

WahlcoMetroflex, Inc.

Flex-Seat™ Guillotine Isolation Dampers



Design Overview

Self-cleaning rack & pinion drive provides reliable blade transfer even under the most corrosive and debris-laden service. See page 5.

Blade position indicator for visual verification of blade position.

Flex-Seat™ Guillotine Dampers from WahlcoMetroflex are designed for the isolation of gas flow system components, including electrostatic precipitators, flue gas desulfurization (FGD) systems, coal mill air entry, fans, gas turbine, exhaust, smelter, pulp and paper, and other process environments.

Gas-tight bonnet guarantees zero atmospheric emissions—even if the throat seals or seal air fan were to fail. See page 6.

Seal air fan pressurizes the bonnet and provides seal air around the blade perimeter. The seal air fan can be mounted on the bonnet structure or on adjacent steelwork away from the damper.

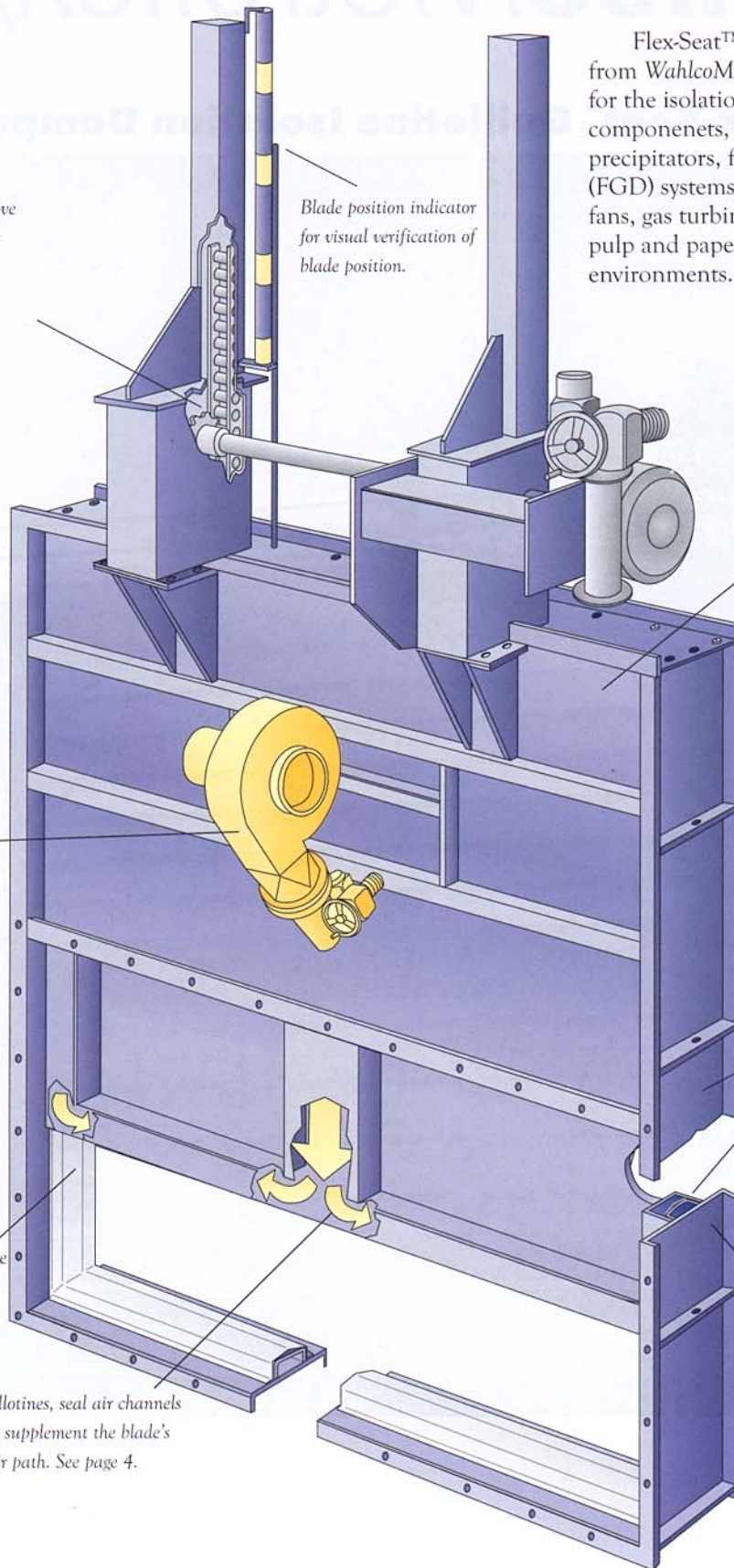
Throat seals maintain 100% isolation along the top of the blade when the blade is open or closed. Externally-replaceable throat seals are available. See page 3.

