individually adjustable to ensure that the control ring cannot "float" through it's arc of travel.

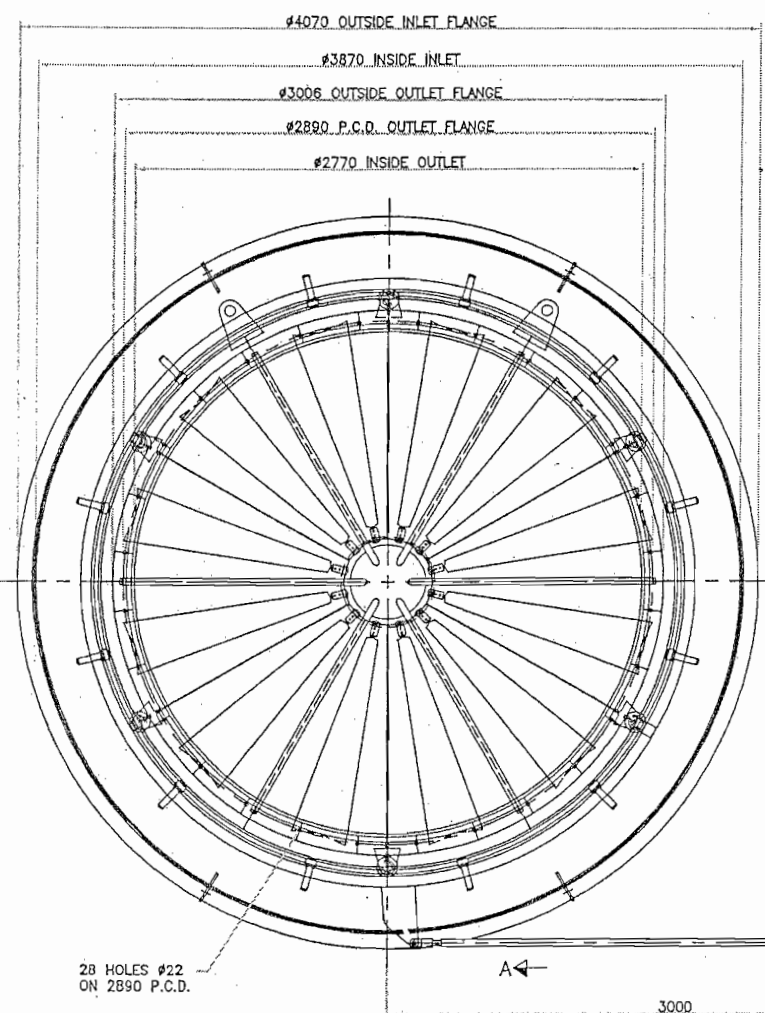
### **Stub shafts**

Stub shafts will always be manufactured in grade 304 stainless steel or better. The stub shafts are designed to transmit the maximum torque potential of the drive mechanism.

It is imperative that the combined geometry of blade connection, thru bearing and lever connection, is such that the potential for pushing the shaft out of alignment during operation is totally eliminated.

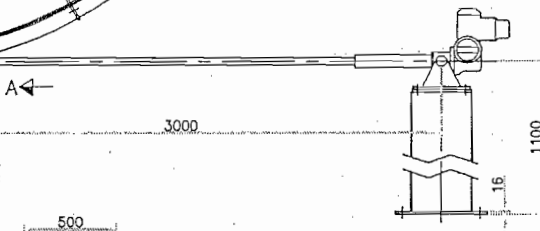
### **Actuators**

**Flowseal** RVC dampers can be furnished with electric, pneumatic, hydraulic or manual actuators. The actuators are to be sized to function reliably over the full range of system temperatures and pressures. Actuators may be fitted with positioners, I/P converters, solenoid valves, manual overrides and fail safe open or fail safe closed devices if required. All actuators are to be fitted at the factory and fully tested prior to shipment.

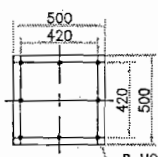


VIEW ON OUTLET FLANGE

28 HOLES #22 ON 2890 P.C.D.

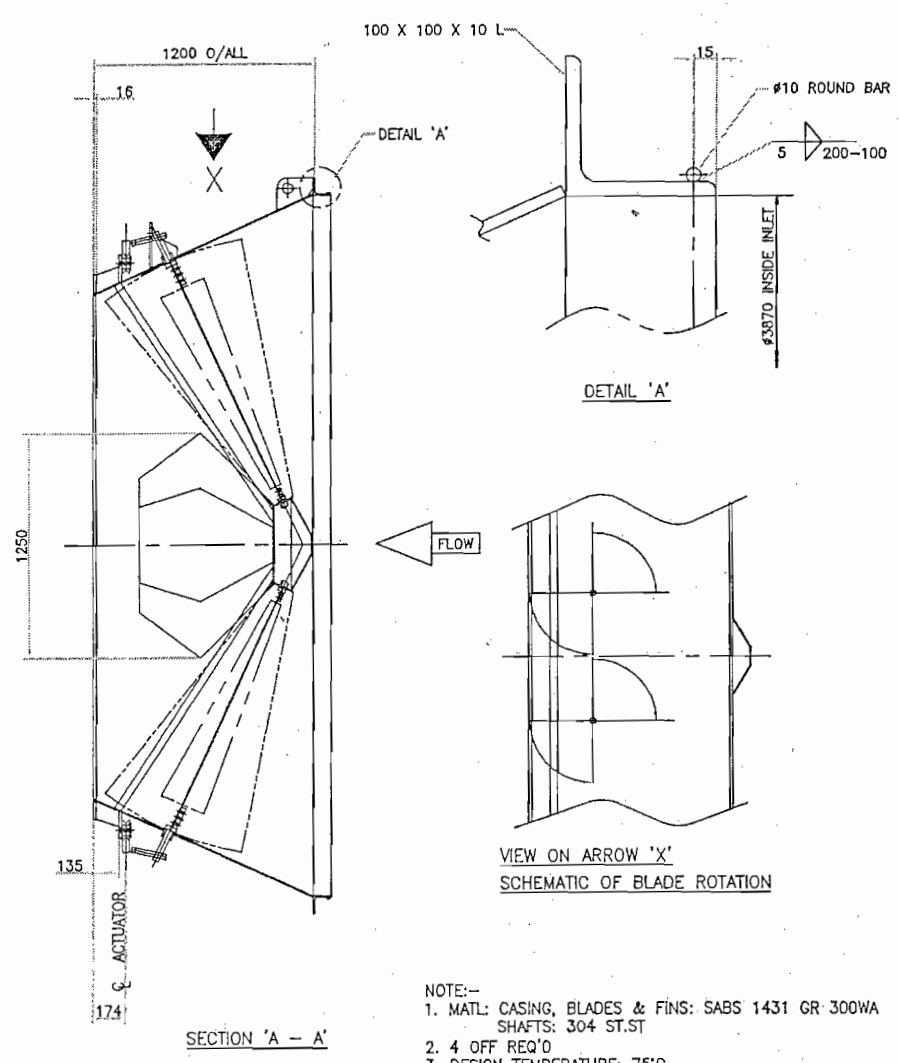


VERTICAL LOADS - PER BOLT  
 +42kN (DOWN)  
 -40kN (UP)



PLAN ON PEDISTAL BASE

8 HOLES #27 FOR M24 BOLTS



SECTION 'A - A'

VIEW ON ARROW 'X'  
 SCHEMATIC OF BLADE ROTATION

- NOTE:-
1. MATL: CASING, BLADES & FINS: SABS 1431 GR 300WA  
SHAFTS: 304 ST.ST
  2. 4 OFF REQ'0
  3. DESIGN TEMPERATURE: 75°C
  4. DESIGN PRESSURE :5.8 kpa
  5. SEALING EFFICIENCY :95%
  6. ACTUATOR: AUMA SA 14.1 COMPLETE WITH LINEAR UNIT LE 70

ITEM	QTY	DESCRIPTION	REMARKS
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DRAWN TMS DATE 30/10/01  
 CHECKED DATE

TITLE G.A. OF Ø3870 12 BLADED RVC

P.O. BOX 13142  
 ELSPARK 1418  
 DRAWING NUM FSE-0952-01  
 REV B

REV	BY	DESCRIPTION	DATE	CHECK
B	TMS	TROTTLER ROD LENGTH TO 3000	14/11/01	DJL
A	TMS	DRAWING CHANGED TO CUSTOMER REQUIREMENTS.	06/11/01	DJL



# Flowseal Engineering (Pty) Ltd

## Dished Disc Dampers

Particularly suited to waste gas ducts on bagasse or black liquor plants or where gas contains fibrous particulate which could get caught up on butterfly or louvre damper blades.





# Flowseal Engineering (Pty) Ltd

## Knife Gates

Knife gate dampers perform the same functions as a guillotine damper, which is to provide a damper where the blade is removed from the air stream whilst in the open position, but are generally smaller in size.

Knife gate dampers can be manufactured with an enclosed bonnet into which the blade is retracted when open. Drive arrangements are of the screw jack type with either a rising or non-rising spindle.

Knife gate operators vary from hand or chain wheel to electric motor driven and linear pneumatic.

