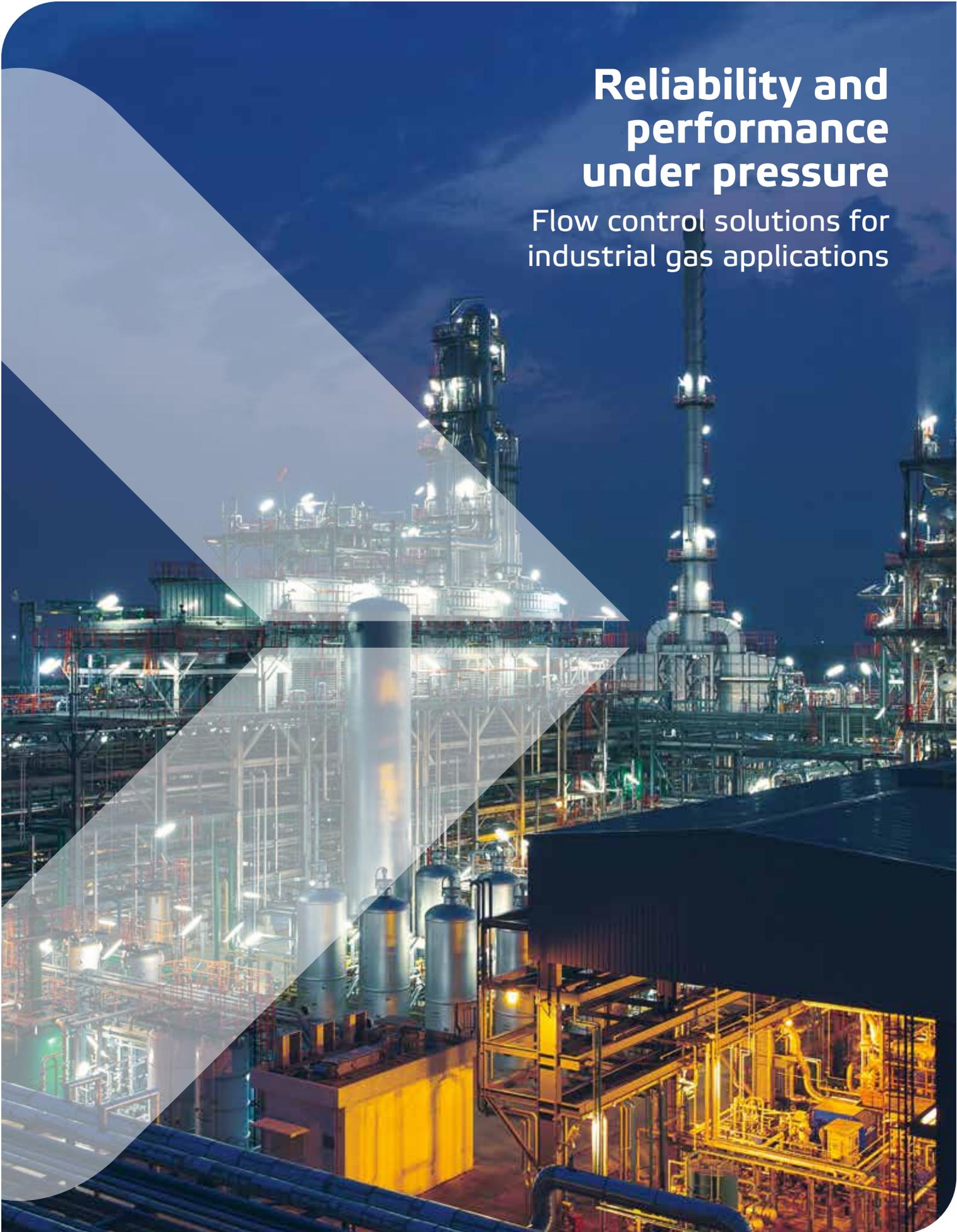
