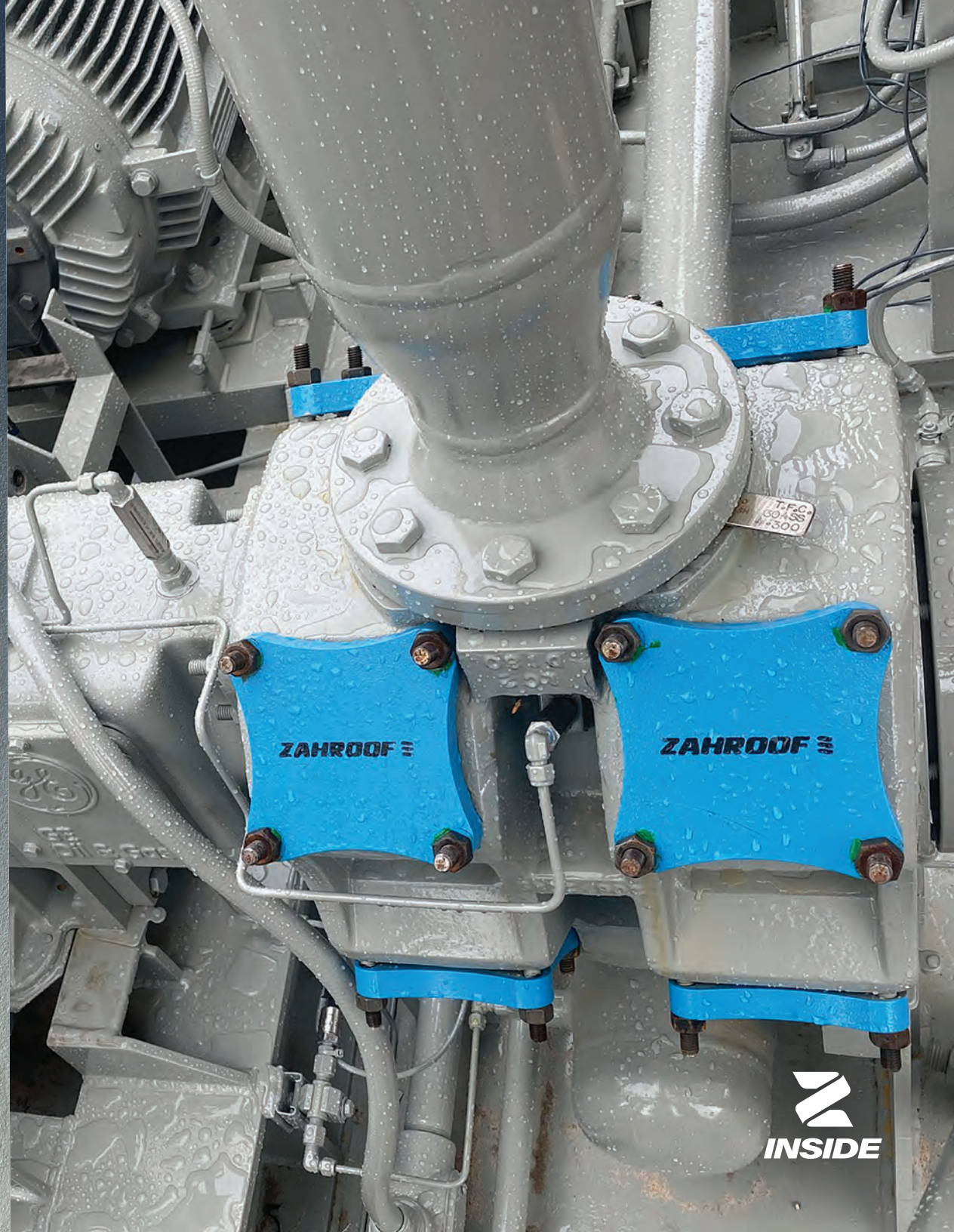


ZAHROOF 
VALVES INC




INSIDE



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ENGINEERING **EXTRAORDINARY**

