Products for Semiconductor Applications

Specialized products and professional services
Meeting your needs in semiconductor applications

About FITOK

Overview

Founded in 1998, FITOK Group has been a leading global supplier of instrumentation valves, fittings, and integrated systems, locating our factories in Germany, the USA, and China, with inventory and sales service centers in Germany, the USA, China,and the UAE.

Here are our advantages:

1. Specialized in instrumentation valves and fittings: decades of rich design and manufacturing experience, products sold in more than 100 countries and regions.
2. Superior R&D capabilities: 150+ professional engineers and 100+ patents.
3. Lean and reliable quality management: a variety of management system certifications and product certifications.
4. Fast and efficient product delivery: global manufacturing bases and service centers for faster product delivery and timely response to customers' needs.

More than **600** tons raw material in stock

Established in **1998**, concentrate on valves and fittings since its establishment

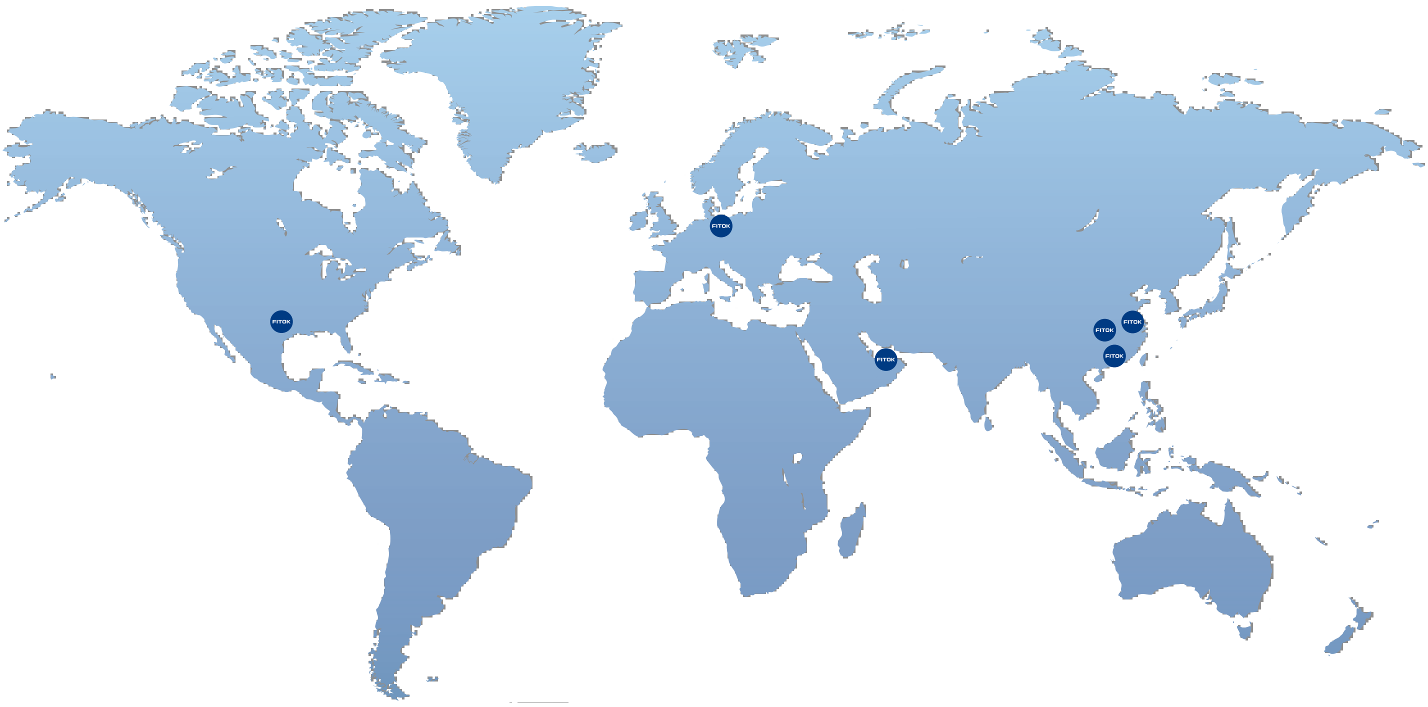
5 product lines to cover various applications