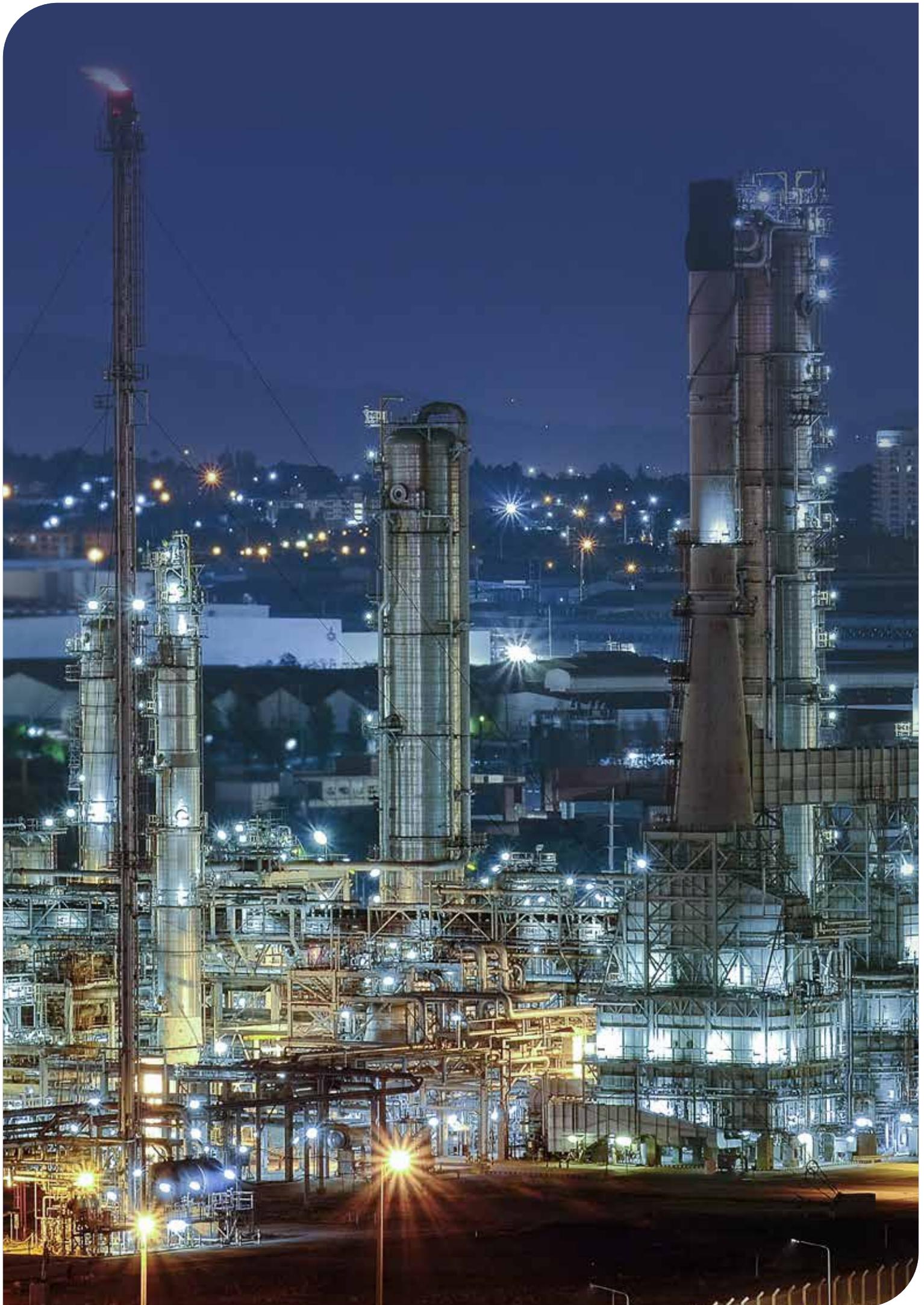