+ INCREASE

Production, Reliability, Run time, Revenue, ROI

+ LOWER

Costs of Maintenance, Inventory, Fuel,
Power Consumption

+ REDUCE

Flaring, Noise, Vibrations, Environmental Impact



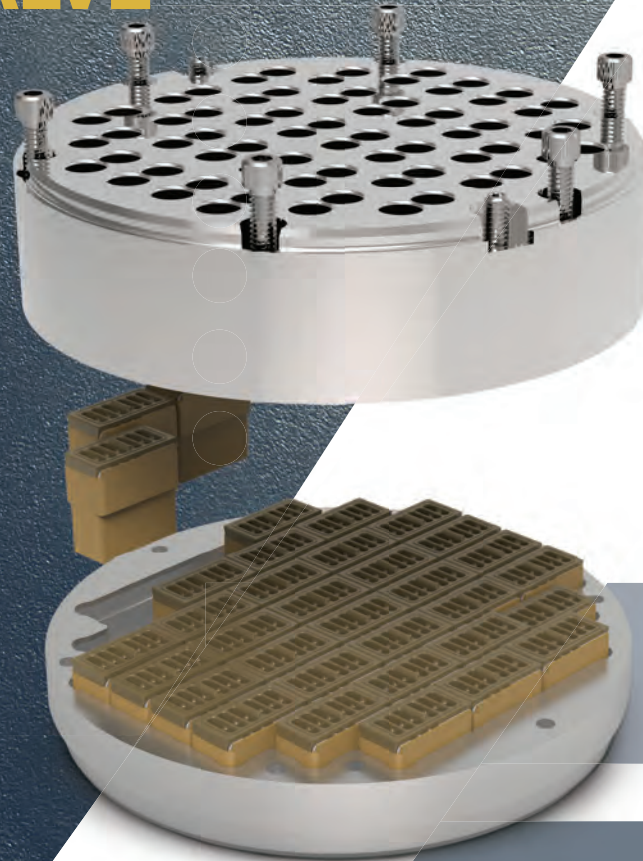
MEET THE ZAHROOF STRAIGHTFLO™ VALVE

The Zahroof StraightFlo™ Valve is a drop-in replacement valve for industrial reciprocating compressors for speeds from 200 to 3600+ rpm, pressure differential across a valve to 6500 psi (450 bar), service temperatures from -300° to 500°F (-184° to 260°C), and for all gases including sweet and sour natural gas, acid gas, CO2, hydrogen, nitrogen, CNG, LNG, ethylene, air, ammonia, HCl, helium, etc.

THIS REVOLUTIONARY TECHNOLOGY IS PATENTED AROUND THE WORLD AND OFFERS SIGNIFICANT IMPROVEMENTS OVER CONVENTIONAL VALVES.

“ The main benefit is an increase in MTBF on all of the compressors. We used to average 0.5 to 2 years, now we’re confident we’ll be able to get 5+ years or more. Our longest current run time is 3.5 years, and the valves still look great. ”

-Zahroof Valve Customer



Up to 12%
throughput
improvement



Reduces power
consumption
by 5–15%



Reduces inventory costs
by as much as 80%



Increases incremental revenue
by hundreds of thousands to
millions of dollars



Reduces service costs, all but eliminates
unscheduled compressor downtime



Reduces number of emission events and
fugitive emissions intensity



5x TO 25x
MEAN TIME BETWEEN FAILURE

UP TO 12%
THROUGHPUT IMPROVEMENT

**SUPERIOR
PERFORMANCE,
ELIMINATE
FAILURES,
EASIER SERVICE**

Whether you're doing equipment service callouts yourself or managing those who do, Zahroof makes your life a lot easier. Compared to existing options, our revolutionary StraightFlo™ Valves for reciprocating compressors perform substantially better by reducing operating costs and improving production by significantly increasing runtime between service while reducing power consumption and/or increasing throughput—guaranteed.

**UNMATCHED
RELIABILITY**

Unlike our competitors, we don't profit when our products fail—so instead of mere months, our valves operate for years in the field. More tolerant of liquid and debris, they turn problem compressors into producers. And they're so dependable, we back them with one of the best warranties in the business.

