DSR/DSS

BUBBLE TIGHT ISOLATION DAMPER

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DSR/DSS

BUBBLE TIGHT ISOLATION DAMPER

FEATURES

- Heavy-duty construction to (2.5–7.5 kPa) design pressure.
- Parts in Type 304 or 316 stainless steel (unless specified).
- Flanges 38 & 50mm wide at 4mm thick. Hole spacings ≤ 100mm.
- Frame ≥ 3 mm thick. Blade shafts ≥ 12.5 mm. Solid rod with Teflon shaft seals.
- Bubble-tight to 2.5kPa ΔP. Blade: two 3.5 mm plates with replaceable silicone seal.
- Seam joint fully welded; reinforcement welds intermittent.
- All welds cleaned and passivated.

DSR/DSS Gas-Tight Isolation Dampers are heavy-duty stainless-steel shut-off dampers engineered for positive containment in critical ventilation systems.

The standard configuration achieves gas-tight shut-off, providing bubble-tight sealing when closed against the rated differential pressure. Performance is verified through pressure decay testing in accordance with DSR/DSS Factory Acceptance Test (FAT) procedures.

The damper is suitable for applications including laboratory exhaust systems, pharmaceutical facilities, clean rooms, hazardous gas environments and mission-critical HVAC installations.

Available configurations:

- Circular
- Square
- Rectangular

KEY FEATURES

TRUE GAS-TIGHT (BUBBLE-TIGHT) ISOLATION

Provides bubble-tight shut-off performance up to 7.5 kPa differential pressure when fully closed.

CONTROLLED DYNAMIC OPERATION

Designed for safe opening and closing at system pressures up to 4.5 kPa differential pressure and airflow velocities up to 20 m/s

HIGH-INTEGRITY SHAFT SEALING

Compression-type PTFE packing gland ensures zero external (ambient) leakage up to 10 kPa.

LOW OPERATING TORQUE DESIGN

Perimeter blade seal configuration (without blade stop seal) reduces friction and actuator torque requirements.

LOW PRESSURE LOSS

Unobstructed blade profile in the open position minimises airflow resistance.

ELEVATED TEMPERATURE OPERATION

Rated for continuous operation at temperatures up to 150°C.

FULLY WELDED STAINLESS-STEEL CONSTRUCTION

Heavy-gauge frame and reinforced double-skin blade ensure structural stability under high differential pressure.

OPTIONAL

Loose gaskets, loose flanges, Viton blade seals, and multiple finish options.

CONSTRUCTION

FRAME

Damper frame is fabricated from heavy-gauge stainless steel with flanges fully welded to both ends.

Minimum flange-to-flange depth: 200 mm

Flanges are pre-drilled with bolt holes at maximum 100 mm spacing to ensure uniform gasket compression and secure installation.

BLADE

Damper blade is constructed of double-skin stainless steel with internal stiffeners as required for damper size and pressure rating.

The reinforced construction ensures structural stability under high differential pressure while maintaining bubble-tight sealing integrity.

For balancing-only applications, a single-skin blade without perimeter seal may be provided upon request.

BLADE SHAFT

Blade shaft is solid stainless steel, continuous through the damper frame.

Shaft diameter ranges from 12.5 mm to 30 mm, depending on damper size and pressure rating.

The shaft is welded to the stiffeners which are fastened to the blade.

Unlike conventional through-bolt fastening methods, this approach avoids full penetration through the shaft and preserves shaft strength

BLADE SEAL

Perimeter blade seal is constructed of high-grade silicone or Viton for corrosion-resistant configuration.

The seal is designed to provide bubble-tight sealing up to 7.5 kPa differential pressure when the blade is fully closed.

The blade seal may be replaced without removal of the shaft assembly.

For balancing applications, blade seals may be omitted where bubble-tight performance is not required.

SHAFT SEAL

Shaft seal consists of a compression-type packing gland continuously welded to the damper frame.

Packing material: PTFE (Teflon)

Performance:

- Zero ambient leakage up to 10 kPa
- Low friction coefficient to reduce actuator torque
- Chemical resistance suitable for industrial and laboratory environments

Packing may be replaceable without removal of damper.