Blade is supported from deflection by the solid seat. This eliminates supplemental support structures that interfere with gas flow. See page 3.

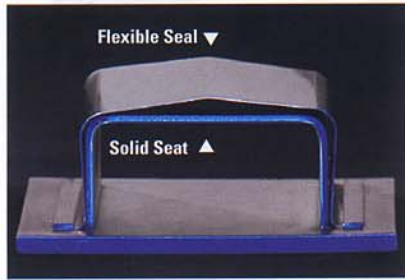
Flex-Seat seals provide 100% isolation when seal air is used. Resilient flexible metal is pushed firmly against the solid seat to form a seal while allowing the blade to grow thermally. See page 3.

In very large guillotines, seal air channels within the blade supplement the blade's perimeter seal air path. See page 4.

Hot frame design eliminates the condensation caused by purge air on designs with blade cavity seals. See page 3.



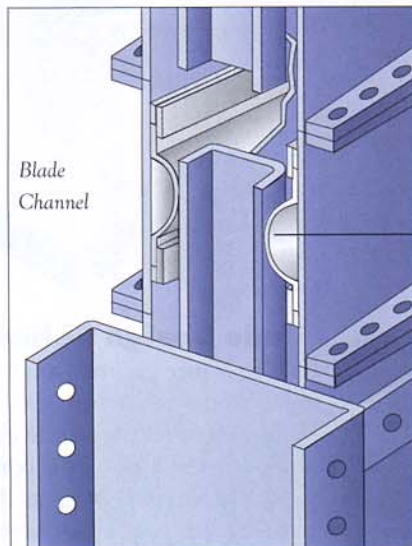
Flex-Seat Seals



Blade Open: No seal cavities to accumulate debris or condensation. Purge air is not required around the blade or frame perimeter while the damper is open.



Blade Closed: Flex-Seat design controls blade movement while providing a tight seal and integral solid seat back-up seal.



100% Isolation

The Flex-Seat seal consists of a resilient flexible metal seal covering a solid seating surface.

When closed, the blade's channel perimeter slightly deflects the flexible seal, sealing it tightly in the blade cavity. The solid seat (under the flexible seal) assures the control of blade location and provides seal support to limit the seal's deflection. The solid seat also functions as an integral back up seal.

The seal and the perimeter blade channel form a seal air path that is pressurized for 100% gas isolation.

Self-Cleaning & Durable

Any ash or debris on the flexible seals readily springs off when the seals are engaged by the moving blade. Flex Seat seals have no cavities which can fill up with debris, adversely affecting their scaling ability.

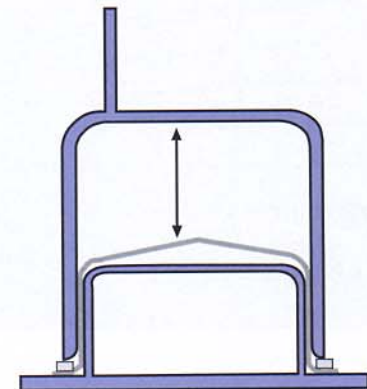
The limited deflection of the Flex Seat metal seal extends its usable life and allows a large selection of seal metals, including C-276. Both the perimeter seals and the throat seals are designed to be long-lasting, yet simple to replace.