Knife gate dampers are particularly suited to higher pressure applications where high sealing efficiencies are required such as pulverised fuel feed lines or as isolation valves on sulphuric acid plants.

Materials of construction and drive configurations are selected and designed to suit the application and customer requirements.

These may also be used as solids knife gate valves on bag filter & electro-static precipitator hoppers etc.



## FLOWSEAL KNIFE GATE DAMPERS

**Flowseal** Knife Gate Dampers are designed and fabricated to meet the requirements of power and industrial plants and comply fully with the requirements of AMCA publication 850-84. They provide effective and reliable isolation in hot, noxious, corrosive and dirty gas flow conditions.

All **Flowseal** Knife Gate Dampers utilize a rugged and heavy duty screw jack drive system to provide a positive drive to the knife gate blade in both directions. The reliability of this system has been amply proved through years of use.

**Flowseal** Knife Gate Dampers are designed so that all parts are field replaceable without removing the frame from the duct. Maintenance is simple and can be performed whilst the system is on line.

The following styles of Knife Gate dampers are available:

### **Type RS Rising Spindle Knife Gate Dampers.**

The rising spindle arrangement is ideally suited to applications where the operating medium is aggressive, ie., hot, corrosive or abrasive, in that the screw thread and nut is kept outside the bonnet in atmospheric conditions. The disadvantage of this system is the height required above the duct to accommodate the external frame and spindle when in the open position.

### **Type RN Rising Nut Knife Gate Guillotine Dampers.**

In this arrangement the nut and screwed portion of the spindle are located inside the bonnet and is only suitable for clean air applications at relatively low operating temperatures. It is a compact and cost effective solution in the correct conditions.

### **Seal Variations**

#### **1. Step Seat – sealing efficiency > 98% of area**

A non machined plate knife blade seals against a landing bar welded to the inside of the casing on the downstream side of the blade.

#### **2. Wedge Seat – sealing efficiency > 99.8% of normal flow**

A machined plate knife blade seats onto a machined landing bar welded to the inside of the casing. The seal is further enhanced by a series of adjustable wedges arranged around the periphery of the blade which force the knife blade onto the seat when in the closed position.

#### **3. Purge Cavity – total isolation**

As per the wedge seat arrangement, but with the addition of two seal rings in the landing bar. The cavity between these two seal rings is pressurised with air or inert gas at a pressure higher than the maximum operating pressure to create a total isolation of process gas across the blade.

### **General Design**

**Flowseal** Knife Gate dampers can be fabricated for any duct size, circular or rectangular and can be fitted to a vertical duct or to a horizontal duct.

The dampers are designed to fulfill specific application requirements and conform to the following minimum specifications.



## **Construction**

Materials of construction are selected for their suitability for the conditions of temperature and pressure, and the corrosive and abrasive environment of the system.

## **Frames**

Frames are designed to be entirely self supporting in the duct with no external mounting or anchoring required and are normally fabricated from carbon steel channel sections. The flanges are pre-drilled to customer requirements.

The frames are designed for the system pressure and temperature as well as construction and transportation loadings.

## **Gate**

The gates are fabricated from a single thickness solid plate in Corten A, 3CR12 or other exotic material as may be required. The thickness of the gate is designed so that deflection under full differential pressure, when closed, is less than  $1/360^{\text{th}}$  of the duct width. The knife gate is retracted into the bonnet (at a fairly similar temperature to the operating temperature) when in the open position, thus minimising thermal distortion of the knife gate blade.

## **Spindle / shaft entry seals**

Sealing to atmosphere at the spindle/shaft entry port is accomplished by gland stuffing box packed with packing that is compatible with the operating conditions.

## **Spindles / Shafts**

These will always be a minimum of grade 304 st st and will be designed so that the slenderness ratio does not exceed  $r/180$ .

## **Actuators**

**Flowseal** Knife Gate Dampers can be furnished with electric, hydraulic or manual actuators. The actuators are sized to function reliably over the full range of system temperatures and pressures with a minimum factor of safety of two. Actuators may be fitted with manual overrides and fail safe open or fail safe closed devices if required. All actuators are fitted at the factory and fully tested prior to shipment.



# Flowseal Engineering (Pty) Ltd

## Gas Valves

As the name implies, these are valves and as such provide isolation to much higher degree than dampers.

Where ducts carry noxious fumes and isolation is required to protect personnel downstream, only a valve offering total isolation will suffice.

This can be accomplished in one of two ways:

1. Provide a damper system in such a way that purge air can be introduced at a higher pressure than the process gas, (see Louvre dampers), or
2. Insert a blanking plate between two flanges or fit a Flowseal swing type Line Blind or a Flowseal fully automated Goggle Valve in the line,

Where gas tight operation is required Two Lever Disc Valves, Double Offset, Butterfly or Knife Gate Valves provide an economical solution (however these valves cannot be considered as man-safe).

Materials of construction and drive configurations are selected and designed to suit the application and customer requirements..



## **FLOWSEAL GOGGLE VALVES ( LINE BLINDS )**

**Flowseal** Goggle Valves are designed and fabricated to provide total and man safe isolation of gas pipelines in chemical, gas and industrial plants and are inspected, tested and certified in compliance with API (American Petroleum Institute) Standard 598.

**Flowseal** Goggle Valves can be supplied to suit a variety of conditions, from clean gas at ambient temperature to dirty and corrosive gas at high temperature, and can be of either the open or enclosed design.

**Flowseal** Goggle valves are designed for minimum maintenance, and that which is required is simple and can be performed whilst the system is on line.

The following styles of goggle valves are available:

### **Swing Blanks.**

A swing blank consists of a swing plate with an open and a closed port (goggle plate), with a central pivot point located between two jackable companion flange sets, with swing bolts for fastening. Operation is totally manual and requires a degree of flexibility in the adjacent piping system to permit jacking of the flanges prior to swinging the goggle plate.

### **Spiral Lock Goggle Valve.**

This consists of a manual slide type goggle plate located between a pair of clamping flanges. The clamping flanges are spread apart and closed by means of a series of interconnected spiral cams, operated by a single lever or ¼ turn gearbox, depending on size.

### **Automated Goggle Valve.**

The automated goggle valve is totally hydraulically operated and is recommended for larger sizes, or for applications where the operator would be at risk during manual operation. The clamping flanges are driven open and closed by means of a series of hydraulic cylinders, these cylinders span a metal expansion bellow, which allows the clamping flange to open and close. Traverse of the goggle plate is by means of a linear hydraulic cylinder whose stroke is exactly equal to the stroke of the goggle valve. This means that end of stroke on the cylinder in both directions is either the open or closed position of the valve, no possibility of incorrect positioning or reliance on limit switches etc.

It must be noted that all goggle valves, when operated, allow the escape of gas to atmosphere if under positive pressure, or suck air into the system if under negative pressure.

Goggle valves can be supplied as either "open", or "enclosed" units. The enclosed valves have a casing built around the goggle plate and clamping flanges, with a vent pipe attachment, which allows escaped gases to be ducted to a place of safety.

### **General Design**

Goggle valves can be fabricated for any pipe or duct size, to suit horizontal, angled or vertical pipes, with goggle plate operation horizontal or vertical.

On automated systems, the hydraulics can be supplied to customer specification. This can vary between simple supply of directional valves, for operation of the goggle valves, with hydraulic pressure supplied by customer, to fully automated system with hydraulic power pack and PLC with all necessary interlocks, alarms and indications.

## **Minimum Specifications.**

### **Construction**

Materials of construction are selected for their suitability for the conditions of temperature and pressure, and the corrosive and abrasive environment of the system.

### **Frames**

Frames are designed to accept a limited amount of axial, lateral and bending loading, however, it is essential that we be advised of valve orientation in duct as well as goggle plate direction of travel, and all anticipated external loading.

The valves are then designed as supported or self-supporting units with external mounting or anchoring as required.

The flanges are pre-drilled to customer requirements.

The frames and housings are designed to withstand 1.5 times system pressure and design temperature as well as construction and transportation loadings.

### **Clamping Flanges**

These are machined on the clamping faces and are either of a corrosion resisting material or plated to prevent corrosion.

### **Goggle Plates**

Goggle plate assemblies are designed for conditions of pressure, temperature and gas composition. Each ring is removeable whilst the valve is in operation (on open valves) and seals are accessible for inspection or maintenance whilst on line.

### **Goggle Plate Guides**

These are designed to ensure smooth and trouble free operation of the valve. An important feature of the valves is that the guides, when unclamped, ensure that the both upstream and downstream seals are clear of the clamping flanges before the goggle plate starts its traverse.