ACTUATION OPTIONS

Dampers may be supplied with manual, electric, or pneumatic operators depending on application.

ELECTRIC ACTUATORS (230VAC OR 24VAC)

- On/Off
- On/Off with spring return
- Modulating
- Modulating with spring return

PNEUMATIC ACTUATORS (600KPA / 6BAR SUPPLY)

- Double-acting
- Single-acting
- Double-acting with proportional control

Actuator selection is based on:

- Damper size
- Operating differential pressure
- Required fail-safe position
- Control strategy

PERFORMANCE

PRESSURE CLASSIFICATION

- Dynamic Operating Differential Pressure: Up to **4.5 kPa**
- Bubble-Tight Shut-Off Rating (Closed Blade): Up to **7.5 kPa**
- Shaft Seal Containment: Zero external leakage up to **10 kPa**

STRUCTURAL CRITERIA

Blade deflection under pressure testing shall not exceed 1/360 of blade span.

VELOCITY AND TEMPERATURE

- Maximum air velocity (fully open): 20 m/s
- Operating temperature: Up to 150°C

TYPICAL APPLICATIONS

HEALTHCARE & CONTAINMENT

Hospital Isolation Units

Maintains negative pressure isolation rooms and prevents reverse contamination during system shutdown or maintenance.

Laboratory Facilities (BSL-2 / BSL-3 / BSL-4)

Provides duct segmentation and containment control in pathogen-handling environments.

Animal Disease Laboratories

Ensures secure isolation of infected airflow zones during testing or emergency isolation.

PHARMACEUTICAL & CLEAN MANUFACTURING

Pharmaceutical Production Facilities

Supports controlled zoning and containment in cleanroom and sterile production areas.

Microelectronic and Semiconductor Facilities

Enables isolation of process exhaust systems and contamination-sensitive production zones.

Food Processing Facilities

Prevents cross-zone contamination in hygienic production environments.

INDUSTRIAL & HAZARDOUS EXHAUST

Industrial Process Exhaust Systems

Provides positive shut-off for corrosive, toxic, or high-risk exhaust streams.

Chemical Process Facilities

Ensures secure mechanical isolation during maintenance or system modification.

HIGH-SECURITY & GOVERNMENT FACILITIES

Department of Energy Facilities

Supports containment and isolation within high-integrity ventilation systems.

Military Installations

Provides protected ventilation control in secure or classified environments.

NUCLEAR & RADIOLOGICAL APPLICATIONS

Nuclear Power Plants

Used for ventilation zone segregation, containment support systems, and controlled isolation of auxiliary exhaust pathways.

Designed to maintain structural stability and sealing integrity under elevated differential pressures typical of nuclear auxiliary ventilation systems.

FACTORY ACCEPTANCE TEST (FAT)

100% UNIT TESTING PRIOR TO DISPATCH

All DSR/DSS Gas-Tight Isolation Dampers are subjected to 100% post-production pressure decay testing prior to dispatch. Each assembled unit is mounted in a sealed chamber and pressurised to its specified rated pressure (up to 7.5kPa as applicable) to verify leakage performance. Pressure drop over a defined time interval (3 minutes) is measured to confirm compliance with specified gastight / bubble-tight criteria, including verification of blade seal compression, shaft packing integrity, weld integrity and casing airtightness. Any unit failing the pressure decay test is quarantined and subjected to bubble (soap) testing to identify leakage location, rectified accordingly, and fully re-tested under the same protocol. No damper is released without passing the pressure decay test. Each approved unit is issued an individual Factory Acceptance Certificate indicating serial number, test pressure, measured leakage result, test date and QA endorsement, with full traceability retained in DSR/DSS quality records.

INSTALLATION

The DSR/DSS Gas-Tight Isolation Dampers shall be installed in accordance with the manufacturer's approved submittal drawings and written instructions. The unit shall be mounted square to the duct axis and shall not be subjected to distortion from misaligned ductwork or structural loading. Independent supports shall be provided to prevent transmission of duct weight or torsional stress to the damper frame.

Round Dampers

a. The internal diameter of the connecting duct shall not be smaller than the diameter (ØD) of the damper and shall not exceed the ØD by more than 3 mm.
b. The bolt pitch circle diameter (PCD) of the mating duct flange shall be aligned precisely with the PCD indicated on the approved DSR/DSS submittal drawings.