Self Cleaning, Tight Closing Replaceable Throat Seals

When the damper is closed, the seal air system is used to maintain the bonnet pressure above the duct pressure. Locating the seal air fan discharge in the bonnet assures that process gases do not enter the bonnet past the throat seals.



Internally or externally replaceable throat seal designs are available if required.



The depth of the lower channel is variable. WahlcoMetroflex has designed channels depths up to 2 ft. (600 mm) to accommodate expected material build-up.

Throat Seal Assembly

WahlcoMetroflex uses a flexible seal across the lower bonnet frame. This seal is in constant contact with the side channels; and contacts the upper and lower blade channels in the fully open or closed position. This arrangement minimizes wear, extending the life of the seal. The illustration to the left shows an externally replaceable seal. Above right photo shows a seal cartridge for an internally replaceable throat seal.

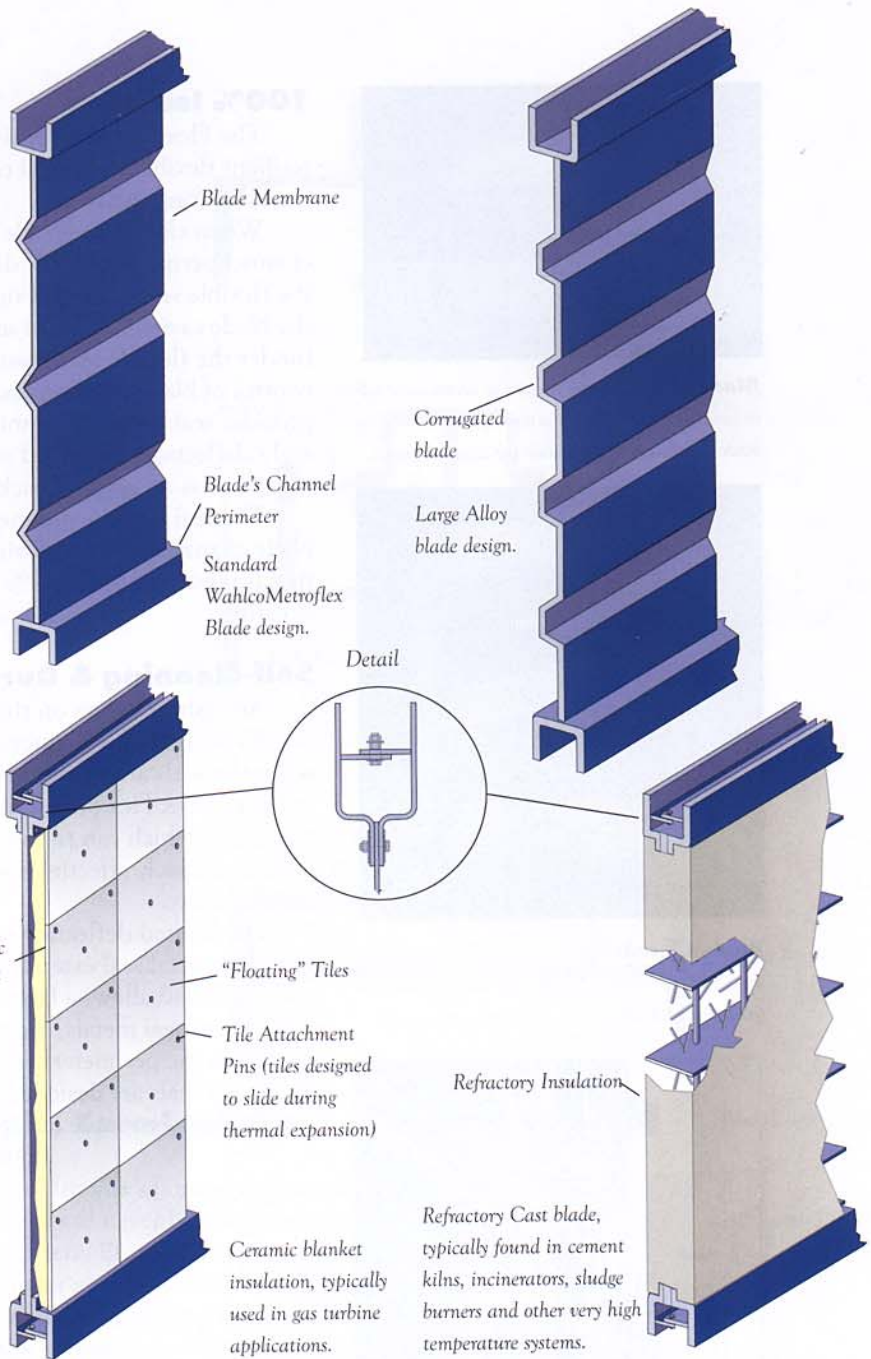
Engineered Blade For Minimal Thermal Distortion