### **Hydraulic Clamping Cylinders**

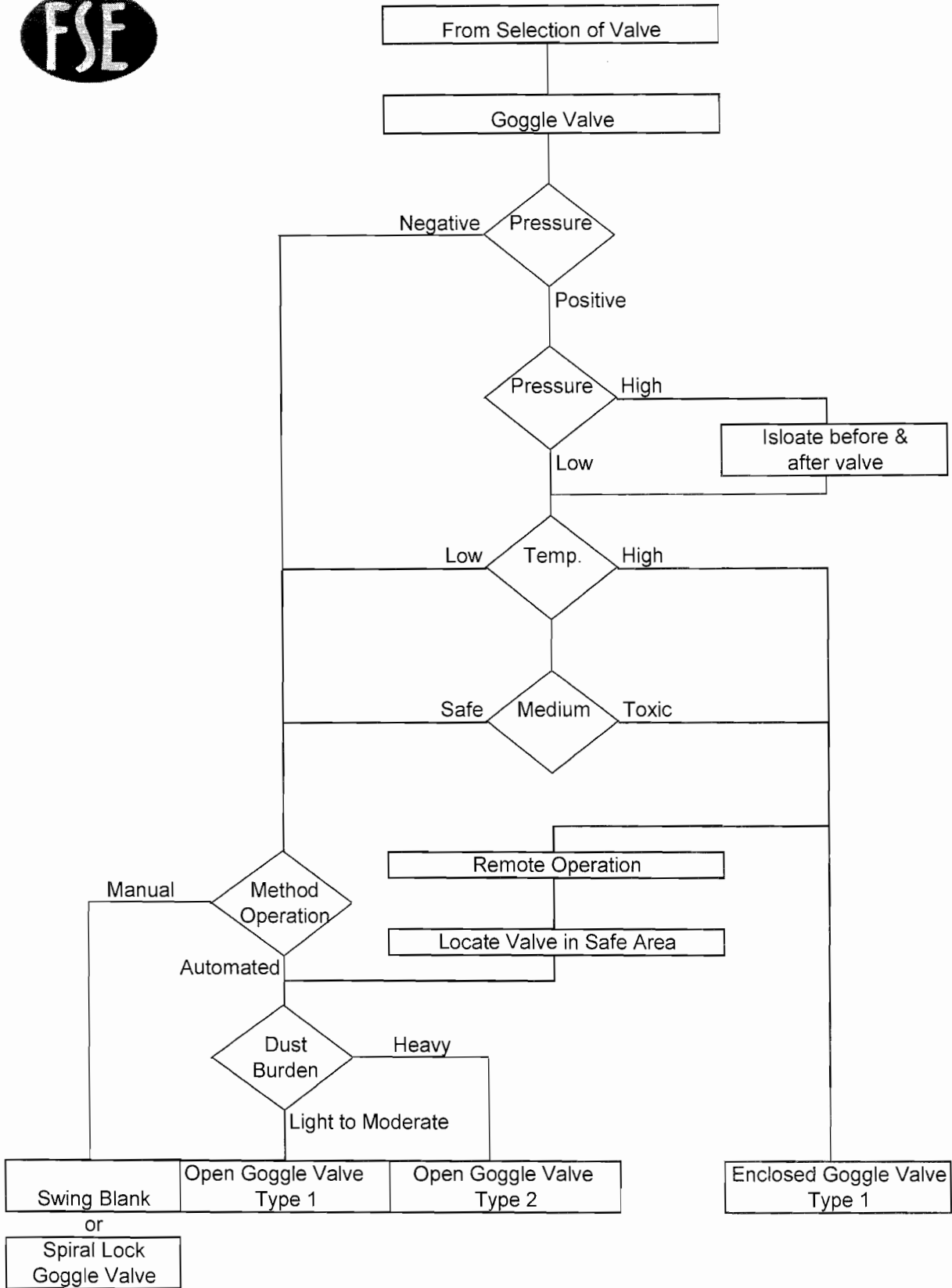
These are single acting spring return cylinders, with sufficient force in the springs to ensure sealing of the goggle plate under operating conditions. The springs used are Belville washers and the design of the cylinders ensures that the washers can not be over compressed, which would result in loss of clamping power.

### **Seals**

The goggle plates are fitted with rubber "O" ring seals or other suitable seals, depending on operating conditions and temperature. The seals are fitted in machined grooves and are readily accessible for inspection and maintenance whilst in operation.

### **Limit Valve**

A hydraulic valve is placed in the circuit, with a striker to detect that the clamping flanges are properly apart, before allowing fluid to the traverse cylinder, thus ensuring that the seals are clear of the clamping flanges before the goggle plate starts to move.



Note! Due to complexity and cost of hydraulics, only use type 2 Goggle Valve if dust is considered to be a major problem, and if tight fitting telescopic flow plates are deemed to be inadequate for the conditions.

## FLOWSEAL GOGGLE VALVE – TYPICAL CONFIGURATION

### DESCRIPTION OF HYDRAULIC SYSTEM

The hydraulic system consists of the clamping and traverse cylinders and roller operated limit valve on the Goggle Valve plus the power pack with electrical control box and directional control valves plus the hydraulic hoses between the Goggle Valve and the Power Pack.

The Clamping cylinders are single acting cylinders requiring hydraulic pressure to unclamp and are equipped with a set of Belville washers (Disc springs) which provide the required clamping force.

They are designed to open with a hydraulic pressure of 100 Bar and provide a clamping force of approximately 2000kg force each in the clamping position.

The traverse cylinder is a double acting linear cylinder with end of travel in the extended and retracted positions determining the open and closed positions of the Goggle plate.

The hydraulic supply to the traverse cylinder directional control valve is via a roller operated limit valve, which will only permit actuation of the traverse cylinder if the clamping flanges are in the open position. This is to prevent damage to the seals during traverse.

The Power Pack consists of a 40 litre reservoir, mounted on wheels and complete with push / pull handle, is comprised of the following components:

1. Power Pack

- Reservoir
- 3.8 cc pump
- Check valve
- 3.0 kW motor, 415 V, 50 Hz, 3 phase, 4 pole
- Level / temperature gauge
- Hydraulic pressure gauge
- Adjustable pressure relief valve
- Filler / Breather cap
- Return line filter
- Low level switch
- Manual Hand Pump (for use in the event of power failure to power pack)

2. Electrical Control Box

- Main Switch
- Power On Indicator
- Tank low Level Indicator
- Overload Trip Indicator
- Pump Running Indicator
- Stop / Start buttons
- Emergency Stop button

3. Directional Control Valves

- Clamp / Unclamp valve
- Traverse Valve

The power pack pump & motor are designed to deliver a maximum pressure of 250 Bar gauge and a total operating time of < 30 seconds from open to closed or vice versa.

The wiring in the electrical control box is configured such that the hydraulic pump motor will not start if the low level alarm indication is on.

The directional control valves are solenoid operated, three position valves. The valves are configured in the following manner:

Neutral position	: Locked in latest selected position
Energise Unclamp	: Unclamp
Energise Close or Open	: Close or Open
Energise Clamp	: Clamp

These valves both incorporate load hold check valves, the purpose of which is to ensure that when the valve is in the neutral position the relevant cylinders remain locked in that position.

Hydraulic hoses are 300 Bar rated.

A manual hydraulic hand pump has been incorporated in line for use in the event of power failure to the power pack.

## **FLOWSEAL TWO LEVER DISC VALVES**

**Flowseal** Two Lever Disc valves are designed and fabricated to meet the requirements of process, gas and industrial plants and are inspected, tested and certified in compliance with API (American Petroleum Institute) Standard 598.

**Flowseal** Two Lever Disc valves are intended mainly for bubble tight isolation on relatively clean gas systems. They can be designed and manufactured for temperatures up to 600°C and for corrosive conditions.

### **General Design**

**Flowseal** Two Lever Disc valves can be fabricated to any size, and can round or rectangular. They can be supplied with a variety of different seal arrangements and materials.

### **Construction**

Materials of construction are selected for their suitability for the conditions of temperature and pressure, and the corrosive and abrasive environment of the system.

### **Housings**

Housings are designed to be entirely self supporting in the duct with no external mounting or anchoring required. The flanges are pre-drilled to customer requirements.

The housings are designed for the system pressure and temperature as well as construction and transportation loadings.

### **Blades**

Damper blades are of single thickness plate construction and can be flat or dished, depending on design pressure. The periphery of the blade is machined to accept the seal material.

### **Bearings and bearing housings**

Bearings shall be maintenance free DU or Vesconite Bushes, under no circumstances will ball or roller bearings be considered due to their potential to brinell and seize under normal damper operating conditions. The bearings shall be located sufficiently removed from any potential heat source to ensure that they are operating within their design temperature rating.

### **Levers and links**

The geometry of the levers and links ensures that during the initial stages of opening, the blade lifts off the landing bar flat and parallel to the duct centre line, thus ensuring positive seating and minimal wear to the seals. If required lubrication points for the various bushes can be provided, however, in the interests of reliability, we endeavour to avoid this if possible.