10-YEAR
LIMITED WARRANTY STAINLESS HOUSING

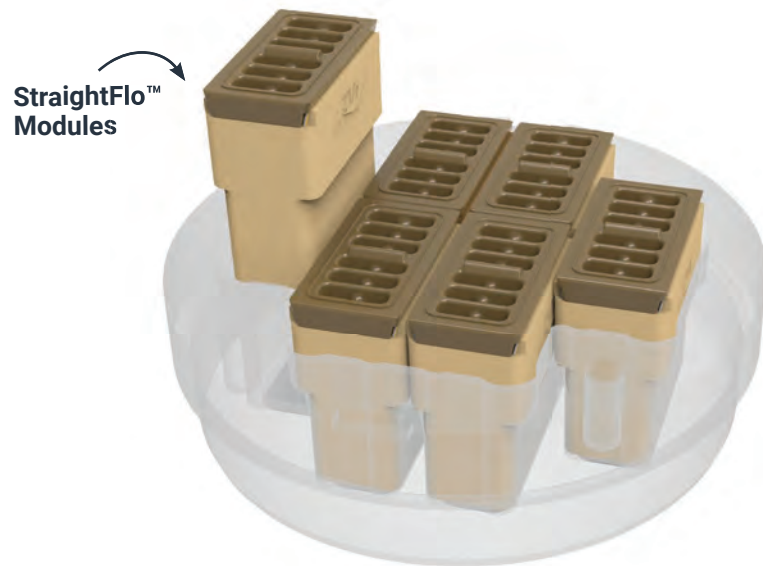
5-YEAR
LIMITED WARRANTY FOR LOW-SPEED APPS

**SERVICED
ON SITE IN
MINUTES**

While conventional valves must be swapped and sent out for machining, StraightFlo™ Valves can be refurbished on site without any machining, special tools or skilled labor. They're as easy to service offshore as on dry land. And with no need to stockpile spare valves, you can reduce inventory by more than 80%.

HOW IT WORKS

Our modular design features interchangeable modules held stationary between the valve seat and carrier. There are 18 standard modules in 2 materials available in our StraightFlo™ Valves, each with varying reed lift and stiffness to cover all reciprocating compressor applications and optimized to provide the best performance and reliability.



Tech Sidebar:

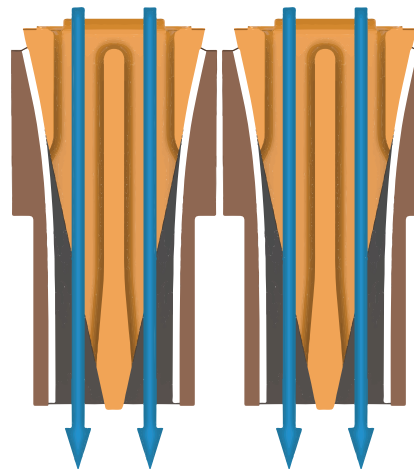
We use our proprietary Dynamic Valve Sizing Program to determine the optimum module. This program simulates the valves in the cylinder for the given application, using NIST real gas properties to calculate the reed displacement, velocity and forces as a function of crank angle to determine the various compressor parameters, including flow and power. It takes into consideration the cylinder and frame geometry, gas composition and operating conditions to determine exactly when the reeds open, the flow of gas through the valves and the pressure drop across the valves as a result of this flow. How cool is that?

REED VALVE MODULES WITH A STRAIGHT-THROUGH FLOW PATH

Each StraightFlo™ module is an enhanced reed valve, designed with a straight-through flow path. Since the gas doesn't have to traverse the usual tortuous, high-loss path, our valves have the highest effective area for a given diameter.

What's more, the module's components don't move or impact the metal housings. Not only is wear-and-tear completely contained inside the modules, but compressors with StraightFlo™ Valves typically operate at 1/10th the vibration levels of those with conventional valves.

With StraightFlo™ Valves, noise can be reduced by more than 7dB.



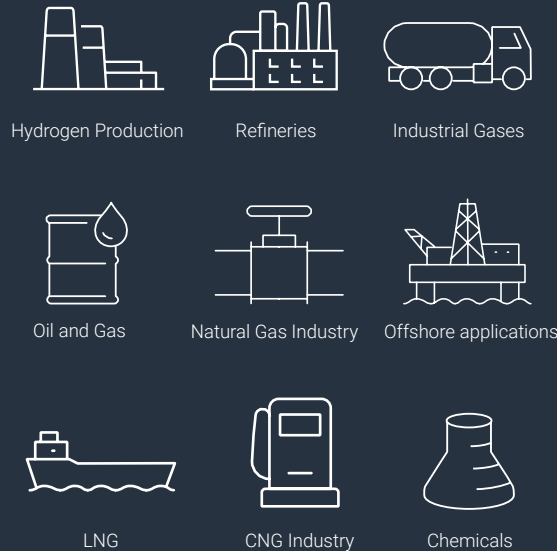
Super-Deep Detail:

Since the reeds act as both the sealing element and the spring element, the lowest natural frequency of our modules is 250Hz, well above any excitation force from an engine or motor. This high separation from excitation forces practically eliminates failure due to resonances. It also makes our valves suited to much higher speeds than are currently common in the field. Compare this to a maximum of 30Hz for poppet valves and about 80Hz for plate/ring valves where a mass (e.g., poppet/plate/ring) has helical coil springs supporting it.