4 major manufacturing bases located globally

Products sold in more than **100** countries and regions

More than **100** patents

Worldwide Presence



FITOK Inc
Manufacturing &
Global Sales Center
- Texas, USA

FITOK GmbH
Manufacturing to Order
-Offenbach, Germany

FITOK Middle East
Regional Sales & Service Center
- Dubai, UAE

FITOK (Wuhan) Incorporated
Manufacturing to Stock
- Wuhan, China

FITOK Incorporated
Manufacturing to Order
- Shenzhen, China

FITOK (Suzhou)
Metal Products Co., Ltd
Manufacturing - Tubing
- Suzhou, China

Single-Source Supplier of Fluid Systems for Semiconductor Industry

FITOK can provide one-stop solutions for fluid systems in the semiconductor industry, from ultra high purity components such as fittings, valves and tubing to the integrated systems, and from the system design to the installation site service.

Fittings, Valves and Tubing

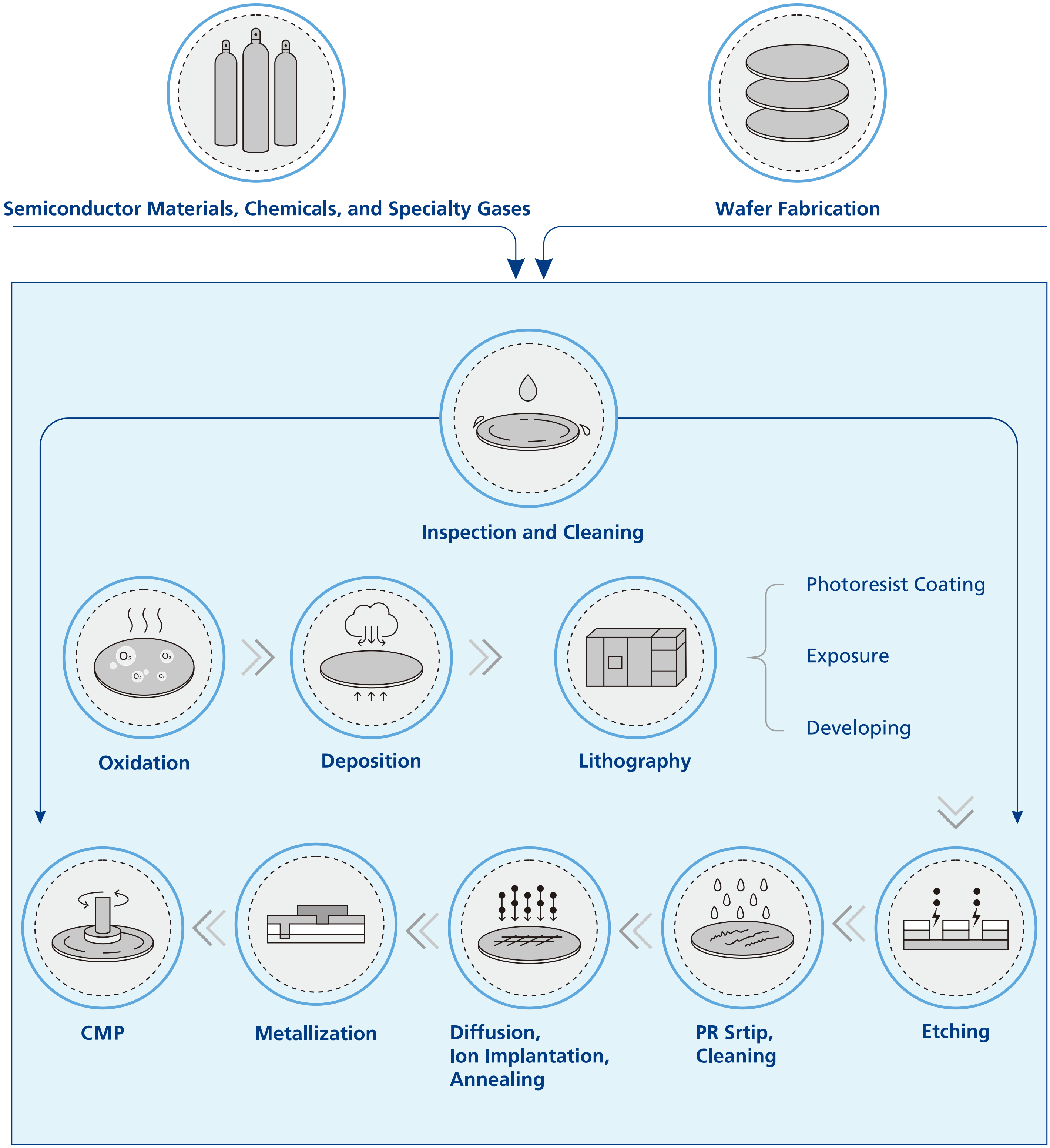
Integrated Systems

Bulk Gases, Electronic Specialty Gases, Chemicals, and Semiconductor Equipment Manufacturing

Semiconductor Manufacturing

Application of FITOK Products in Semiconductor Manufacturing Process

As a global leading supplier of valves and fittings, FITOK provides a full range of valves and fittings for semiconductor raw material production, semiconductor equipment manufacturing, semiconductor manufacturing process and the piping system construction and maintenance of semiconductor facility.

