

Flow control solutions for
industrial gas applications





Challenges in industrial gas applications

Industrial gases are used in many industries and processes such as oil refining, chemical, steel and pharmaceutical plants. Bulk industrial gases are used as such in many industrial and medical applications.



Reliability – The key to success

The most common methods to produce these gases comprise of different separation technologies, such as air separation and pressure swing adsorption. The gases can be categorized as liquefied gases, air gases, noble gases and other important gases, like hydrogen. Since they are an important part of the successful production of many industrial products, the most critical challenge regarding the industrial gas process operation is reliability. An interrupted gas supply will stop production and lead to a plant shutdown or disturb the bulk gas deliveries. This means ensuring maximized uptime and continuous, uninterrupted gas supply. At the same time profitability must be ensured through balanced cost control.

Such industrial gas applications place high requirements on valves. Operations are extremely demanding from high-cycle, fast stroking and tight shut-off to control accuracy in both warm and cryogenic conditions. Metso can answer to all these challenges through extensive experience and application knowledge for selecting and sizing just the right valve to meet the most demanding requirements in any specific industrial gas application completed with life cycle care.

We can answer all your industrial gas industry challenges with our extensive expertise and application knowledge by selecting and sizing the right valves to meet your needs.

Metso Intelligent Reliability

The choice of many industrial gas companies

Ultra-reliable performance

Neles, Jamesbury and Mapag valves are the world's leaders in reliable, high-performance industrial gas flow control solutions. Since the 1970s, we have provided valves and accessories that meet the industry's most difficult process challenges across the entire range of industrial gas processes; cryogenic, adsorption, and membrane technologies. Because we consider industrial gas companies as major customers, Metso has established specialized industrial gas account management. Complete line of control, automated on/off and switching valves, and accessories answer the needs for accurate control, tight shut-off, high reliability, and low maintenance.

Single source responsibility with global service center network

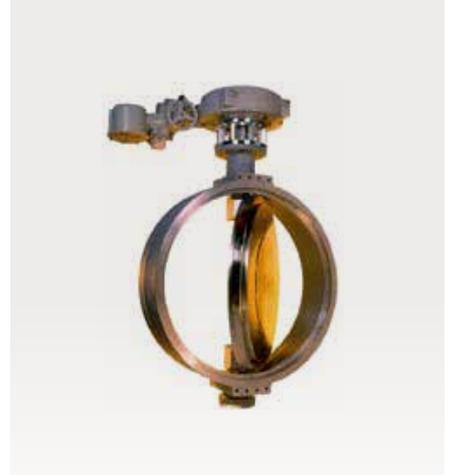
Operational reliability combined with single source responsibility means that customers can rest assured that our valves will serve well for many years under the severe conditions of industrial gas applications. Thanks to Metso's network of global service centers, valves can also be completely rebuilt and brought back into use in as-good-as-new condition. Our Service Center personnel are trained to maintain, diagnose and troubleshoot industrial gas valves and installations.

Metso ensures the high reliability demands by

- Preventive program
 - Accurate documentation of the service actions.
- The combination of these substantial benefits makes an extremely cost effective solution for a demanding service that requires the highest possible level of reliability.

We are committed to industry-specific product innovations such as

- Valves for cryogenic applications, high-cycle valves, and emission control,
- Neles SwitchGuard SG9000 intelligent on-off valve controller for process critical and high cycling on-off applications.
- Metso's valve sizing program Nelprof is continuously developed to meet the changing requirements to size and select the right valve and accessories for control, on/off and safety applications



Mapag Type O valve



Jamesbury Wafer-Sphere butterfly valve

Metso iCV valve offering includes:

- Finetrol eccentric rotary plug valves
- V-port segment valves for high flow capacity applications
- Neles RotaryGlobe valves with low flow or high pressure
- Neldisc high-performance triple eccentric disc valves for applications with a low-pressure differential or large pipe sizes
- Metso's top entry rotary control valves for critical and severe applications





Cryogenic processes

Air separation process



Jamesbury's Wafer-Sphere with patented cryogenic seat design.

The complex air separation process uses various stages of compression, purification, cooling & distillation and tank car filling. The most common technology used in this separation process is via cryogenic distillation.

