High Velocity P/V Valve

Technology Route Comparison

Traditional Gravity Type vs Magnetic Type vs Exsafe Fluid-Dynamic Type

Stable by Fluid Dynamics, not by Magnets.





Executive Positioning

Exsafe does not add magnetic components to compensate for instability. It uses a wide-body, low-contraction flow path and calculated fluid-dynamic force balance to achieve stable opening, tight closing and lower lifecycle cost.

Three Technical Routes

A practical comparison for shipowners, shipyards, fleet managers and technical purchasing teams.

Traditional Slim Gravity Type

Simple structure. However, slim flow path, high contraction ratio and weak backpressure capability can make the valve sensitive to pressure fluctuation.

Magnetic Type

Uses magnetic force to assist closing, reseating and damping. It may improve some gravity-type issues, but introduces magnet aging, corrosion, gap variation and maintenance dependency.

Exsafe Fluid-Dynamic Type

No magnets. A wide-body, low-contraction flow path creates calculated upward airflow force so F_air is close to gravity plus friction during opening.

Core Conclusion

The issue is not gravity itself. The deeper issue is whether the valve geometry can handle backpressure, pressure waves and airflow-force balance after opening.

Dynamic Behavior Comparison

Dimension	Traditional Gravity	Magnetic Type	Exsafe Fluid-Dynamic Type
Control Principle	Seat load mainly from disc weight. Sealing, setting and stability are mutually constrained.	Magnetic force is added to weight. Extra control components compensate for instability.	F_air approx. G + F_friction. Stability comes from geometry and airflow balance.
After Opening	Sensitive to pipe pressure waves and backpressure. Flutter, oscillation and hammering may occur.	Good designs can damp some movement, but magnetic force changes rapidly with air gap.	Small and stable opening. Designed for non-oscillation and non-hammering behavior.
Opening Travel	Often needs larger travel to obtain capacity, increasing inertia and impact risk.	Can create quick separation. Travel and blowdown depend on magnetic circuit and damping design.	Wide-body flow area reduces dependence on large disc lift. Stable opening is valued over large jumping motion.
Backpressure Capability	Slim path and large contraction ratio reduce resistance to pressure fluctuation.	Magnetic control can help, but pipe-wave coupling still affects disc force.	Wide chamber and low contraction ratio help buffer pressure waves and reduce local velocity change.

Sealing, Blowdown and Lifecycle Cost

Traditional Gravity

Sealing
Metal seat can be affected by eccentricity and impact wear; soft seal adds aging and compatibility risk.

Blowdown
Larger opening-closing pressure difference may lead to over-venting and VOC / inert gas loss.

Maintenance
Seat wear, guide wear and hammering can increase later maintenance cost.

Magnetic Type

Sealing
May use magnetic holding force or resilient elements to support tight closing.

Blowdown
Not naturally low. Reseating depends on magnetic force, travel and damping structure.

Maintenance
Magnets, magnetic gap, corrosion, deposits and specialized parts add service dependency.

Exsafe Fluid-Dynamic Type

Sealing
Metal-to-metal hard sealing, 5.5 mm contact width and conical self-centering design.

Blowdown
Low opening-closing pressure difference. Example: opens around 21 kPa and closes around 20 kPa.

Maintenance
No magnets and no main soft seat. Low maintenance demand supports lower lifecycle cost.

Customer Value Message

A lower purchase price is not the whole cost. Oscillation, hammering, leakage, magnet replacement, crew time, downtime and VOC loss can become more important over the vessel lifecycle.

Proof Points for External Communication

Use this page with type approvals, test records, videos and product datasheets.

Non-Oscillation

Zero contact of valve seat and disc during the test: much more stable, 0 Hz.

Low Blowdown

Opening-closing pressure ratio >=87%; field example: 21 kPa open, around 20 kPa close.

Zero Leakage

Metal-to-metal seal. Leakage target 0 m3/h with reference to ISO 15364:2021 Annex J.

No Magnets

No periodic magnet replacement and no magnetic aging uncertainty.

Longer Pipe Length

Class data: EM-50A to EM-150A max vent pipe length <=291 m; EM-200A <=44 m.

Custom Capability

Pressure setting, material and nominal size can be customized. Custom pressure range: 5-100 kPa.

Recommended English Core Statement

Exsafe does not rely on magnetic components to compensate for instability. With a wide-body, low-contraction flow path and fluid-dynamic force-balanced design, the valve opens through a small and stable gap, minimizing oscillation, hammering, over-venting and long-term maintenance risk.