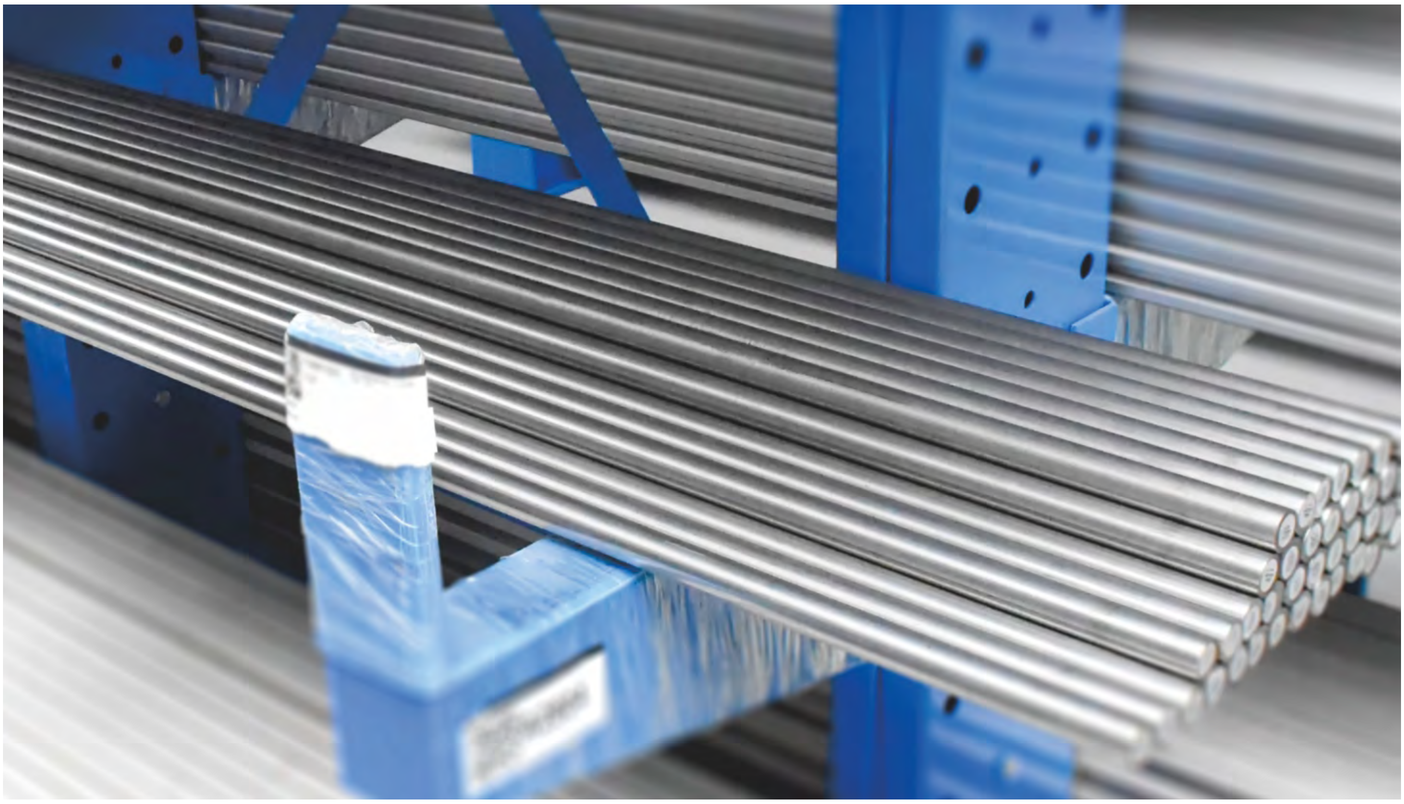


Products for Semiconductor Applications

Features

Raw Materials

The purity of raw materials is critical to achieving fine surface finishes for fluid system components. A finer surface finish contributes to improved process cleanliness.
FITOK uses 316L SS, 316L SS VAR, and 316L SS VIM-VAR materials that comply with the SEMI F20 standard for valve bodies. Compared with 316L SS, 316L SS VAR and 316L SS VIM-VAR offer improved material homogeneity with fewer inclusions, resulting in finer surface finishes and enhanced corrosion resistance.



FITOK adopts cobalt alloy complying with AMS 5876 standard or Alloy C-276 complying with ASTM B575 standard as diaphragm material to achieve high corrosion resistance and excellent durability.

Ultra High Purity Process

1. Electropolishing

The internal surface of ultra high purity products for the semiconductor industry is electropolished to improve the smoothness of the flow path and to form a chromium-rich layer on the metal surface to improve corrosion resistance, and the electropolished products are passivated to remove free iron ions. After electropolishing, the following testing standards can be achieved.