# Reliability and performance under pressure

Flow control solutions for  
industrial gas applications





# Your partner in industrial gas

We are an industry leader with decades of experience in delivering valves to a wide range of industrial gas applications around the world. We regularly partner with major players in industrial gas. We are committed to providing our customers with a valve portfolio that meets their evolving needs.

## Reliable performance

We provide 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 other technologies.

Our complete range of control, automated on/off and switching valves, and accessories answer the needs for accurate control, tight shut-off, high reliability, and low maintenance.

## In-depth understanding

We understand and address the most common methods and separations technologies used in the production of industrial gases. This includes air separation and temperature, pressure and vacuum swing absorption. We also understand the risks involved with unstable compounds such as oxygen and hydrogen, which our products are designed to handle.

Since industrial gases are an important part of the successful production of many industrial products, the most critical challenge regarding the 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.

## Global single source responsibility

Operational reliability combined with single source responsibility means that our customers can rest assured that their valves will serve well for many years under the severe conditions of industrial gas applications.

Thanks to our network of global service centers, valves can also be completely rebuilt and brought back into use in as-good-as-new condition. Our service personnel are trained to maintain, diagnose and troubleshoot industrial gas valves and installations.





## Air separation processes

Our portfolio is suited for the entire industrial gas range with valves for different process conditions from utilities, general service and specific cryogenic and oxygen applications to extremely demanding high cycling applications.

### Demanding conditions

Extreme operational and environmental requirements such as very low 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.

### Cryogenic knowhow

Our products and experience cover the entire Air Separation Unit

(ASU) process from the compressor and purification through the cold box to tank loading and distribution. Our industry-leading metal and soft seating technology is ideally fitted for specific cold box requirements – the core of the air separation process. The proven high reliability and a long lifecycle make Neles the world leader in cryogenic valves.

### Advanced valve testing

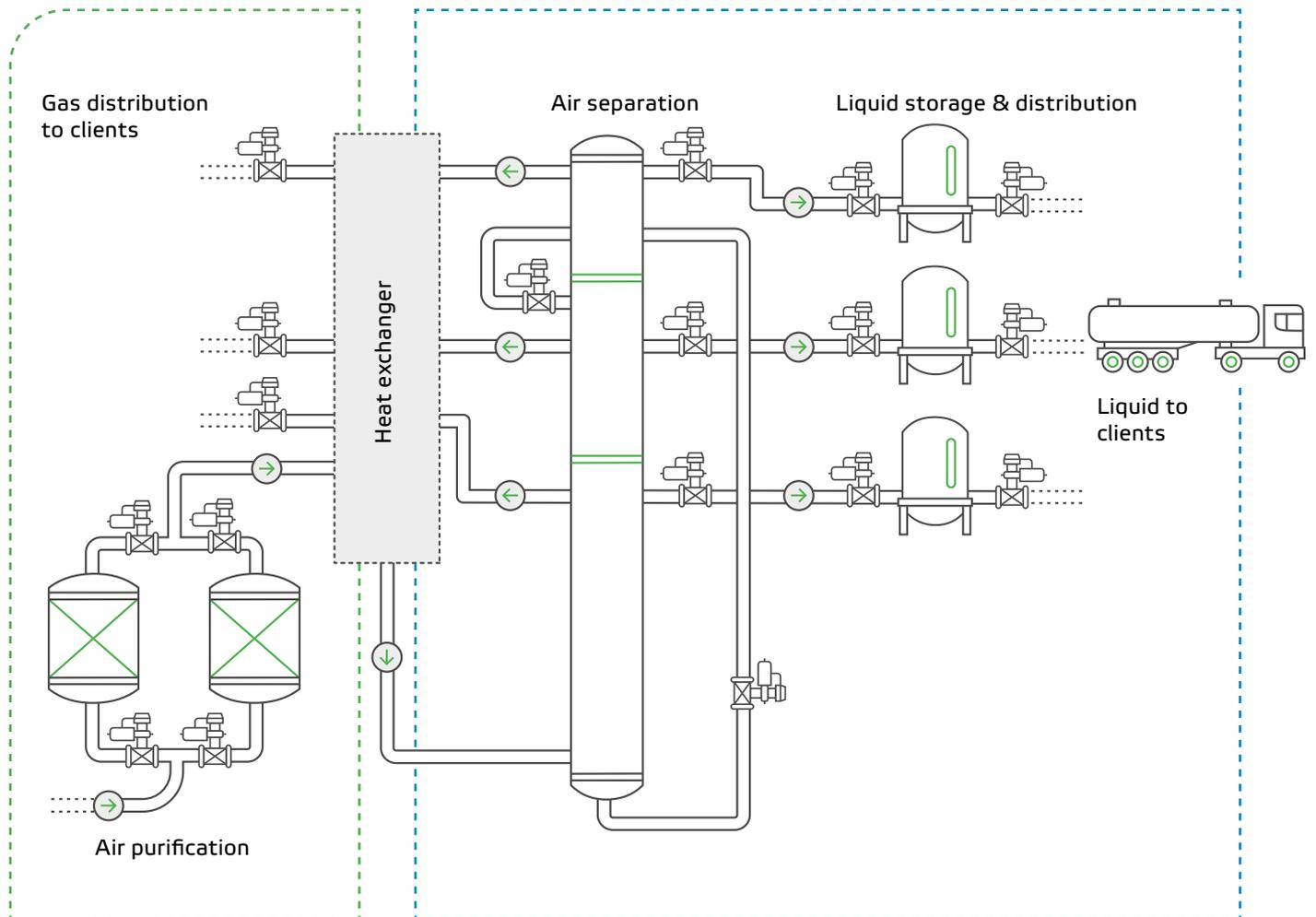
For the valves in the cold area, our cryogenic testing facilities allow a thorough evaluation of the valve.