### **Shafts**

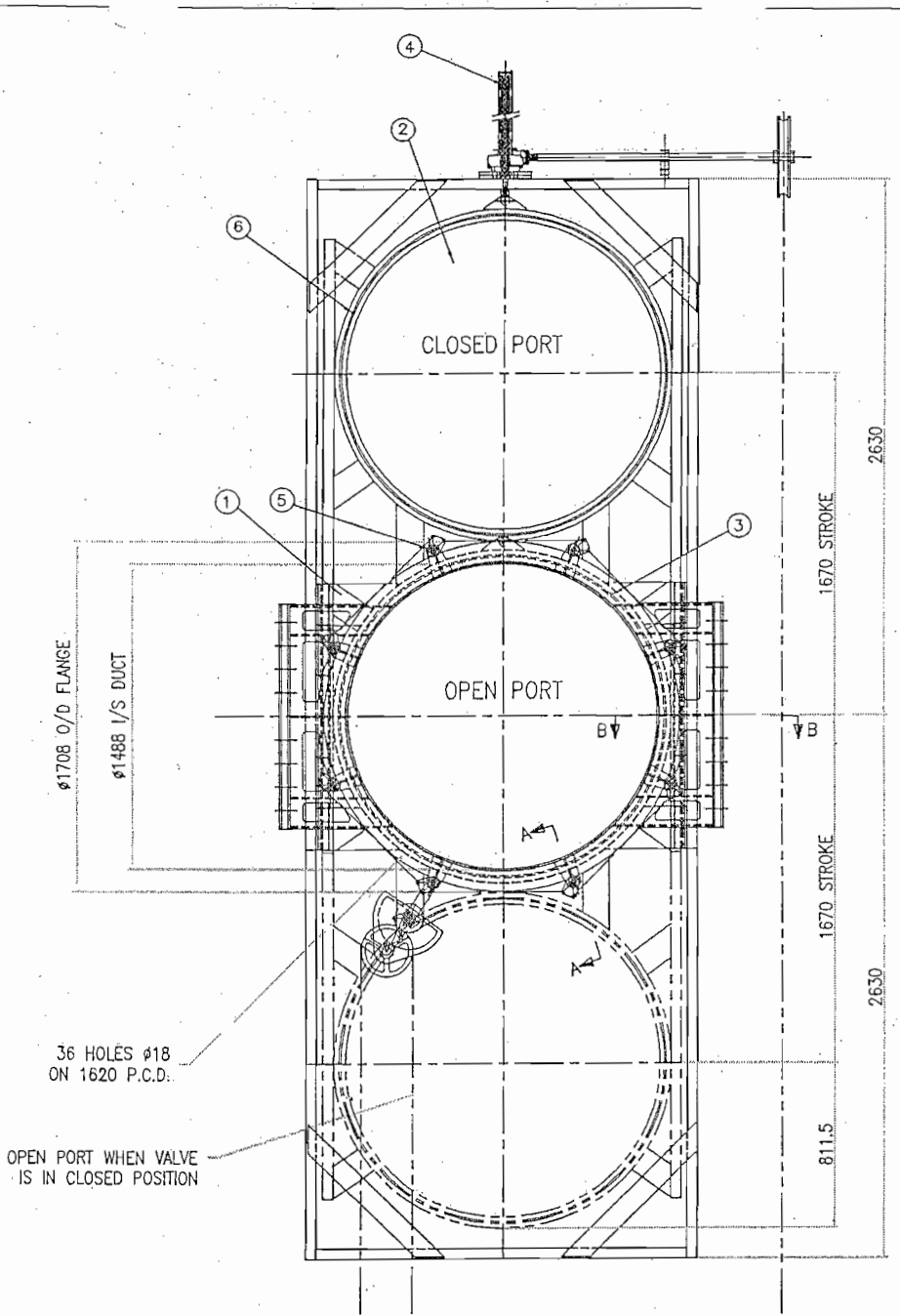
Shafts will always be manufactured in grade 304 stainless steel or better. The shafts are designed to transmit the maximum torque potential of the drive mechanism.

It is imperative that the combined geometry of blade connection, thru bearings, levers and links is such that the full potential forces of the actuator can be accommodated



## **Actuators**

**Flowseal** Two Lever Disc valves can be furnished with electric, pneumatic, hydraulic or manual actuators. The actuators are to be sized to function reliably over the full range of system temperatures and pressures. Actuators may be fitted with positioners, I/P converters, solenoid valves, manual overrides and fail safe open or fail safe closed devices if required. All actuators are fitted at the factory and fully tested prior to shipment.



ITEM	QTY	DESCRIPTION	REMARKS
1.	1	VALVE BODY	0842-01-01
2.	1	GOGGLE PLATE	0842-01-02
3.	1	FLEXIBLE ELEMENT	
4.	1	SPINDLE	
5.	8	CLAMPING / UNCLAMPING CYLINDERS	
6.	4	SEAL RINGS	
7.	1 SET	VESCONITE SLIDES	
8.	2	BRIDGE PLATES.	

**GENERAL NOTES:**

MATERIALS: ALL WELDED PARTS & WELD ON COMPONENTS- GRD 304 ST.ST.  
 FLEXIBLE ELEMENT & FLOW PLATES- GRD 304 ST.ST.  
 SEAL RINGS :SILICONE CORD  
 BOLTS NUTS ETC : 4.6 GALVANISED.  
 WELDING : ASME IX.

DESIGN CONDITIONS: INSTALLED FLOW DIRECTION: HORIZONTAL  
 NORMAL OPERATING CONDITION : OPEN  
 DESIGN TEMPERATURE : 200°C  
 DESIGN PRESSURE : 0.301 Bar.g  
 SEALING EFFICIENCY : TOTAL ISOLATION OF PROCESS GAS ACROSS CLOSED PORT.

TAG NO. : HV-350066		PROJECT No. 6348
<b>SULPHOS</b> Dougie Roberts Centre Street Boulevard P.O.Box 505 Bedfordview 2006 Republic of South Africa Telephone (011) 458-1000 Telex 7-47450 SA Telefax (011) 458-1400 E-mail: sulphos@wesa.co.za		VENDOR AUTHORITY SIGNATURE
PO/CONTRACT No. PO 427-H2S04	SEQUENCE No.	CATEGORY: G2
EQUIPMENT No. HV-350066		
EXTERNAL DOCUMENT REVIEW FOR CONFORMITY WITH SPECIFICATIONS AND DESIGN DRAWINGS		
A= NOT SUITABLE. RESUBMIT BEFORE FABRICATION B= MODIFY AS NOTED. RESUBMIT BEFORE FABRICATION C= MODIFY AS NOTED. COMMENCE FABRICATION AND RESUBMIT D= SUITABLE. COMMENCE FABRICATION. SUBMIT FINAL OR 'AS BUILT' DOCUMENTATION AS REQUIRED I= RETAINED FOR INFORMATION F= CERTIFIED FINAL RECEIVED	SUBMISSION No. 02	SULPHOS AUTHORITY SIGNATURE
THEY REVIEW DOES NOT RELIEVE THE VENDOR/CONTRACTOR OF ANY RESPONSIBILITY FOR THE ERRORS IN DESIGN AND DETAILING OF CONNECTIONS, DIMENSIONS AND SIZES		