Demanding conditions require enhanced reliability

Extreme operational and environmental requirements such as very cold temperatures and an oxygen-enriched atmosphere, which require correct material selection and control of fugitive emissions, are the major challenges. Valve designs have to provide long-lasting safe tight shutoff operations to avoid health hazards and production interruptions.

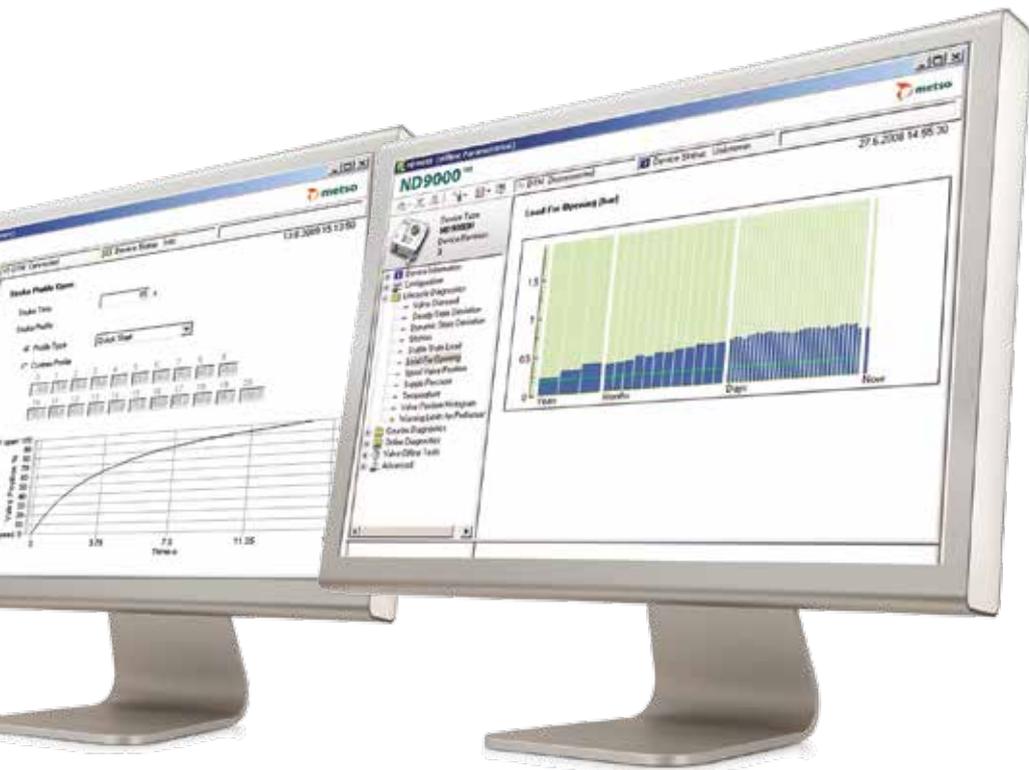
Ensured success through cryogenic knowhow

Neles, Jamesbury and Mapag products and experience cover the entire ASU process from the compressor and purification through the cold box to tank loading and distribution. The patented metal and soft seating technology is ideally fitted for specific cold box requirements – the core of the air separation process. Using our vast

experience the correct materials needed for hazardous oxygen applications can be selected. The proven high reliability and a long life cycle make Metso the world leader in cryogenic valves. Continuous plant availability can be ensured with intelligent on-line diagnostic capability.

The largest and most advanced valve testing in the world

For the valves in the cold area, our cryogenic testing facilities allow a thorough evaluation of the valve. The performance can be verified accurately in extreme conditions fulfilling the needs of international and customized standards. Metso's cryogenic testing laboratories in Finland, Germany and the USA are the largest and most advanced of any dedicated valve test facility in the world. The computer-controlled testing system assures cryogenic valve performance during commissioning and subsequent operation.



Metso supplied 72 valves designed to reliably operate for millions of cycles.

Non-cryogenic processes

Swing adsorption solutions

Swing adsorption processes are used to separate or purify gases to produce industrial applicable gases like hydrogen, chlorine or flour (H_2 , Cl_2 , F_2). There are three different separation processes based on either pressure alternation (PSA/VSA - Pressure and Vacuum adsorption) or temperature alternation (TSA – Temperature adsorption).

Considerations PSA/VSA and TSA plants

Gas flow interruptions that cause high consequential costs call for operational safety and reliable continuous supply. Therefore the speed and ease of service as well as the predictions of problems are of extreme importance.