The performance can be verified accurately in extreme conditions fulfilling the needs of international and customized standards. Our cryogenic testing laboratories located 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.

# Air separation unit diagram

Warm area

Cryogenic area



## Air purification:

- Challenges include cycling valves, humidity, molecular sieve protection, temperature swings (ambient to 300°C)
- Specifically designed 3-lever valves that only allow opening at low delta pressure (dP) to ensure the protection of the molecular sieve adsorbers

## Air separation and liquid storage & distribution:

- Cryogenic valves with extended shaft design and possibility for horizontal shaft mounting installation
- Valves allowing maintenance of internals on welded valves of the cold box
- Valve design providing long-lasting safe tight shutoff and excellent controllability in operation avoiding hazards and production interruptions
- Our portfolio is suited for use in cryogenic environments and complies with oxygen requirements
- With our unique smart products and embedded diagnostics capabilities reliability can be improved even further. They allow us to monitor valve condition.





## Swing adsorption processes

Swing adsorption processes are used to separate or purify gases to produce industrial applicable products.



### Optimizing performance

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.

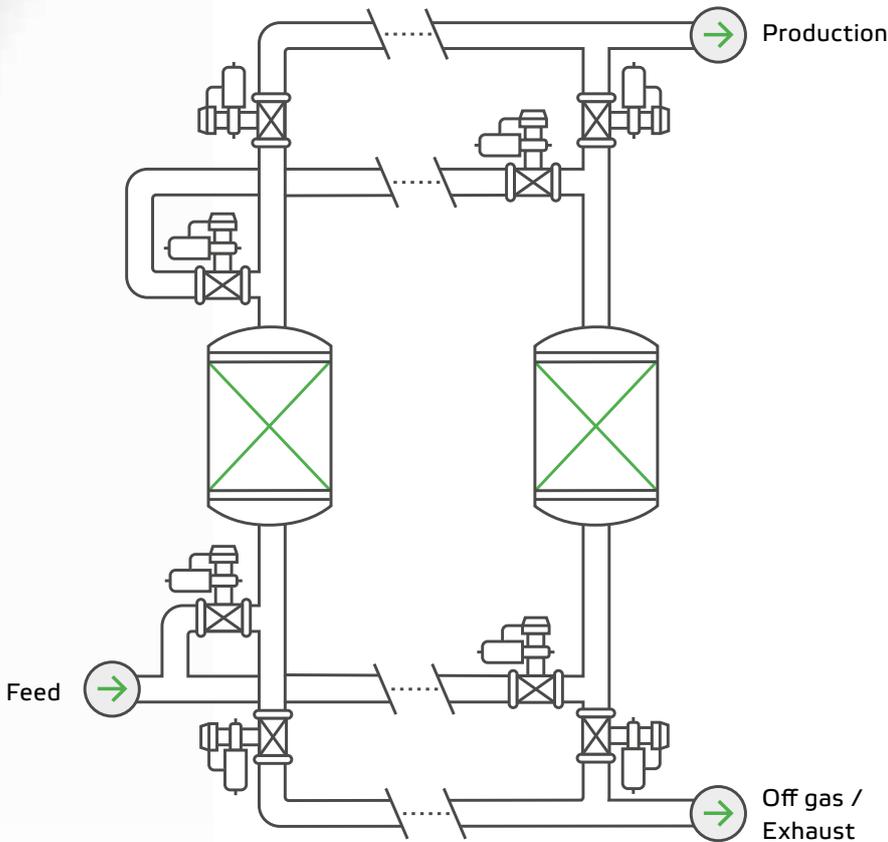
Switching between adsorption and desorption is a very challenging application for valves with a 2-4 cycles per minute and on/off cycle time of less than 1 second for millions of cycles during operational lifetime.

### Developing together

In order to meet the expectations of one of the most demanding valve applications, Neles has been working together with industrial gas customers for many years. The result of this cooperation is a unique offering of high-cycle butterfly valves. The valves perform millions of cycles with reliable tight shutoff.

With our unique smart products and embedded diagnostic capabilities, reliability can be even further improved. Online diagnostics enable the implementation of a predictive maintenance strategy.

# Swing adsorption process diagram



## Pressure Swing Adsorption (PSA) :

- Fast stroking
- Reliable tight shutoff
- High differential pressure