Test Item	Test Standard
Surface roughness (Ra)	SEMI F37
Surface chemical composition	SEMI F60
Cr/Fe	
CrO/FeO	
Oxide layer thickness	SEMI F72
Surface defect analysis	SEMI F73
Surface contamination	
Corrosion resistance	SEMI F77

2. Cleaning

Ultra high purity products for the semiconductor industry are rinsed with ultrasonic DI water in the NEBB-certified ISO 5 cleanroom and dried in an enclosed oven. The technical specifications of the DI water comply with SEMI E49 standard.

CESSTECH NEBB

CERTIFICATE OF COMPLIANCE

FITOK (WUHAN)
INCORPORATED
武汉市飞托克实业有限公司

ISO Class 4 焊接, 装配室 & ISO Class 5 FC-03 清洗间

- Welding & Assembly Room	ISO Class 4
- FC-03 Cleaning Room	ISO Class 5
- Secondary Changing Room	ISO Class 6

As per requirements of ISO 14644-1:2015(E), the designated areas listed above has met their respective acceptance criteria for ***ISO Class 4, 5*** (at ≥0.1µm & ≥0.3µm) and ***ISO Class 6*** (at ≥0.3µm & ≥0.5µm) under At Rest condition. Testing was performed as outlined in the above standard and the results are attested to in the Report No: ***CT/CPT/584-24.***