Square and Rectangular Dampers

a. The damper frame shall be manufactured 6 mm smaller than the nominal (order) size (Width X Height) to allow clearance between blade seal and the connecting ducts.
b. The connecting duct internal dimensions shall be fabricated according to the nominal (order) size (Width X Height) and shall not exceed the nominal dimension by more than 3 mm. No part of the connecting duct dimensions shall be smaller than the nominal size.
c. The flange bolt hole pattern and centre-to-centre spacing of the mating duct flange shall be aligned precisely with the PCD indicated on the approved DSR/DSS submittal drawings.

Connecting Duct

A short connecting duct shall be connected to each side of the damper and be limited to a length of about 1000 mm for easy removal for servicing or repair. Access panel may be provided on the connecting duct for inspection purpose.

Flange and Sealing

Matching flanges and suitable solid rubber gaskets or seals may be provided to ensure proper compression, leak-tight integrity, and correct blade clearance.

Bolts shall be tightened uniformly to achieve even gasket compression. Field modification of flange openings, bolt holes, or duct dimensions that may compromise blade clearance or containment performance is not permitted.

COMMISSIONING VERIFICATION

Upon installation, the following shall be verified:

- Free blade rotation without mechanical interference
- Correct flange alignment and bolt clearance
- Maintenance of specified pressure cascade boundaries
- Bubble-tight shut-off integrity under static differential pressure

For convenience, matching flanges and solid rubber seals may be purchased with the damper.

For detail installation instructions of the gas-tight damper, refer to our DSR/DSS Installation Instruction document IM-062023/0004/00

MAINTENANCE

DSR/DSS Gas-Tight Isolation Dampers are designed for airtight performance up to 7.5kPa differential pressure. Periodic maintenance is required to maintain sealing integrity and operational reliability.

Inspect every 6 months under normal HVAC service and every 3 months for critical applications (hospital, pharmaceutical, laboratory, biohazard, data centre). Conduct immediate inspection after any abnormal pressure event.

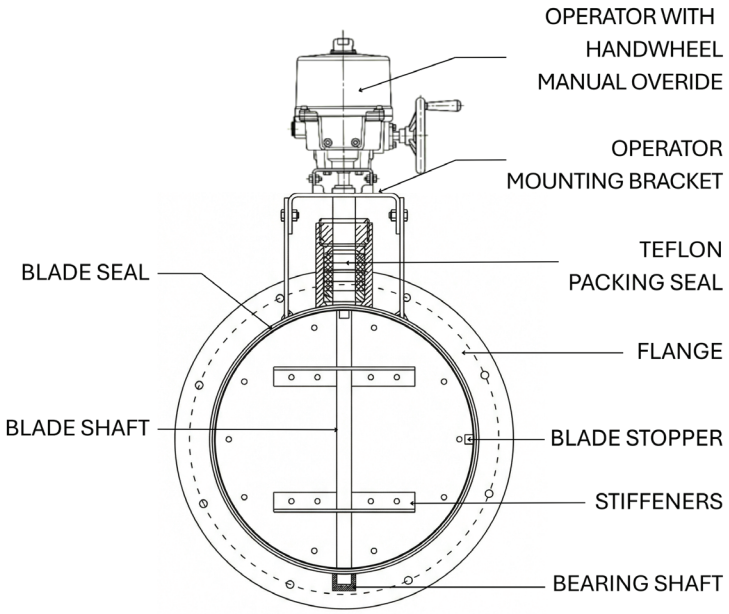
Visually check frame, flanges, blade, seals, shaft packing gland, actuator mounting and wiring for corrosion, looseness, wear or obstruction. Blade shall move freely without rubbing. Blade seals (Silicon / Viton) must remain flexible and undamaged.

Cycle damper fully open and closed to verify smooth travel and complete shutoff. Confirm proper sealing under system pressure. For modulating units, verify positioning accuracy. Abnormal noise, incomplete closure or excessive actuator load requires servicing.