The *WahlcoMetroflex* engineered blade consists of a structural frame and reinforced metal membranes. As a result, thermal distortion from temperature differentials across the blade surfaces is minimized—particularly when compared to solid plate designs.

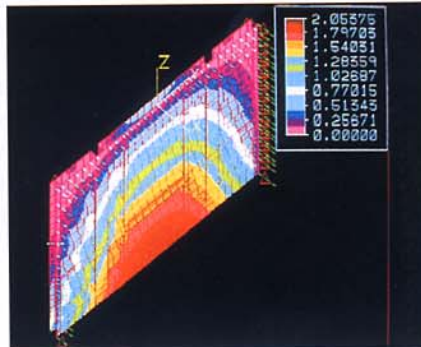
WahlcoMetroflex structural blades do not require heavy welds as in plate blade designs that lead to latent thermal distortion and subsequent poor sealing and/or operational performance. This also makes field assembly of large, “spliced” installations easier by eliminating the need for critical blade welding.

Blades are fully supported from deflection on all sides by the solid seat. Unlike thick plate designs, this arrangement avoids support structures in the gas flow that encourage debris accumulation. The moving blade does not rub against any support structures—an important concern with alloy blades.

The *WahlcoMetroflex* blade design also accommodates insulation for applications where it is desirable to minimize heat loss.



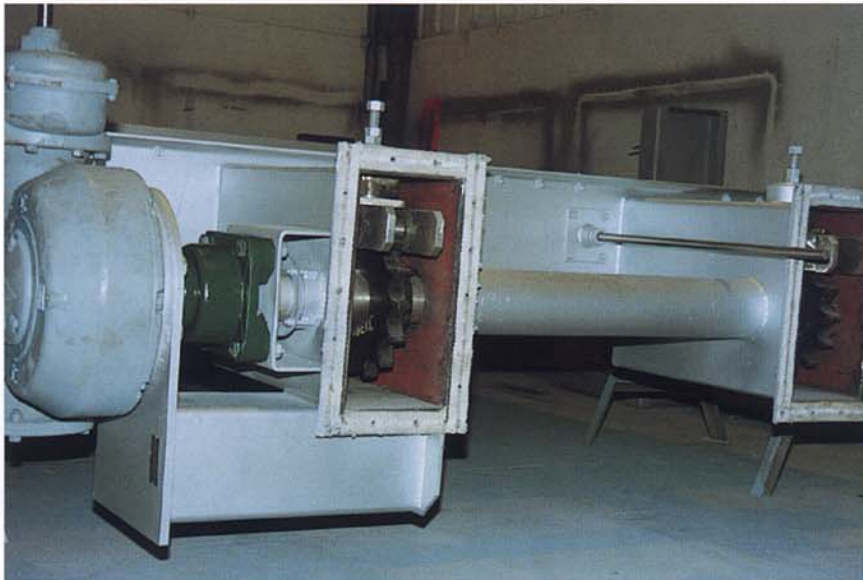
A *WahlcoMetroflex* Engineered Blade is lifted into the frame during shop erection. This blade is approximately 32 ft. x 20 ft. (9800 mm x 6100 mm). The two channels through the blade membrane provide both blade strength and needed seal air flow paths to the lower channel.



Blade Design Refinement

To assure accurate analysis of stresses and deflection, *WahlcoMetroflex* uses finite element analysis techniques. This computer analysis accurately predicts thermally induced stresses, as well as structural stresses, and further assures the integrity of the *WahlcoMetroflex* designs.