Ong Yam Chai
NEBB Certified CPT Professional

CESSTECH (S) PTE LTD

3. Welding, Assembly and Testing

- Cleaned products are welded, assembled, tested and inspected in the NEBB-certified ISO 4 cleanroom
- Helium leak test products as required by SEMI F1. INFICON helium leak detector with a minimum detectable leak rate (vacuum) < 5×10^{-12} std·cm^3/s

4. Packaging

- Ultra high purity products are packaged in the ISO 4 cleanroom and the product packaging complies with SEMI E49 standard
- Products are end-capped and double bagged with inner vacuum-sealed clean polyethylene bag and outer polyethylene bag

Product Portfolio

Fittings

Diaphragm Valves

More Information

Atomic Layer Deposition Diaphragm Valves

More Information

High Purity Pressure Regulators

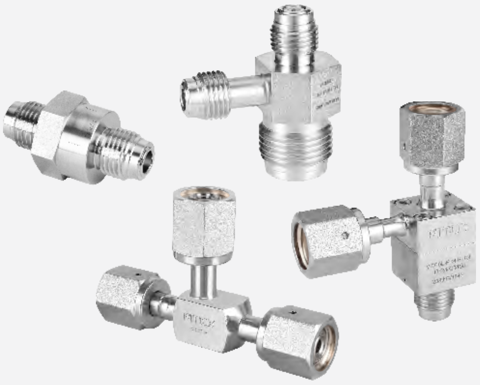
More Information

High Purity Ball Valves

More Information

Bellows-Sealed Valves

Check Valves and Vacuum Generators



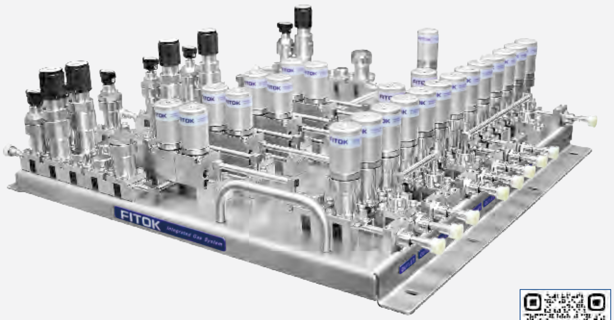
More Information

Changeover Systems

Gas Stick Assemblies

More Information

Integrated Gas Systems



More Information

High Purity Tubing

More Information

Metal Flexible Hoses

More Information

Featured Products

ALD Series Atomic Layer Deposition Diaphragm Valves

FITOK ALD Series Atomic Layer Deposition Diaphragm Valves are ideal for the atomic layer deposition processes. They deliver ultra-high precision, cleanliness, consistency, and long cycle life, ensuring accurate gas dosing for technological processes.

- Ultra long cycle life
- No dead space in the flow path
- High Cv consistency and stability
- Quick response to offer a total opening / closing response time of less than 15 ms
- Standard, thermal and thermal immersion models optional, the thermal immersion model has a working temperature up to 428 °F (220 °C)
- For the valve fitted with a solenoid valve, the solenoid valve is circularly rotatable along the actuator for easy position adjustment

Type	Size	Material	Cv ①	Working Pressure psig (bar)	Pneumatic Actuator Working Pressure psig (bar)	Working Temperature °F (°C)				Internal Surface Roughness μin. (μm)	Leak Rate (Helium) std·cm³/s	
						Valve Body	Actuator	Solenoid Valve	Sensor		Internal ②	External
Standard	1/4"~1/2", 6~12 mm or 1.125"~1.5"	Body: 316L SS, 316L SS VAR, 316L SS VIM-VAR Seat: PFA Diaphragm: Cobalt alloy	0.27 or 0.62	Vacuum to 145 (10)	60~90 (4.2~6.2)	32~248 (0~120)	32~248 (0~120)	-0.4~122 (-18~50)	-13~158 (-25~70)	Ra≤ 5 (0.13)	$\leqslant 1\times10^{-9}$	$\leqslant 1\times10^{-9}$
Thermal						32~392 (0~200)						
Thermal Immersion			0.3 or 0.62	Vacuum to 70 (4.8)		70~428 (20~220)	70~428 (20~220)	—	—			