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 ELSPARK 1418

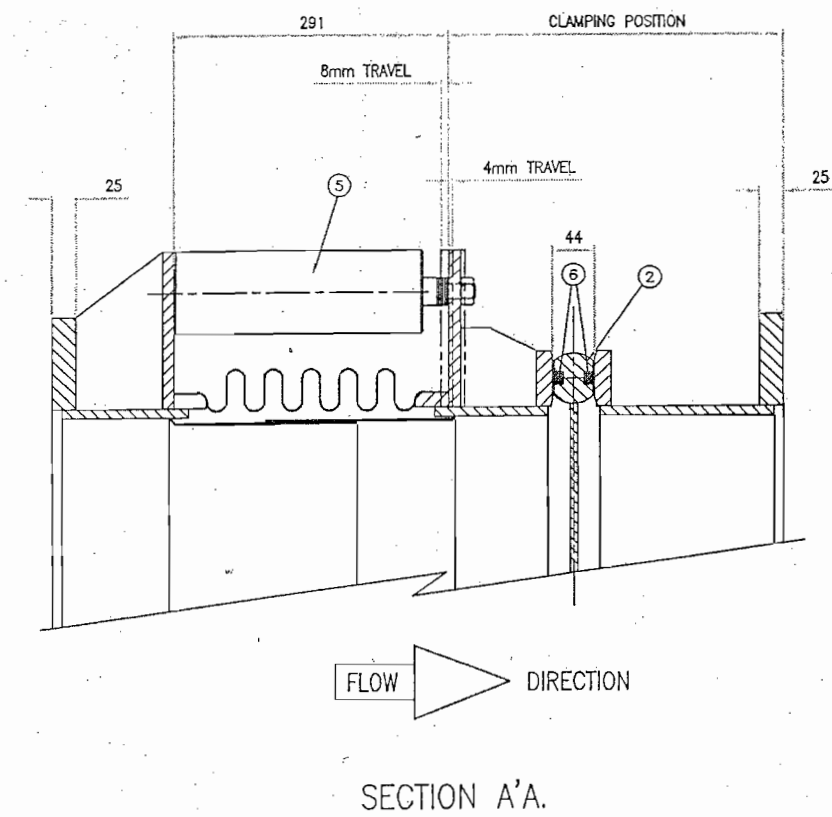
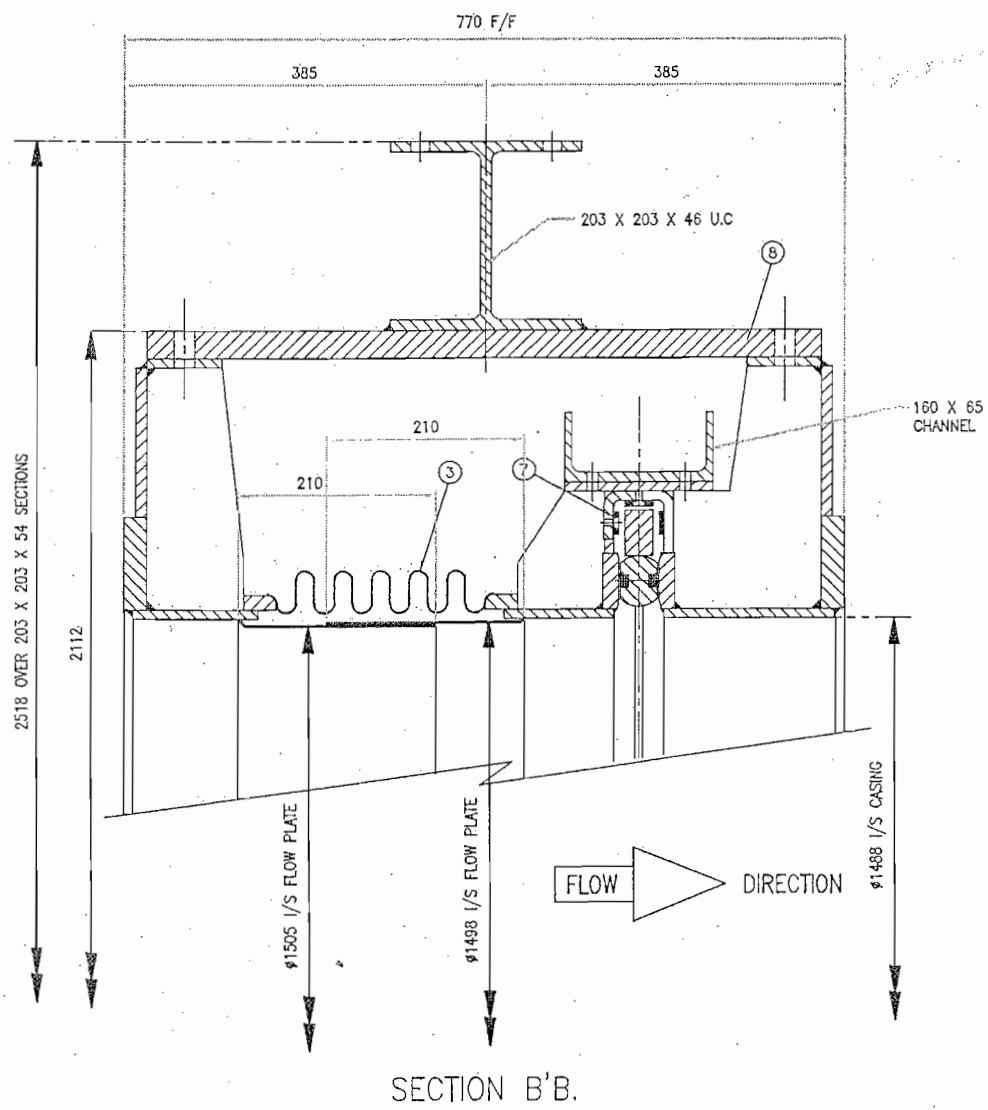
DRAWN DATE TITLE  
 TMS 03/06/01 G.A OF  $\phi 1488$  GOGGLE VALVE

CHECKED DATE

DRAWING NUMBER  
 FSE-191301

REV	BY	DESCRIPTION	DATE	CHECK

ITEM	QTY	DESCRIPTION	REMARKS
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DRAWN TMS	DATE 03/07/01	TITLE DETAIL OFF SECTION A & B.	DRAWING NUMBER 0842-01	REV A
CHECKED	DATE		2 OF 3	

REV	BY	DESCRIPTION	DATE	CHECK
A	TMS	FLANGE HOLES REMOVED.	08/07/01	DJL



# Flowseal Engineering (Pty) Ltd

## Metallic Expansion Joints :

Flowseal Engineering are designers, manufacturers and suppliers of a wide range of expansion joints.

In addition to the range of Metallic and Non Metallic joints shown below, we are able to supply:

- Rubber Expansion Bellows
- Stainless Steel Flexible Hose
- Slip Type Expansion Joints
- PTFE or PTFE Lined Expansion Joints

## Metallic Expansion Joints :

The options and variations in this category are numerous and include the following:

### Options

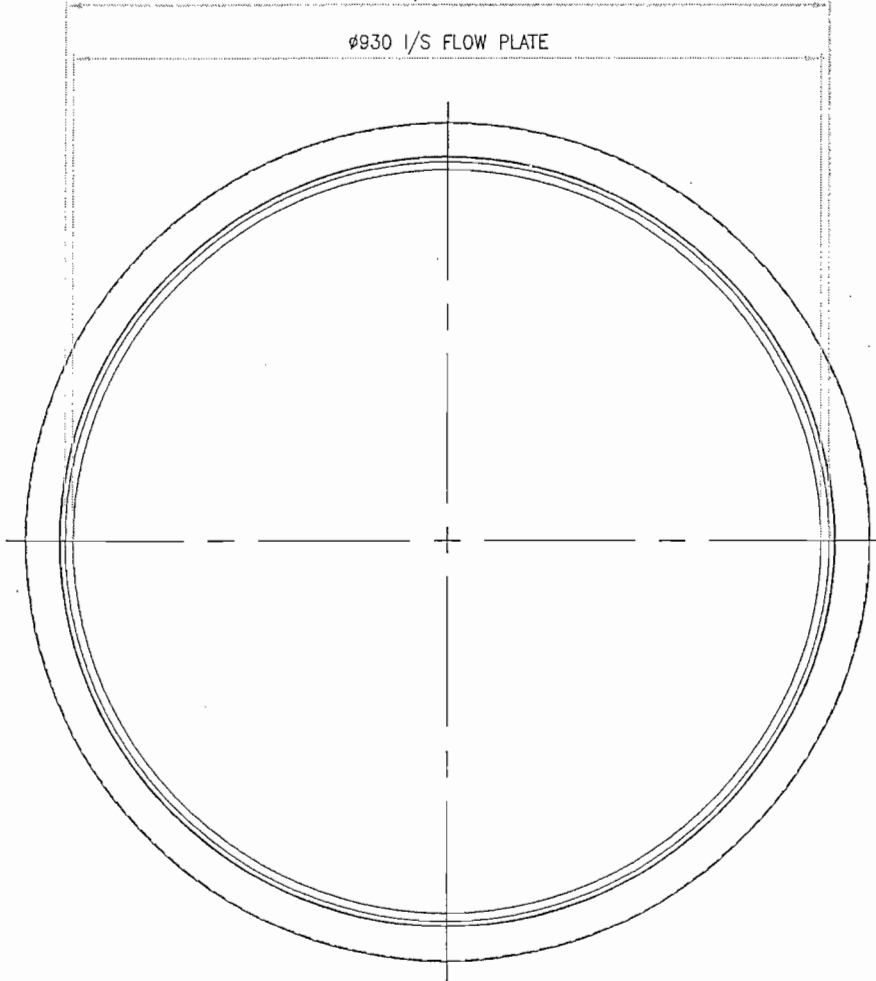
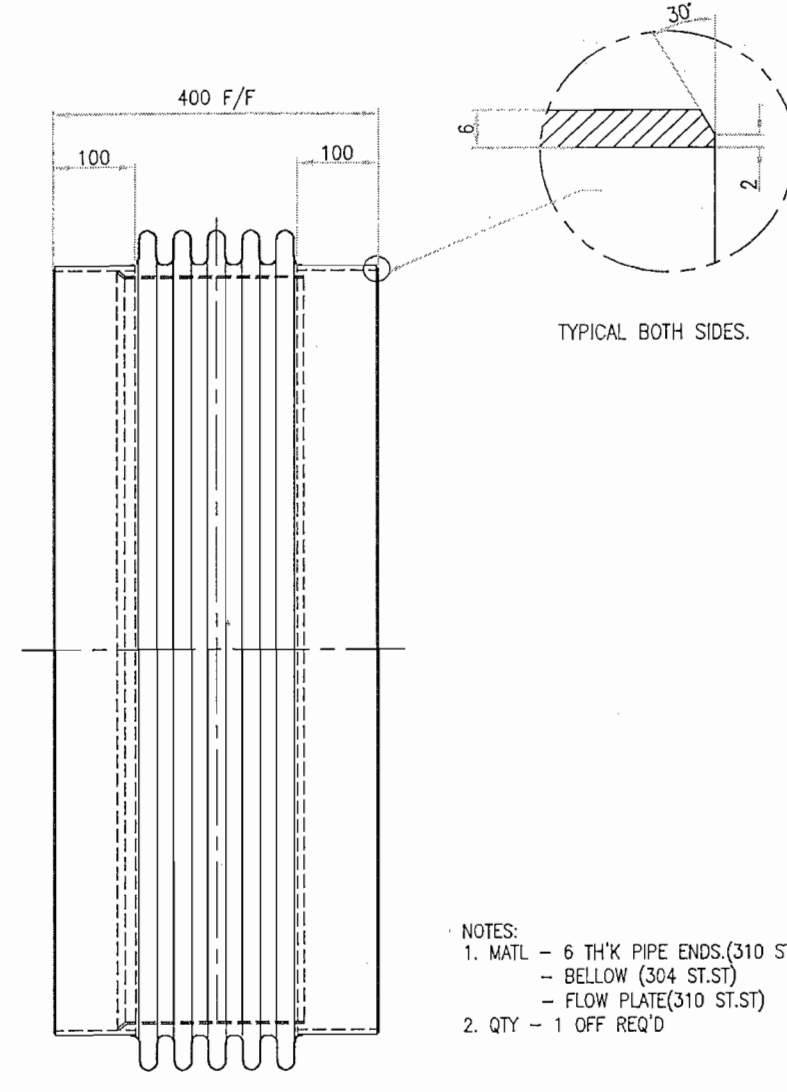
Spun Bellows  
 Pressed Bellows  
 Cold Rolled Bellows  
 Hydro Formed Bellows