Rugged Rack & Pinion Drives

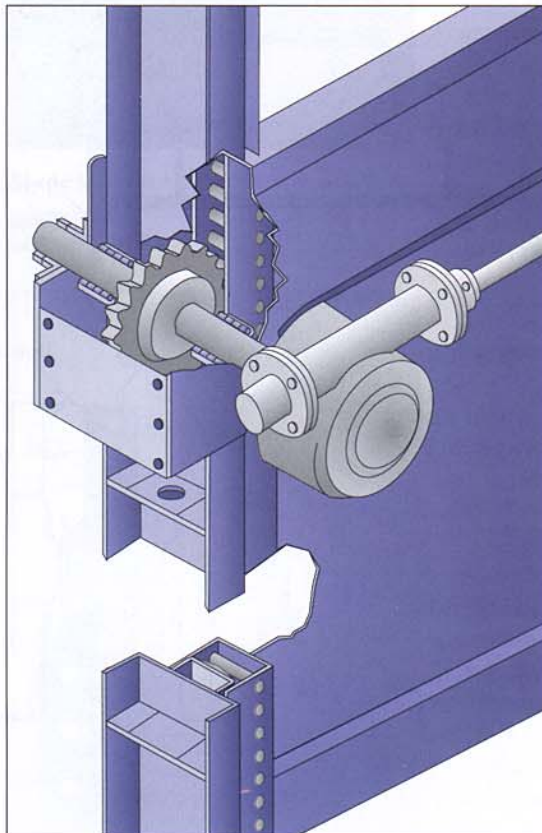


Top Drive Design: WahlcoMetroflex's most popular drive configuration. The top drive design uses a common actuator and gearbox, providing the most economical solution.

Reliable & Self Cleaning

WahlcoMetroflex rack & pinion drives have been used in over 1,500 installations worldwide since 1979. The self-cleaning rack never needs lubrication and does not stretch over time.

WahlcoMetroflex rack & pinion drives can work in all duct arrangements with vertical, side or flat draw orientations. The actuator drive can be located either on the top or the side of the frame, providing flexibility to meet a customer's needs.

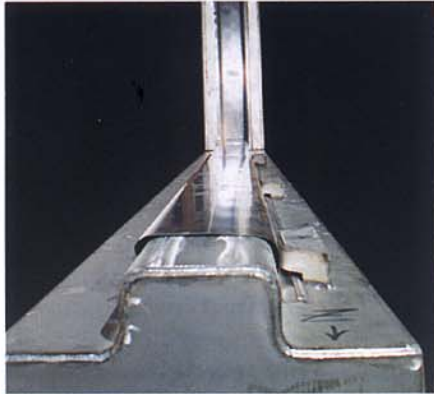


Side or Face Drive Design: Typically used in space-restricted applications. The drive height does not extend beyond the height of the bonnet. Side design uses a single actuator and two gearboxes, one located on each side (shown). Face design uses one actuator and dual rack & pinion positive drive system.



Close-coupled rack & pinion arrangement. On larger dampers a double rack design can be supplied. The pins are typically 1-1/2" to 2" in diameter, depending on damper size.