① The Cv value is adjustable and varies with temperature. The value shown indicates the factory preset at room temperature.
② For certain models, the internal leak rate is $\leqslant 1\times10^{-8}$ std·cm³/s.

DK Series High Temperature Diaphragm Valves

DK series diaphragm valves are designed and manufactured to Ultra-High Purity (UHP) standards, ensuring the complete absence of non-metallic materials, such as resins, in gas wetted areas. These valves represent the pinnacle of metal diaphragm valve technology and can operate at temperatures up to 482 °F (250 °C). This makes them ideal for applications such as Metal-Organic Chemical Vapor Deposition (MOCVD) systems and corrosive media delivery systems.

- Thermal immersion design for use in high temperature up to 482 °F (250 °C)
- Metal seat to provide excellent resistance to swelling and contamination
- Cobalt alloy diaphragm with high strength and corrosion resistance to ensure long cycle life
- All-Metal wetted parts with broad chemical compatibility
- Minimal particle generation and minimal dead space, easy to purge

Size	Material	Cv	Working Pressure psig (bar)	Pneumatic Actuator Operating Pressure psig (bar)	Working Temperature °F (°C)	Internal Surface Roughness µin. (µm)	Leak Rate (Helium) std·cm^3/s	
							Internal	External
1/4"~3/8" or 6~8 mm	Body: 316L SS, 316L SS VAR	0.27	Vacuum to 145 (10)	72~101 (5~7)	Body, Actuator: 14~482 (-10~250)	Machine finished: Ra$\leqslant$10 (0.25) Electropolished: Ra$\leqslant$5 (0.13)	$\leqslant 3\times10^{-9}$	
	Diaphragm: cobalt alloy							

RTCC Series Miniature Tied Diaphragm Regulators

RTCC Series Miniature Tied Diaphragm Regulators feature a single-stage pressure reduction design and a compact form, making them ideal for low flow ultra high purity applications.

- Alloy C-22 lift poppet and Alloy C-276 diaphragm provide excellent corrosion resistance
- Metal-to-metal seal between valve body and diaphragm provides ensured sealing performance
- FR metal gasket face seal, W-seal, and C-seal connections optional
- Reinforced diaphragm design extends diaphragm service life
- No threads or springs exposed to the wetted area for easy purging
- Tied diaphragm construction offers positive shutoff for safety

Size	Material	Cv	Max. Working Pressure psig (bar)	Outlet Pressure Range psig (bar)	SPE (Supply Pressure Effect)	Working Temperature °F (°C)	Internal Surface Roughness µin. (µm)	Leak Rate (Helium) std·cm^3/s		
								Internal	External	
									Inboard	Outboard
1/4", 1.125" W/C-seal	Body: 316L SS, 316L SS VAR	0.08	150 (10.3)	0 ~ 100 (0 ~ 6.9)	0.3 psig per 20 psig source pressure change	PCTFE: -40~160 (-40 ~ 71)	Ra$\leqslant$5 (0.13)	$\leqslant 2\times10^{-9}$	$\leqslant 2\times10^{-10}$	$\leqslant 2\times10^{-9}$
	Seat: PCTFE									
	Diaphragm: Hastelloy									

Stainless Steel Electropolished Tubing (EP Tubing)

FITOK provides EP tubing with excellent roughness, cleanliness, and corrosion resistance by strictly controlling raw materials, electropolishing process, cleaning and packaging. FITOK EP tubing meets the high requirements of surface quality, purity, etc. in the semiconductor application.