- Hundreds thousands of cycles per year

## Vacuum (Pressure) Swing Adsorption (VSA/VPSA):

- Fast stroking
- Large valve diameter
- Reliable tight shutoff
- Million of cycles per year

## High-performance portfolio

We offer a unique portfolio of high-cycling butterfly valves from the Neles™ and Jamesbury™ brands. Our valve assemblies have been developed to perform millions of cycles with reliable tight shutoff.

With our unique smart products and embedded diagnostics capabilities reliability can be improved even further. They allow us to monitor valve condition.

Our valves are installed in major PSA and VSA plants all around

the world. Our valves, actuators and controllers are specifically designed for high cycling swing adsorption plants, featuring fast stroking times, repeatability of operations and high cycle capability combined with long-lasting tightness.





## Green hydrogen production



Green hydrogen refers to  $H_2$  and  $O_2$  produced from water utilizing renewable energy by the process of electrolysis. Ammonia synthesis is used to produce ammonia from N and H.

### Electrolysis

Our valves deliver superior performance in low-pressure electrolyzers as well as in those that are subject to high temperatures reaching up to  $700^{\circ}C$ . New electrolysis technologies are also creating the need for valves that can ensure both high capacity and low-pressure losses respectively. In addition to our Neles segment valves and the Jamesbury™ Wafer-Sphere™ 800-series butterfly valve, our Neles L-series butterfly

valves with their 2-shaft design are particularly strong performers in this area. We also have a strong offering in place for  $O_2$  service.

### Ammonia synthesis

Ammonia synthesis is used to produce ammonia from nitrogen and hydrogen. The produced ammonia can then be used for fertilizer production, as eFuel, or as a hydrogen carrier for transport or energy storage. Alternatively,

it can also be further processed into urea or nitric acid. The role of valves in the ammonia synthesis loop is to control the flow of synthesis gas into the converter and to ensure the recycling of the unreacted synthesis gas. Neles butterfly valves provide the optimal solution for ammonia synthesis loop isolation and control valves. Their wide design options make them suitable for all on-off/control applications in the ammonia synthesis loop.