### Variations

Circular  
 Rectangular  
 Oval  
 Single Convolution  
 Multi Convolution  
 Single Expansion Joint  
 Double Expansion Joint  
 Single Ply  
 Multi Ply  
 Hinged  
 Gimble  
 Tied  
 Pressure Balanced -  
 Expansion Joints

Designs are in accordance with accepted codes such as EJMA and ASME etc and Quality Control to ISO 9001 ensures our customers of a quality product.



ITEM	QTY	DESCRIPTION	REMARKS
		 <p style="text-align: center;"> <math>\varnothing 950</math> I/S PIPE ENDS  <math>\varnothing 930</math> I/S FLOW PLATE         </p>	 <p style="text-align: center;">400 F/F</p> <p style="text-align: center;">TYPICAL BOTH SIDES.</p> <p>NOTES:            1. MATL - 6 TH'K PIPE ENDS.(310 ST.ST)                      - BELLOW (304 ST.ST)                      - FLOW PLATE(310 ST.ST)            2. QTY - 1 OFF REQ'D</p>
ITEM	QTY	DESCRIPTION	MATERIAL
			REMARKS

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DRAWN DATE TITLE  
 TMS 06/09/01  
 CHECK DATE

GA. OF  $\varnothing 950$  METAL COMPENSATOR

DRAWING NUMBER  
 FSE-0924-01



# Flowseal Engineering (Pty) Ltd

## Non Metallic (Fabric) Expansion Joints :

Applications range from Single Ply Fabrics handling air to Multi Ply Composite Fabric Expansion Joints handling Furnace waste gases at temperatures of up to 1400°C.

Fabric Expansion Joints are always designed to suit the application and the Customer's requirements. Construction can be of the "Sleeve", "U" or "Belt" type, Circular or Rectangular and with or without "Flow Plates" or "Insulation Pillows".

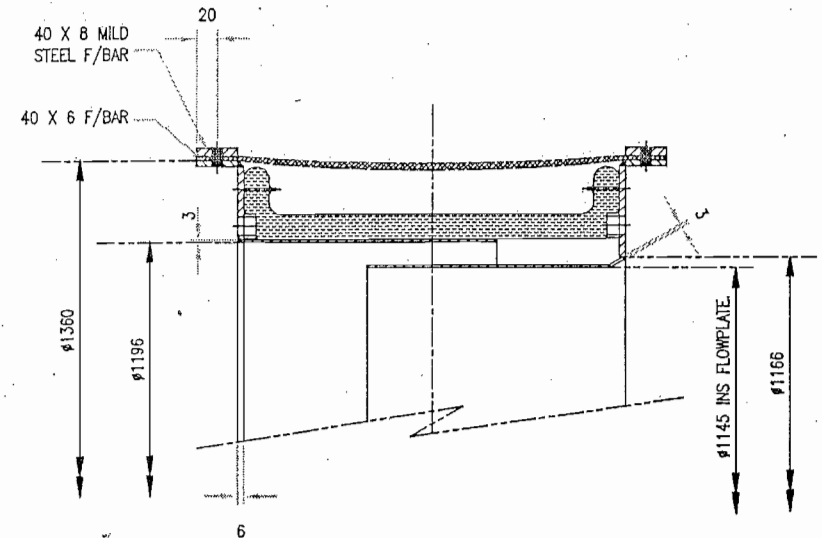
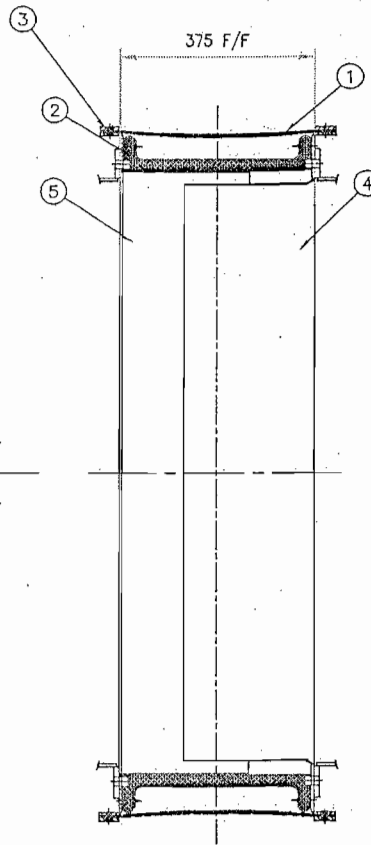
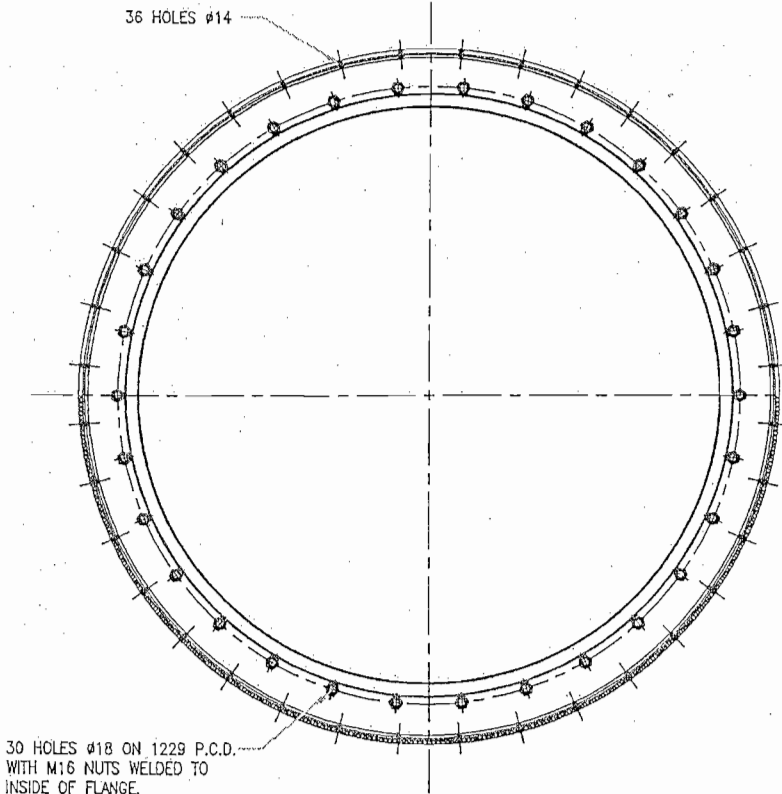


Flowseal can supply the associated steelwork, or provide the details for Customer supply.

The PAPCO TEXTFLEX range of expansion joint materials offers the customer an extremely high quality material, guaranteed for three years from date of installation, at prices not significantly higher than normal multi ply composite materials. With an anticipated life expectancy in excess of 10 years, and considering the cost of installation, this is a most attractive option for end users.



ITEM	QTY	DESCRIPTION	REMARKS
1	1	FLEX ELEMENT	TEXFLEX
2	1	BOLSTER	CERAMIC FIBRE
3	1	BACKING BARS	MILD STEEL 0859-01-03
4	1	INNER FLOWPLATE	316 ST.ST 0859-01-02
5	1	OUTER FLOWPLATE	316 ST.ST 0859-01-01



NOTE:  
1. MATL-316 ST.ST U.O.N.  
2. 1 OFF REQ'D.

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TITLE  
DETAIL OF  $\phi 1170$  X 375 F/F  
FABRIC COMPENSATOR.

DRAWING NUMBER  
FSE-0859-01

REV	BY	DESCRIPTION	DATE	CHECK



# Flowseal Engineering (Pty) Ltd

## Process Valves

Flowseal Engineering are suppliers of various valves to the process, power generation and water industries.



### Types

- Gate
- Globe
- Non Return
- Butterfly
- Ball
- Parrallel Slide
- Control (Self Actuated)
- Knife Gate
- Plug
- Pressure Reducing
- Pressure Relief

### End Connections

- Screwed
- Flanged
- Wafer
- Socket Weld
- Buttweld
- R.T.J.