Frame Configurations & Bonnet Designs



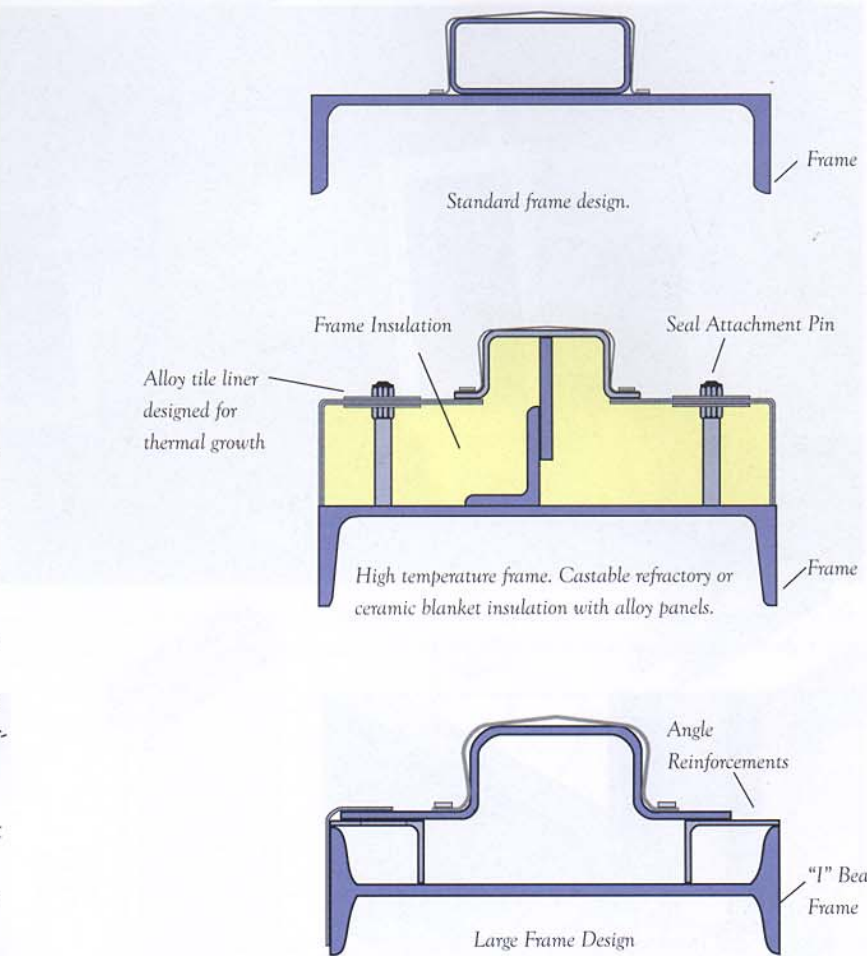
Frame Design Minimizes Corrosion

Other damper designs have seat cavities which accumulate ash and debris that can interfere with blade and seal air movement. These dampers use continuous purge air to keep debris out of the cavities, but the blowing air “cools down” the frame and encourages acid condensation and corrosion. Water-washing systems require drainage and flushing water systems.

On the other hand, WahlcoMetroflex seals are self-cleaning; they require no purge air or water-washing systems. The frame stays “hot,” minimizing acid condensation and subsequent corrosion.



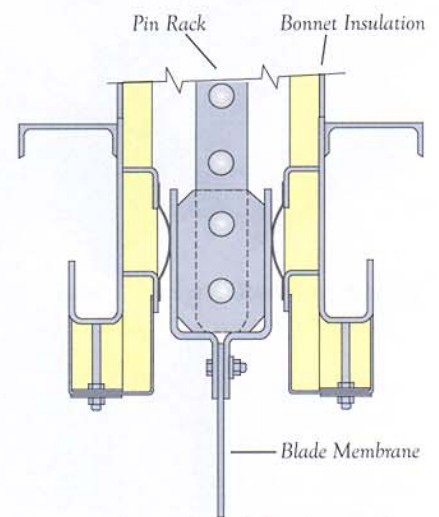
The bonnet serves as an extension to the ductwork, assuring zero leakage to atmosphere under all conditions.



Fail-Safe, Zero-Leakage Bonnets

WahlcoMetroflex's bonnet design insures that flue gas will never be able to escape into the atmosphere. Even if the throat seals and the sealing air system somehow failed, the damper would not become a source of leakage to the atmosphere.

The bonnet protects the system from rain, which can create corrosion and cement-like mixtures when combined with ash. Another feature of the Flex-Seat design is the throat seals which only contact the blade channel perimeter when fully open or fully closed, reducing wear and considerably increasing longevity.



High temperature throat seal detail showing ceramic insulation of the bonnet and bolted attachment of the blade channel to blade membrane.

Custom Guillotine Designs



The Flex-Seal seal and blade perimeter can easily be formed for round ducts. Note the blade position indicator for verification of the blade position.