# Global knowhow

Our solutions are always engineered to provide improvements in process performance while reducing costs. But the true added value often stems from our expertise in managing projects in their entirety.

## Service solution for industrial gas producers

We have developed service solutions to specifically address the needs and requirements of industrial gas producers. These solutions focus on the monitoring of valve and process performance, defining turnaround scope, reducing downtime during planned outages, eliminating unplanned valve failures, and optimizing inventory coverage.

Based on our 45 years service experience we have learned how to extend the valves lifetime by selecting the right spares and repair actions. Our service personnel receive documented training to ensure adherence to the detailed specifications and technical standards associated with equipment in industrial gas applications such as being certified to handle oxygen valves repair or ATEX

certified equipment. Experienced field technicians offer local support and are equipped with best-in-class tools and service facilities.

We are the valve technology and service partner for many of the major industrial gas companies worldwide, providing tailored solutions for PSA and VSA processes and ASU plants.

We have dedicated relationships with manufacturers and licensors to ensure continuous technological development.

Our highly skilled field service experts are never far away, as they are located in our 40 service centers worldwide. They are available to provide everything from warranty repairs to support during upgrades.

## Locations around the world:



● Valve technology centers ● Service centers ● Authorized service partners



## Project knowhow that delivers value

The experience and knowhow our project engineers bring to the table during the project and commissioning phases can help expedite project completion and enable a speedy and fluent process startup.

We help you select the optimal valve solutions for your planned process and provide a clear and defined chain of responsibility from sales to execution and a strong service presence thereafter.

Once the project is handed over to our services, we remain dedicated to offering our expertise in terms of both ensure process performance and ultimately improving it through process optimization, predictive maintenance and updates across the product lifecycle.

# Our offering

## Butterfly valves

Neles butterfly valves						
Product	Series	Design	Specifications		Service	Bulletin
Neles high performance triple eccentric disc valves	LW & LG-series 	Wafer (WS) or lug (LG)	<b>Size:</b> DN80 – 1000 / 3" – 24" <b>Temperature:</b> -200 to +600 °C / -330 to +1110 °F <b>Pressure:</b> ASME 150 – 300 / PN 10 – 64		General on-off and control applications	2L121 2L1220 2LW20
	L6-series 	Double flanged	<b>Size:</b> DN100 – 2200 / 4" – 88" <b>Temperature:</b> -200 to +600 °C / -330 to +1110 °F <b>Pressure:</b> ASME 150 – 600 / PN 10 – 100			
Neles three lever valve for Air Separation Units (ASU)	BH-series 	Designed to air separation unit air inlet shut-off valve	<b>Size:</b> DN200 – 1600 / 8" – 64" <b>Temperature:</b> -29 to +280 °C / -20 to +536 °F <b>Pressure:</b> PN10 – 40, ASME 150 - 300		Air purification, molsieve 3-lever valves	2BH20
Neles full bore butterfly valve	BN-series 	Flanged, lug or wafer	<b>Size:</b> DN80 – 1600 / 3" – 64" <b>Temperature:</b> Max. +260 °C / +500 °F <b>Pressure:</b> PN10 – 40 / ASME 150 – 300		For high capacity applications	
Neles metal seated double eccentric disc valve	BW-series 	Flanged, lug or wafer, butt weld ends	<b>Size:</b> DN100 – 1600 / 4" – 64" <b>Temperature:</b> -200 to +470 °C / -320 to +880 °F <b>Pressure:</b> PN63 – 400 / ASME 600 – 2500		Critical applications such as high cycle, high temperature, cryogenic, oxygen and abrasive applications	2BW20
Neles high performance butterfly valves	BWX-series 	Wafer, lugged, double flanged	<b>Size:</b> DN100 – 600 / 4" – 24" <b>Temperature:</b> -200 to +470 °C / -320 to +880 °F <b>Pressure:</b> PN63 / ASME 600		Butterfly metal seated for cryogenic and general application	2BWX20
Jamesbury Wafer-Sphere high performance butterfly valves	815/830/835/860-series 	Wafer/lugged	<b>Size:</b> DN65 – 750 (2½" – 30") <b>Temperature:</b> Max +260 °C / +500 °F <b>Pressure:</b> ANSI 150, 300 & 600		For high cycle applications and standrad on-off & control valves	W104-1 W105-1 W101-6
	K815/K830/K860-series 	Wafer/lugged	<b>Size:</b> DN80 – 750 (3" – 30") <b>Temperature:</b> -196 to 38 °C / -320 to +100 °F <b>Pressure:</b> ANSI 150, 300 & 600			