### Mode of Operation

- Manual
- Pneumatic Actuator
- Electric Actuator

### Pressure Range

- Vacuum to 400 Bar

### Specifications

- ANSI
- DIN
- BS
- SABS



### Temperature Range

- -180°C to 800°C

### Materials

- Cast Steel
- Stainless Steel
- Duplex Steel
- Alloy 20 Hastalloly etc







# Flowseal Engineering (Pty) Ltd

## Explosion Panels

Explosions can be devastating and occur far more frequently than most people realize. They often result in loss of life, injury, damage to plant and equipment and loss of production.



Flowseal Explosion Vent Panels, which conform to the requirements and specifications of NFPA68 (1998 edition), offer a safe and cost effective means of countering this catastrophe.



Our Engineers can assist in the application and sizing of explosion vent panels.

Bag Filters showing the effectiveness of proper explosion venting



Flowseal explosion vent panels are of the "composite slotted" type and are essentially maintenance free.

They can be manufactured for temperatures up to 500°C and for rectangular, round or curved vents.

All Flowseal Explosion vent panels are certified and can be manufactured to burst at pressures as low as 5kPa.





# Flowseal Engineering (Pty) Ltd

## Explosion Panels

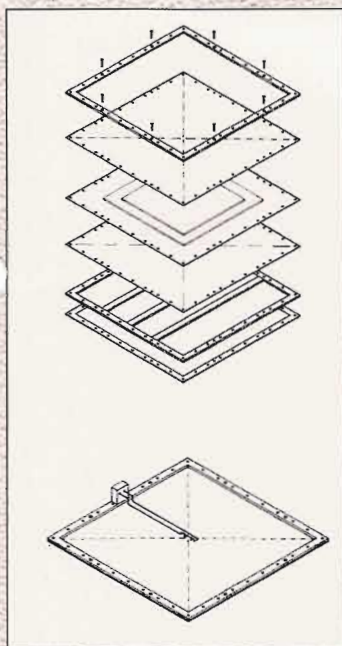
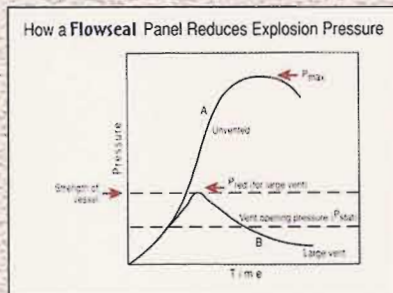
How a Flowseal Explosion Vent Panel Reduces Explosion Pressure. An explosion in an unvented vessel causes pressure to rise rapidly along curve A to a maximum pressure. This increased pressure is likely to cause damage to the vessel before Pmax is reached.

In a vessel with an explosion vent panel fitted, the pressure will rise until the panel bursts (Pstat), and will continue to rise until the maximum pressure (Pred) is reached and then drop off rapidly as the vessel is vented. Vessels should therefore be designed to withstand a pressure greater than Pred.

- Pstat - vent opening pressure
- Pred - maximum explosion pressure in vented vessel
- Pmax - maximum explosion pressure in unvented vessel

Flowseal Explosion panels Offer These Advantages:

- Low burst pressure: Activation pressure as low as 0,05 bar (5kPa).
- Instantaneous reaction: Will open rapidly without hindering discharge of dust and combustion products.
- Full area venting: When bursting, panels provide maximum area for relief of pressure.
- Low inertia: Vent closures are light, with low inertia.
- Robust: Panels are strong enough to withstand normal operating and fluctuating pressures and temperatures as well as aggressive atmosphere.
- High temperature operation: When protected by a Flowseal heat protection shield, panels can be subjected to temperatures of up to 500°C.
- Vacuum conditions: Panels can operate under negative pressures using vacuum support frames.
- Consistent activation: Consistent burst pressure are provided which are not offered by other methods of explosion relief.
- No fragmentation: Panels are designed to retain all parts when bursting-no flying projectiles.
- Low maintenance: No mechanical parts to be maintained.
- Certified burst pressures: Panels are burst tested and certified. Tolerance  $\pm 10\%$  of nominal burst pressure.
- Burst indicators: Burst indication systems can be fitted to the full range of panels if needed.
- Special sizes: Both standard and special designs are available to suit your requirements.





# Flowseal Engineering (Pty) Ltd

## Explosion Panels

Explosion Panels Protect Your Equipment

### Fact:

In a plant that handles grain, plastics, animal feedstuffs, coal, sugar or a variety of other dusts or gasses, there is a very real danger of explosion. Examples of industrial equipment in which explosive conditions may occur are:

- 
- crushers
  - grinders
  - pulverisers
  - sieves
  - screens
  - dust collectors
  - dust arrestors
  - conveyors
  - screw feed conveyors
  - bucket elevators
  - driers
  - cyclones
  - ovens
  - furnaces
  - spray driers
  - blenders
  - mixers
  - ducts
  - pipes
  - bins
  - silos
  - spreaders
  - coating machines
  - packaging equipment
  - hoppers
- 

### Fact:

Dust or gasses contained in this equipment will burn rapidly if ignited. This will lead to a quick rise in pressure within the system and, in the extreme, a devastating explosion. Dust can be ignited by:

- \* flames
- \* hot surfaces
- \* incandescent material
- \* spontaneous heating
- \* welding or cutting
- \* friction heating or sparks
- \* impact sparks
- \* electric sparks
- \* electrostatic discharge

### Fact:

A Flowseal explosion vent panel is an economical and effective way to protect both personnel and capital equipment from severe damage.



## **FLOWSEAL BURSTING DISCS & EXPLOSION PANELS**

**Flowseal** Bursting Discs & Explosion Vent Panels are manufactured to comply with the requirements of the American NFPA 68, 2002 edition entitled Guide for Venting of Deflagrations and also the German VDI-3673, 1995 edition and are tested and certified in compliance with BS 2915 : 1990, the Specification for Bursting discs and bursting disc devices.

**Flowseal** Explosion vent panels can be of the multi ply composite slotted type or of the domed one piece construction type. The accuracy of response is within 10% of the certified burst pressure and the response is immediate.

### **General Design**

**Flowseal** Explosion Vent Panels are manufactured with controlled opening patterns that ensure full opening on initial rupture and can be fabricated to any size, and can be circular, rectangular or curved. They can be supplied in a variety of different configurations depending on temperature, pressure, medium etc.

### **Construction**

All Flowseal Vent closures are designed to withstand natural forces such as wind loads and operating conditions such as pressure fluctuations and the effects of temperature, abrasion and corrosion.

### **Frames**

Frames are designed to completely support the panels and to ensure that the panels can rupture as planned without any hindrances or distortion that may adversely affect the bursting pressure or the vent area.

The frames are generally drilled to suit customer requirements.

For composite slotted type panels, if the system is under negative pressure, the frame must incorporate vacuum support bars designed to support the panels under full negative pressure. In calculating vent areas, the area of the vacuum support frame is to be taken into account.

### **Panels (Support and Burst)**

All Flowseal multi ply composite panels incorporate a support panel on the inside, this is to prevent abrasion and or damage to the seal membrane as well as preventing the seal membrane being sucked inward due to negative pressure.

Multi ply composite slotted panels and single ply domed panels all conform to the NFPA 9-4.3.2 requirement relating to the inertia of vent closures, and that is that the mass must not exceed 12.2kg per square metre.

### **Vibration Damping**

In all composite slotted type panels, a layer of ceramic fibre is inserted between the support panel and the seal membrane to minimise the effects of vibration brought about by the turbulence of passing air or the pulsing of a pulse type bag filter.

### **Seal Membrane**

The seal membrane is generally made out of a ply of PTFE non permeable foil or other material suitable for the operating temperature and medium.

## **General**

**Flowseal** Bursting discs and explosion panels are manufactured so that in the event of an explosion, all parts are retained, there will be no shrapnel or fragmentation.

## **Burst Detection**

Burst detection can be provided if required simply by means of a break wire system or by means of encapsulated reed switch and magnet.