- **Materials:** 316L SS, 316L SS VAR, 316L SS VIM-VAR
- **Inspection:** visual inspection, surface roughness measurement, particle testing, moisture testing and a series of tests with scanning electron microscopy (SEM), Auger electron spectroscopy (AES), electron spectroscopy for chemical analysis (ESCA or XPS)
- **Sufficient Inventory:** with flexible manufacturing systems and sufficient finished goods inventory in global warehouses, FITOK help customers save procurement and inventory costs, and reduce lead time
- **Prefabrication services:** FITOK can provide EP bent tubing and prefabricate EP bent tubing assemblies upon request to improve the installation efficiency for customers

Product	Standard	O.D.	External Surface Roughness µin. (µm)	Internal Surface Roughness µin. (µm)	Length
TEP Series	ASTM A269/A632	1/4" ~ 2 1/2"	Ra⩽40 (1)	Ra⩽5 (0.13)	4m, 6m, 20ft
PEP Series	JIS G3459	6A ~ 50A		Ra⩽7 (0.18)	4m, 6m
	ASTM A312	NPS 1/8 ~ NPS 2		Ra⩽10 (0.25)	4m, 6m, 20ft

Gas Stick Assemblies

FITOK gas stick assemblies integrate a ball valve, a diaphragm valve, a regulator, a pressure gauge and other accessories into one stick to reduce site connections for easier site installation. FITOK gas stick assemblies, including AGH series high purity gas stick assemblies and AGL series general gas stick assemblies, are widely used in the semiconductor industry.

AGH Series

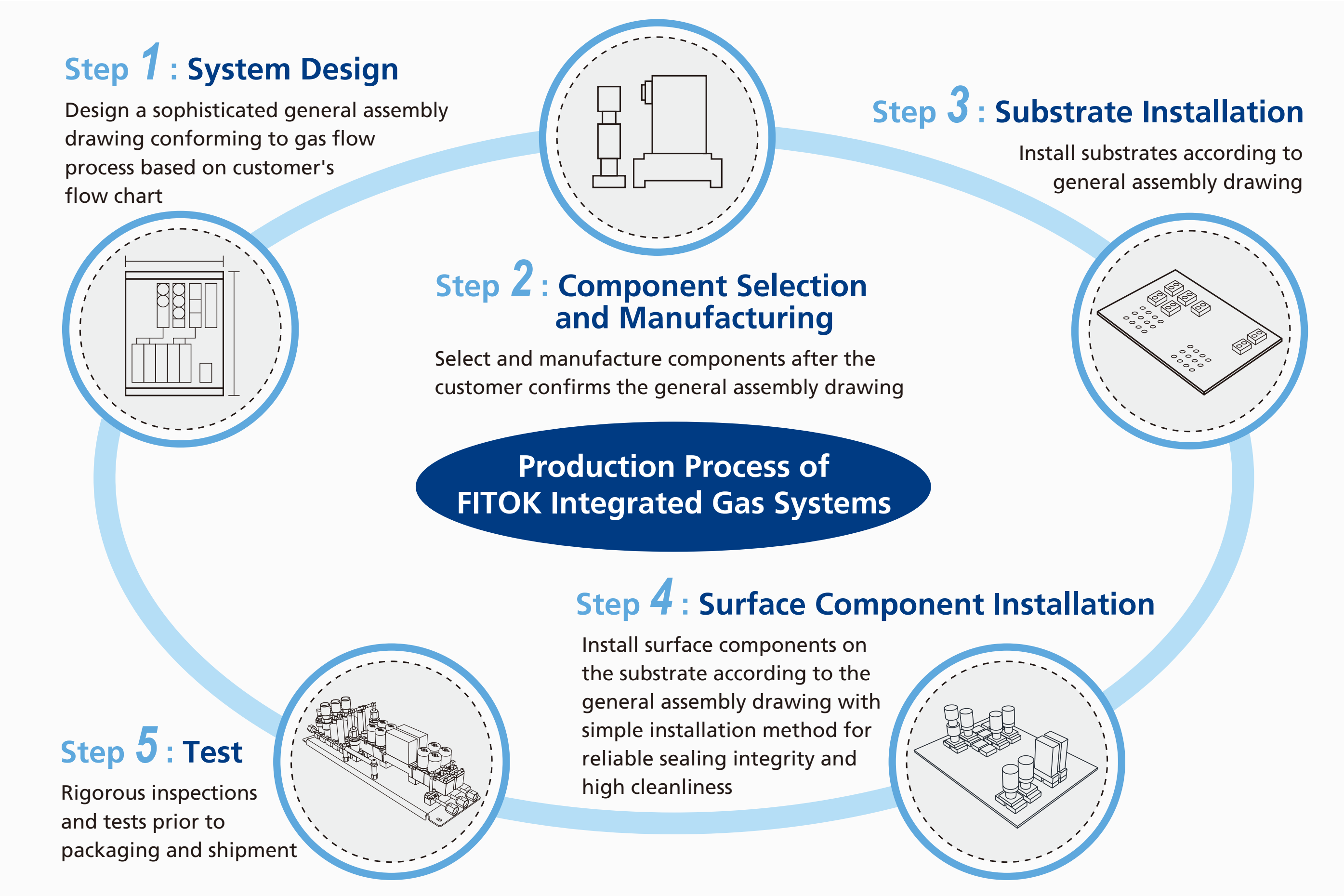
- Applicable to high purity gas systems in the semiconductor industry
- Integrated from a diaphragm valve, a regulator and a pressure gauge
- Alloy diaphragm improves strength and corrosion resistance for long cycle life
- T series tubular fittings optional for pressure gauge connection (customized lengths available)
- Cleaned, welded, assembled, tested, packaged and marked following Ultra High Purity Process Specification
- Sizes from 1/4" to 1" optional