## Ball valves

Neles ball valves					
Product	Series	Design	Specifications	Service	Bulletin
<b>Neles X-series modular ball valves</b> 	XA, XB, XC, XU & XT -series	Flanged, seat supported, full or reduced port	<b>Size:</b> DN25 – 600 / 1" – 24" <b>Temperature:</b> -200 to +600 °C / -320 to +1110 °F <b>Pressure:</b> PN10 – 160, ASME 150 – 900	Metal seated valves for ESD, on-off and control applications	1X22 1X23 1X26 1X27 1XH20
	XG, XM & XH -series	Flanged, trunnion mounted, full or reduced port			
<b>Jamesbury flanged ball valves</b> 	7000 -series	Standard port. Flanged	<b>Size:</b> DN15 – 500 / ½" – 20" <b>Temperature:</b> 260°C / 500°F <b>Pressure:</b> ANSI 150 & 300	Soft seated valves for ESD & on-off applications	B107-1 B107-3
	9000 -series	Full port			<b>Size:</b> DN15 – 600 / ½" – 24" <b>Temperature:</b> 260 °C / 500 °F <b>Pressure:</b> ANSI 150 & 300

## Globe control valves

Neles globe control valves					
Product	Series	Design	Specifications	Service	Bulletin
<b>Neles globe valves</b> 	GU-series	Unbalanced, top-guided	<b>Size:</b> DN15 – 150 / ½" – 6" <b>Temperature:</b> -200 to +593 °C / -320 to +1053 °F <b>Pressure:</b> ASME 150 – 2500 / PN10 – 320 / JIS 10K – 20K	General, severe service control valves, cryogenic service	4GV21
	GB-series	Balanced, cage-guided			<b>Size:</b> DN 50 – 900 / 2" – 36" <b>Temperature:</b> -200 to +593 °C / -320 to +1053 °F <b>Pressure:</b> ASME 150 – 2500 / PN10 – 320 / JIS 10K – 20K
<b>Neles angle pattern valves</b> 	AU-series	Unbalanced, top-guided	<b>Size:</b> DN15 – 150 / ½" – 6" <b>Temperature:</b> -200 to +593 °C / -320 to +1053 °F <b>Pressure:</b> ASME 150 – 2500 / PN10 – 320	General, severe service control valves, cryogenic service	4GV23
	AB-series	Balanced, cage-guided			<b>Size:</b> DN 50 – 1200 / 2" – 48" <b>Temperature:</b> -196 °C to +593 °C <b>Pressure:</b> ASME 150 – 2500 / PN10 – 320

## Segment valves

Neles segment valves					
Product	Series	Design	Specifications	Service	Bulletin
<b>Neles segment valves</b> 	R-series	Flanged	<b>Size:</b> DN25 – 800 / 12" – 32" <b>Temperature:</b> -52 to +425 °C / -60 to +797 °F <b>Pressure:</b> ASME 150 – 600 / PN10 – 100	For general control applications	3R21 3R24



Valmet's professionals around the world work close to our customers and are committed to moving our customers' performance forward – every day.

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