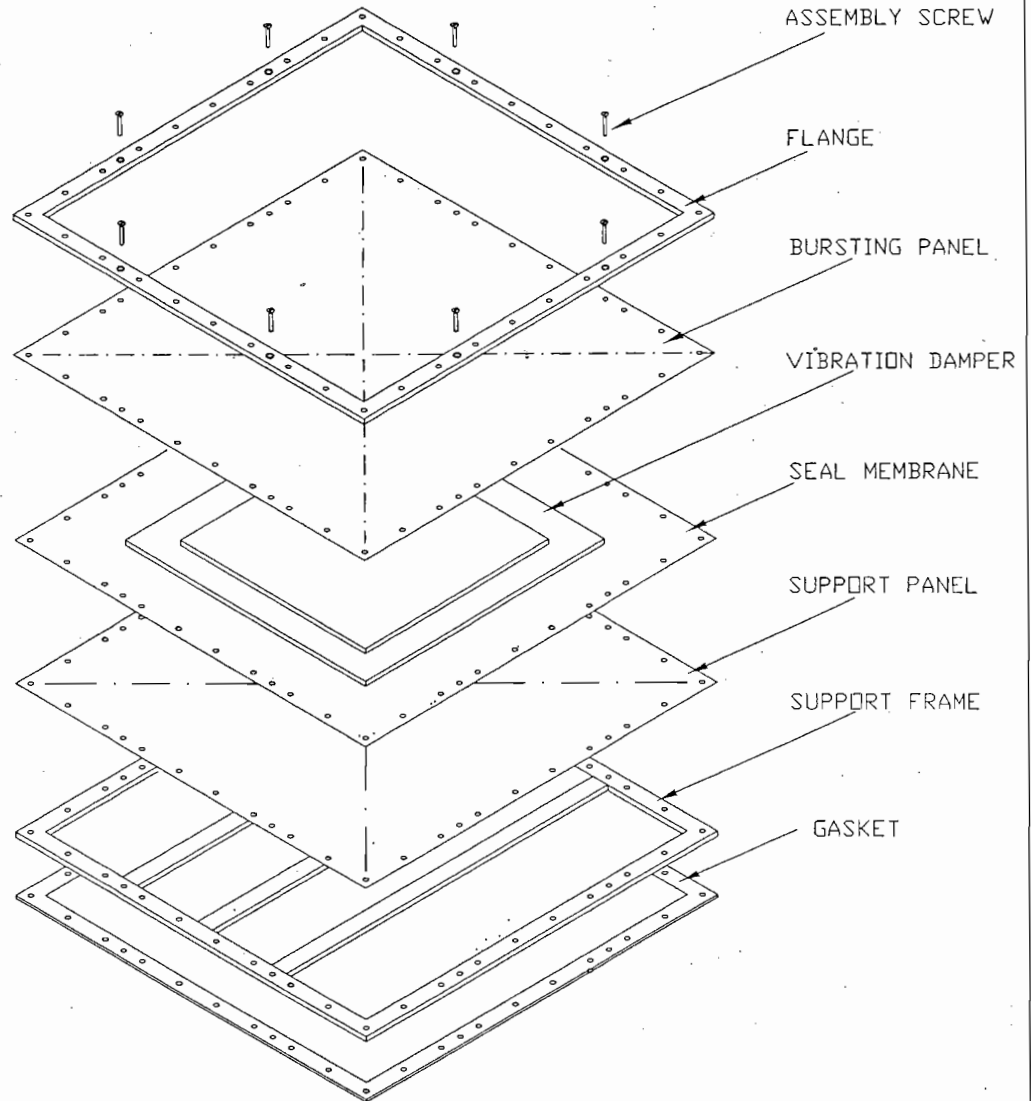
## **Burst Testing and Certification**

Burst testing is done in the Flowseal factory and complies with the requirements of BS 2915:1990. At least one panel of every batch is tested in order to provide certification.

## **Tags and Signage**

All panels supplied are fitted with tags which indicate the static burst pressure of the panel, and are equipped with a bold sign stating in large lettering "DANGER - EXPLOSION VENT – KEEP CLEAR"

## COMPOSITE SLOTTED PANEL TYPE (CSP) EXPLOSION VENT PANEL



### TYPICAL MATERIALS OF CONSTRUCTION

FLANGE	: CARBON STEEL
BURSTING MEMBRANE	: STAINLESS STEEL, NICKEL, INCONEL ETC
VIBRATION DAMPER	: FIBRE GLASS MATT
SEAL MEMBRANE	: PTFE FOIL, ALUMINIUM FOIL ETC
SUPPORT MEMBRANE	: STAINLESS STEEL, NICKEL, INCONEL ETC
SUPPORT FRAME	: CARBON STEEL OR STAINLESS STEEL
GASKET	: EPDM RUBBER

### POSITIVE CHARACTERISTICS OF TYPE CSP VENT CLOSURES

1. CSP VENT CLOSURES CAN BE CERTIFIED TO OPEN AT SPECIFIC ACTIVATION PRESSURES
2. ACTIVATION PRESSURES AS LOW AS 5 kPa GAUGE POSSIBLE
3. VENT OPENS INSTANTANEOUSLY WITH UNIMPEDED FLOW OF COMBUSTION PRODUCTS
4. VENT CLOSURES ARE MAINTENANCE FREE
5. ON ACTIVATION OF THE VENT THERE ARE NO DANGEROUS PROJECTILES

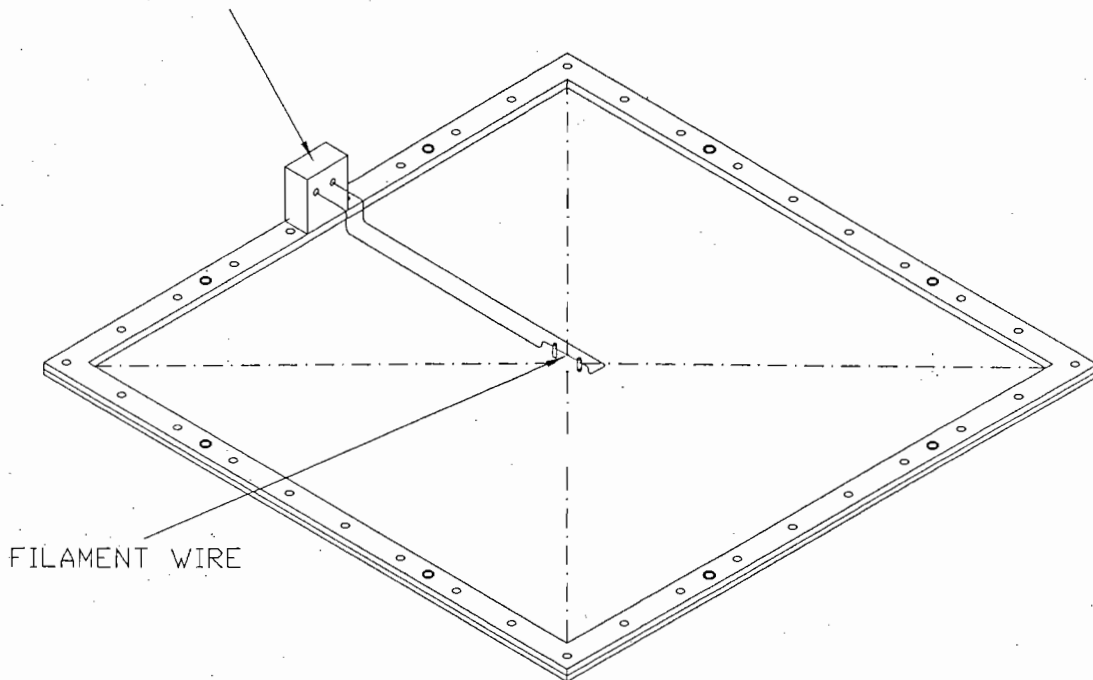
**FSE FLOWSEAL ENGINEERING** (PTY) LTD

PHONE (011) 824-1989/7  
FAX (011) 824-2049

P.O. BOX 13142  
ELSPARK 1418

## BURST INDICATION SYSTEM FOR EXPLOSION PANELS

JUNCTION BOX WITH TERMINALS INSIDE  
WHEN CONTINUITY IS BROKEN - PANEL HAS BURST





## EXPLOSION PANELS ARE SAFEGUARDING ASSETS AT:

<b>CUSTOMER</b>	<b>APPLICATION</b>	<b>MEDIUM</b>
Atomic Energy Corporation	Multicyclones	Carbon Dust
Iscor - Pretoria	Bag Filters	Coal Dust
Ferrometals - Witbank	Furnace Ducting	Carbon Monoxide
Saldanha Steel - Western Cape	Coal Silo	Coal Dust
Middelburg Ferrochrome	Furnace Ducting	Carbon Monoxide
Alusaf – Hillside Smelter	Ducting	Aluminium Dust
New Consort Mine - Barberton	Electro Static Precip	Carbon Monoxide
Samancor - Meyerton	Furnace Ducting	Carbon Monoxide
Samancor - Meyerton	Bag Filter	Furnace Implosion
PG Bison Piet -Retief	Bag Filter	Saw Dust
African Product - Klipriver	Bag Filter	Maize Dust
Pyromet -Texas	Furnace Ducting	Carbon Monoxide
S A Breweries	Silos & Bucket Elevators	Grain Dust
S A Breweries - Rosslyn	Silos & Bucket Elevators	Grain Dust
Union Lime Co - Northern Cape	Coal Silo	Coal Dust
AECI - Modderfontein	Ducting	Fertilizer Dust
Sasol II - Secunda	Ducting	Coal Dust
Char Technology - Witbank	Ducting & Vessels	Hydrocarbons
Tubatse Ferrochrome - Steelpoort	Bag Filter	Furnace Implosions
Impala Platinum - Rustenburg	Silo	Coal Dust
Mozal - Mozambique	Ducting	Aluminium Dust
Zimalc - Benoni	Ducting & Filters	Aluminium Dust





# Flowseal Engineering (Pty) Ltd

## Diverse Products

Flowseals designs manufactures supplies a range of products that are allied to the main product range.



- Pot Strainers
- Y Strainers
- Sight Glasses
- Tank Level Gauges
- Seam Traps
- Air release Valves
- Battery Kiln Seals.
- Fire Curtains
- Heat Shields
- Insulation cloths
- Insulated hoses
- Stack cap seals
- Gaskets
- Tadpole tape
- Flexible hoses
- Rubber bellows
- Rubber sleeves
- Silencers
- Solids handling valves