Optimizing both operating and capital expenditures must be addressed.

Switching between adsorption and desorption is a very challenging application for valves with a 2-4 cycles per minute and on/off cycle time of less than 1 second for millions of cycles during operational life time.

Metso's solutions for improved reliability and life cycle

In order to meet the expectations of one of the most demanding valve applications,

Absorbent Bed with valves, Metso's engineering research team has been working together with industrial gas customers for many years on how develop and improve. The result of this cooperation is a unique offering of high-cycle butterfly valves from the Mapag and Jamesbury brands.

The valves perform millions of cycles with reliable tight shutoff. With Metso's unique smart products and embedded diagnostic capabilities, the reliability can be even further improved. Both Metso's intelligent Neles positioner ND9000 and the smart controller SwitchGuard SG9000 allow optimized process configuration. Online diagnostics enables the implementation of predictive maintenance strategy. These Metso valves are currently being installed in PSA and VSA plants all around the world.

Reliable high-cycling valves for a major French refinery

Metso recently signed a contract with one of the major industrial gas industry players, and helps them to fulfill PSA requirements of the big French refining companies.

The refinery produces about 350 000 barrels per day of oil products. To meet new energy standards, they recently increased the production of clean diesel fuel by building a new hydrocracking unit carbon.

A non-stop hydrogen supply is extremely important for the refinery, and this calls for reliable PSA –unit operations that at the same time should be balanced with cost control measures to insure profitability. The most critical part of the unit is the high-cycling valves that have to withstand extremely frequent cycling and fast stroking times. For this 12-bed PSA-unit Metso supplied 72 valves designed to operate for millions of cycles providing reliable tight shutoff with intelligent controllers and Metso FieldCare condition monitoring system.



Metso global service network

World-class quality, worldwide support

Metso offers predictive maintenance services, including a detailed diagnostics analysis of intelligent controllers' data with maintenance recommendations and their timing. All of the above and more can be included in a life cycle agreement, which will be designed to your needs specifically.

When you choose Metso, you can count on more than high-quality, innovative products. You can also depend on total solutions that give you a competitive advantage in process reliability and accuracy. You can rely on our services to keep your process competitive.

Metso has developed service solutions to specifically address the needs and requirements of industrial gas customers and suppliers. These solutions focus on reduced downtime during planned outages, elimination of unplanned valve failures, and inventory utilization. Our service technicians receive documented training to ensure adherence to the detailed specifications and technical standards associated with equipment in industrial gas applications. Experienced field technicians offer local support and are equipped with professional field diagnostic tools, such as Nelscope.

Turnaround management is easy with the Metso team. The team participates in pre-planning, making sure the correct spare parts, necessary tools and expertise are all on-site. If necessary, an asset survey is carried out before the turnaround for accurate scope definition. All findings are recorded to a database to be used for maintenance planning. To analyze the valves' condition even more accurately, we offer predictive maintenance services, including a detailed diagnostics analysis of intelligent controllers' data with maintenance recommendations and their timing. All of the above and more can be included in a life cycle agreement, which will be designed to your needs specifically.



Metso life cycle services and maintenance

A service offering to cover all your needs

Our Service Technicians are available for you, to ensure operational reliability, help eliminate unpredicted failures and plan effective maintenance that minimizes downtimes.

Metso service technicians come on-site and make a visual audit to see the condition of your valves and accurate type codes to check spare part availability. The maintenance plan is always verified against the specific requirements of the site in question, making necessary modifications if needed. The number of cycles, age and condition of the valves as well as the availability target of the plant are amongst the things to be considered. The planned turnaround schedule is discussed. The maintenance plan may also include predictive maintenance services, e.g. Valve HealthCheck or Valve HealthCare, where the valve's condition is analyzed by interpreting the diagnostic data.

With the Metso service agreement the needed spare parts are always available. For additional security, Metso's Valve Spare Container is a good option, bringing a selection of spare parts on-site against a service fee, without an obligation to buy.

Your maintenance plan is always verified against the specific requirements of each particular site. We provide services that answer your specific needs.



Maintenance Solution

- Intelligent Valve Repair
- Intelligent Field Survey
- Criticality Analysis
- Maintenance Plan
- Valve Modernization
- Metso Valve Spare Parts



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