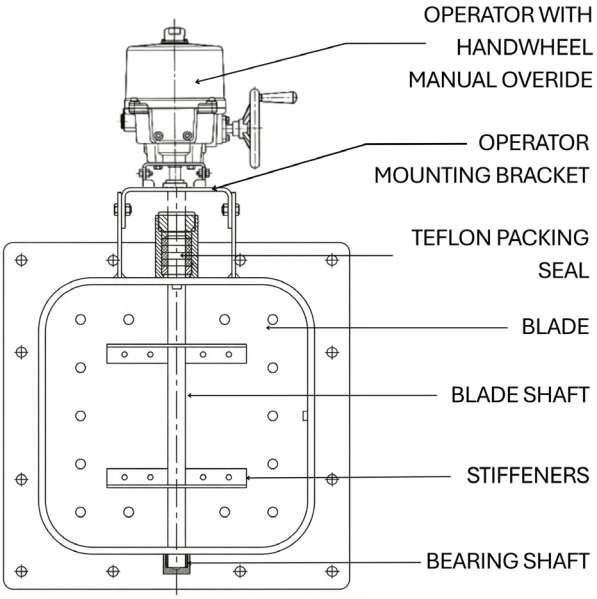
Clean internal surfaces using non-corrosive agents compatible with stainless steel (SUS304 / SUS316). Do not use abrasive tools.

Inspect Teflon shaft packing for leakage; tighten evenly if required. Replace packing or blade seals if airtight performance cannot be maintained.

Maintain actuator in accordance with manufacturer's instructions and confirm torque suitability for rated pressure.



Circular Isolation Damper



Square / Rectangular Isolation Damper

APPLICATION

Designed for sealing / controlling airflow in round / square / rectangular ducts; provides airtight seal to 7.5 kPa.

In biohazard environments, allows isolation for decontamination / filter changes.

Available in multiple sizes for various airflows.

TYPICAL APPLICATIONS

- Hospital isolation units
- Pharmaceutical facilities
- Microelectronic sites
- Industrial process exhaust
- Chemical process facilities
- Animal disease laboratories
- Military / DOE / nuclear HVAC systems

Ordering Information

The DSR/DSS GAS-TIGHT ISOLATION DAMPER is specified using a structured product code that defines the exact damper configuration. The code identifies key parameters including:

- Damper type
- Shut-off pressure rating
- Flange size and thickness
- Casing thickness
- Blade & seal thickness
- Material
- Blade seal type
- Surface finish
- Actuator type & voltage
- Fail-safe position
- Nominal dimensions (W × H × D)

Each element of the code corresponds to a defined product feature, ensuring the damper supplied matches the required mechanical, pressure, and control specifications for the application. Refer to the coding structure below when specifying or ordering the product.

DSS300-300-F504C3B4S4-304-0-E4/FC/230_700*700*300

1 2 3 4 5 6 7 8 9 10 11 12

1. Damper Type

R450 = Round damper
S300 = Sq/rect damper

2. Shut-off Pressure

300 = 3kPa
450 = 4.5kPa
600 = 6kPa
750 = 7.5kPa
Others (Specify) _____

3. Flange Size and Thickness

F384 = 38mm, 4mm thick
F504 = 50mm, 4mm thick

4. Casing Thickness

C3 = 3mm thick
C4 = 4mm thick

5. Blade Thickness

B3 = 3mm thick
B4 = 4mm thick

6. Blade Seal Thickness

S4 = 4mm thick black seal
V3 = 3mm thick vision

7. Material

304 = SS304
316 = SS316

8. Finish

0 = Non
1 = ETRE 300
2 = PTRE 300
3 = Others (Specify) _____

9. Operator Type

E1 = Electric modulating actuator
E2 = Electric modulating actuatorwith fail-safe feature
E3 =Electric on-off actuator
E4 = Electric on-off actuator with fail-safe feature
MG2 = Manual handwheel gear operator (for balancing function)
P1 = Pneumatic single acting
P2 = Pneumatic double acting
P3 = Pneumatic with proportional control

10. Fail-safe position (only applicable to E5)

FO = Fail-open
FC = Fail-close

11. Actuator Voltage

024V = 24Vac
230V = 230Vac

12. Manual Size

W = Width
H = Height
D = Depth

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