EASY TO SERVICE, NO NEED FOR SPARES

Its modular design means the StraightFlo™ Valve can be easily serviced in minutes. Just undo the fasteners holding the valve assembly together, slide out the old modules with your fingers, slide in the new, and reattach the valve seat to the carrier. There's no need to ship valves offsite for machining. Plus, inventory can be minimized by over 80% compared to conventional valves. Stock 6 to 8 module types and your entire fleet of compressors is covered—no matter the brand, cylinder size, application, or operating condition—so you can repair any valve in the field without having to return to a warehouse to get the right valve or parts.

PERFORMANCE ACROSS INDUSTRIES



INTERCHANGEABLE, EASY TO RE-RATE

StraightFlo™ modules are interchangeable between valves: whether they're 1.5" in diameter or greater than 14", whether they're suction or discharge valves, whether the valve goes into a cylinder made by Manufacturer X or Manufacturer Y.

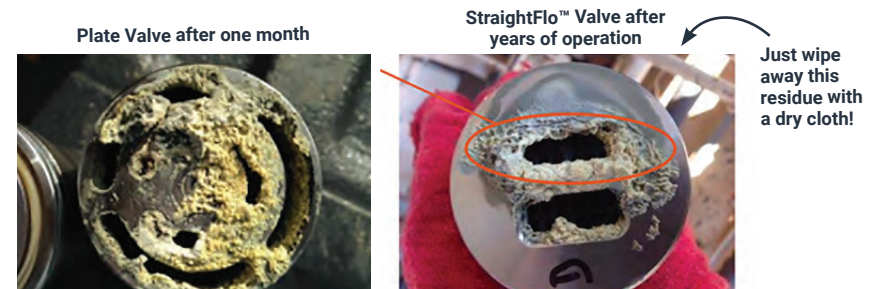
They're also easy to re-rate for a new application—just change out the present modules with modules rated for the new application. As long as the valve seat is pressure rated for the new application, you now have a valve for a brand-new application at very little cost.

Fun Fact:

No machining means the valve seat pressure rating never drops below that of the new valve. It also eliminates the chance of machining errors that result in tolerance stack up mistakes and prevent valves from being installed after service.

HIGHLY TOLERANT DESIGN

The straight-through flow path makes our valves self-cleaning and highly tolerant of liquids and solids. When the reeds are wide open, liquids and solids go right through the module without any impact on the critical sealing faces. With conventional valves, liquids and solids strike the sealing element head on, often causing it to break or for the solid particles to become embedded. Embedded solids can affect the sealing surfaces to the point that the valve seat cannot be repaired and must be replaced. With StraightFlo™ Valves, that doesn't happen.



STRAIGHTFLO™ PRODUCTS



STANDARD



INTEGRAL CAGE VALVE
WITH COVER

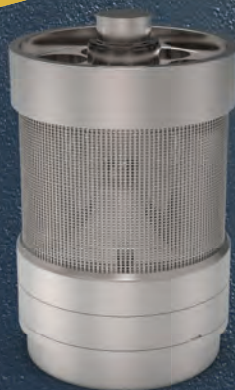


CONCENTRIC WITH INTEGRAL
PIPE AND FLANGE



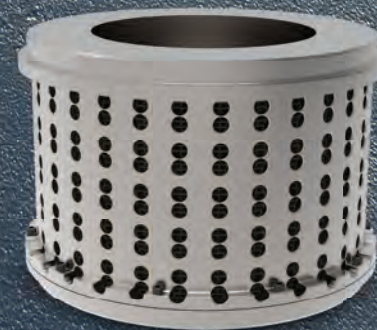
STACKED

Reduce or eliminate damage
that can occur from liquids or
solids in the gas stream



VALVE PROTECTION
MESH (VPM)

Optimal flow for transmission
and pipeline applications



RADIAL VALVE

THE STRAIGHTFLO™ UNLOADER VALVE

Features the same modular design as all StraightFlo™ Valves and delivers the same improved performance, serviceability and reliability. An optimal drop-in replacement for both finger-type and plug-type unloaders, utilizing the existing actuator system. Utilizing the patented poppet style or hollow piston technology.