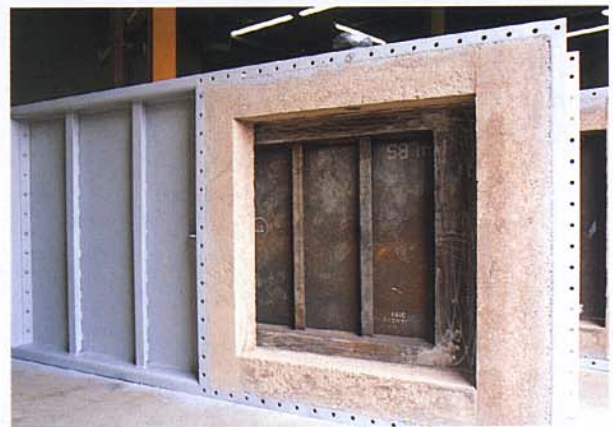
For applications where a small amount of leakage is acceptable, a slide gate is a low cost option. The design pictured above includes a locking pin to prevent inadvertent movement of the blade, and a pneumatic operator.



The Flex-seat guillotine, specific to this custom-designed unit, has the unique ability to split the duct into two sections. Blades can be retracted individually or in tandem.



For small guillotine dampers, a single rack is often supplied. Unit shown with electric actuator for top-draw application.



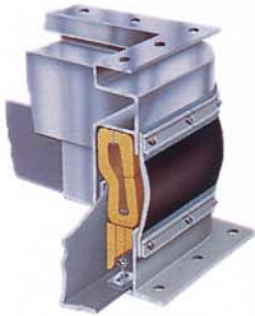
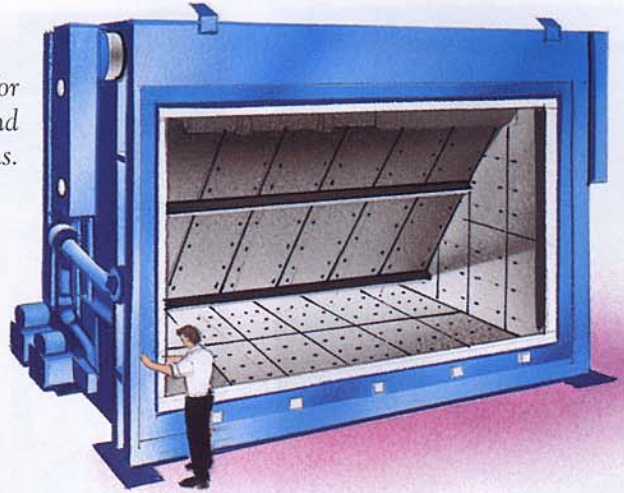
Another excellent application for the Flex-Seal guillotine is high temperature service. The units pictured have refractory-lined frames. WahlcoMetroflex's unique design also allows the refractory insulation of the blade membrane and the bonnet.

Additional Gas Flow Control Products

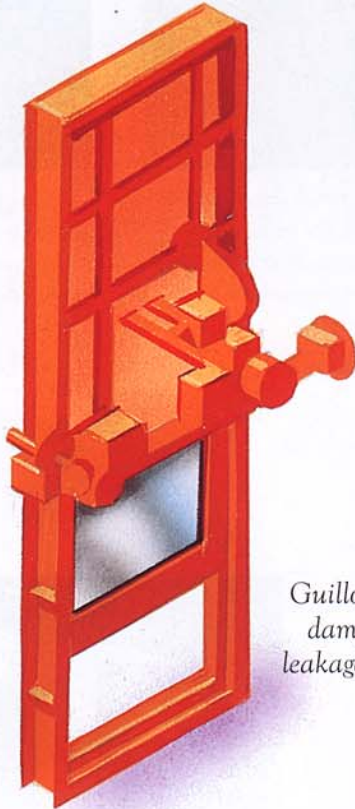


Multi-louver damper for control and tight shut off application.

Divorter damper for combined cycle and co-generation systems.



WahlcoMetroflex's fabric expansion joints are designed for applications over 2000°F (1100°C).



Guillotine and flap dampers for zero leakage applications.

Rolled bellows for control of expansion and contraction in high temperature/high pressure piping.



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