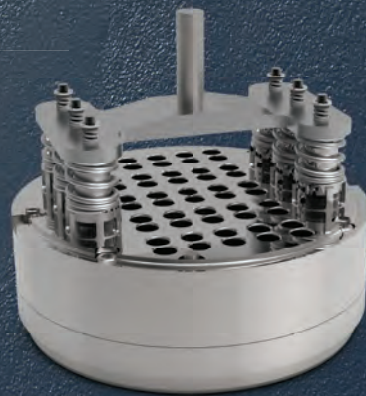
*Simplifies serviceability
and improves safety*



PLUG UNLOADER



INTEGRAL CAGE



SUCTION VALVE WITH UNLOADER



JACKBOLT ELIMINATOR

HOW MUCH DIFFERENCE CAN A VALVE ACTUALLY MAKE?

The difference between profit and loss. Between a smooth operation and a frantic one. Between a safer workplace and unacceptable risk. The difference is in the details, but the effect is enormous.



INNOVATIVE, EFFICIENT & GREEN

With each passing year, there's growing concern about the environment, and legislation has become increasingly stringent. At Zahroof, we are committed to improving energy efficiency, reducing the carbon footprint, and protecting the planet as we benefit our customers. One of our primary goals is to help you achieve as close to net-zero as possible.

REDUCE ENVIRONMENTAL IMPACT

Replacing conventional valves with StraightFlo™ Valves improves compressor performance and efficiency, making the collection, transfer, and distribution of energy resources more eco-friendly. By keeping compressors running longer, there's far less to flare.

	Highly efficient valves mean less fuel consumption for the same work. Up to 10% less in a typical 1000 rpm high-speed pipeline application.
	Less-frequent servicing reduces unburnt methane emissions due to venting, purging, flaring and blowdown of pipes– from 5X to 25X less.
	Since StraightFlo™ Valves don't need machining or the replacement of valve seats or guards, they create less waste.

REDUCE NOISE

With no plates, poppets or rings impacting against a valve seat or guard, the StraightFlo™ Valve generates substantially lower vibration and noise levels than conventional valves.

10X LOWER VIBRATION LEVELS	6–8 DECIBELS LESS NOISE	REDUCES AMOUNT OF SOUND DAMPENING INSULATION NEEDED



**ZAHROOF GENERATES BOTH
COMPELLING INVESTMENT RETURNS
AND SOCIAL AND ENVIRONMENTAL
IMPACTS FOR OUR CUSTOMERS**

Responsible investment is increasingly central to financial strategies. When a fund manager's research turns up a positive ESG profile, that business is better positioned to win investments, and its share price will rise.



Increase production & throughput revenue



Lower cost of maintenance, inventory & fuel



Reduce or eliminate flaring



Achieve lower impact rating on road to net-zero

OUR STRAIGHTFLO™ VALVE GUARANTEE

The StraightFlo™ Valve guarantee is 2X the MTBF (mean time between shut down of compressor due to valve issues) of the compressor compared to MTBF with the valves we replace under the same operating conditions (includes quality of gas) plus 10% reduction in valve losses.

CAPEX EFFICIENCY

In addition to the best, most reliable valves in the global energy industry, we also offer several innovative, capital-efficient options that allow you to reap the many benefits of employing Zahroof Valves, without making a significant capital expenditure—all at a low fixed monthly cost, with no long-term commitments and no hidden fees.¹

STRAIGHTFLO™ MODULE SUBSCRIPTION PROGRAM (MSP)

With our MSP subscription program, the modules across all your applications are automatically replaced after a pre-determined Preventive Maintenance interval, based on your application, thereby fully servicing your valves and providing you trouble-free operation until the next scheduled service.

STRAIGHTFLO™ RENTAL PROGRAM

Our Rental Program allows you to get the benefits of StraightFlo™ Valves now while making OPEX friendly monthly payments that earn credit towards the purchase of the valves over time. Longer-term leases, facility contracts, and profit/cost-savings sharing arrangements are also available.

ZAHROOF VALVES CONSIGNMENT PROGRAM

Our consignment program allows customers to utilize their maintenance budgets more effectively and implement StraightFlo™ Valves on a wider scale throughout their fleet. We'll manufacture valves that are optimized for your specific compressors and work with you to keep your inventory up to date.

¹Certain terms & conditions apply to all programs and options.

ABOUT US

Zahroof, established in 2010 as a groundbreaking innovator in the global compressor valve market, develops, manufactures, and sells reciprocating compressor valves, unloaders, and associated products.

The company has developed its disruptive and unique StraightFlo™ compressor valve using its patented Modular Reed Valve (MRV) technology. The StraightFlo™ Valve provides superior performance and reliability, exceptional cost savings and lower emissions as compared to conventional reciprocating compressor valves.



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