AGL Series

- Applicable to general gas fluid systems and oxygen-enriched environments
- Integrated from a ball valve, a regulator and a pressure gauge
- Excellent sensitivity and set point pressure stability for precise pressure control and fluid shutoff
- Alloy diaphragm improves strength and corrosion resistance for long cycle life
- Special Cleaning and Packaging Process Specification ensures the product cleanliness meets the requirements of ASTM G93 Level C
- Sizes from 1/4" to 1" optional

Integrated Gas Systems

Integrated Gas Systems are used for gas control in the semiconductor industry. As semiconductor manufacturing process develops, the requirements for gas control device become higher. FITOK Integrated Gas Systems use SEMI compliant surface-mounted components and are modularly designed. While reducing the size of the device, installation and maintenance become easier.



Step 1 : System Design

Design a sophisticated general assembly drawing conforming to gas flow process based on customer's flow chart

Step 2 : Component Selection and Manufacturing

Select and manufacture components after the customer confirms the general assembly drawing

Step 3 : Substrate Installation

Install substrates according to general assembly drawing

Production Process of FITOK Integrated Gas Systems

Step 4 : Surface Component Installation

Install surface components on the substrate according to the general assembly drawing with simple installation method for reliable sealing integrity and high cleanliness

Step 5 : Test

Rigorous inspections and tests prior to packaging and shipment

Modular design - shorten design time

According to the customer's P&ID diagram, the design can be completed by installing standard substrates, valves (diaphragm valves, check valves, regulators), flowmeters, filters, pressure sensors and other components on the panel.

Surface mounting - easy installation and maintenance

All components are surface mounted in accordance with SEMI standard, and installation with silver-plated screws and later maintenance can be completed with simple tools.

Miniaturization

The size is about 1/3 the traditional panel, and the corresponding flow path size is also reduced for better contamination control.

SEMI standard materials, electropolishing process and orbital welding

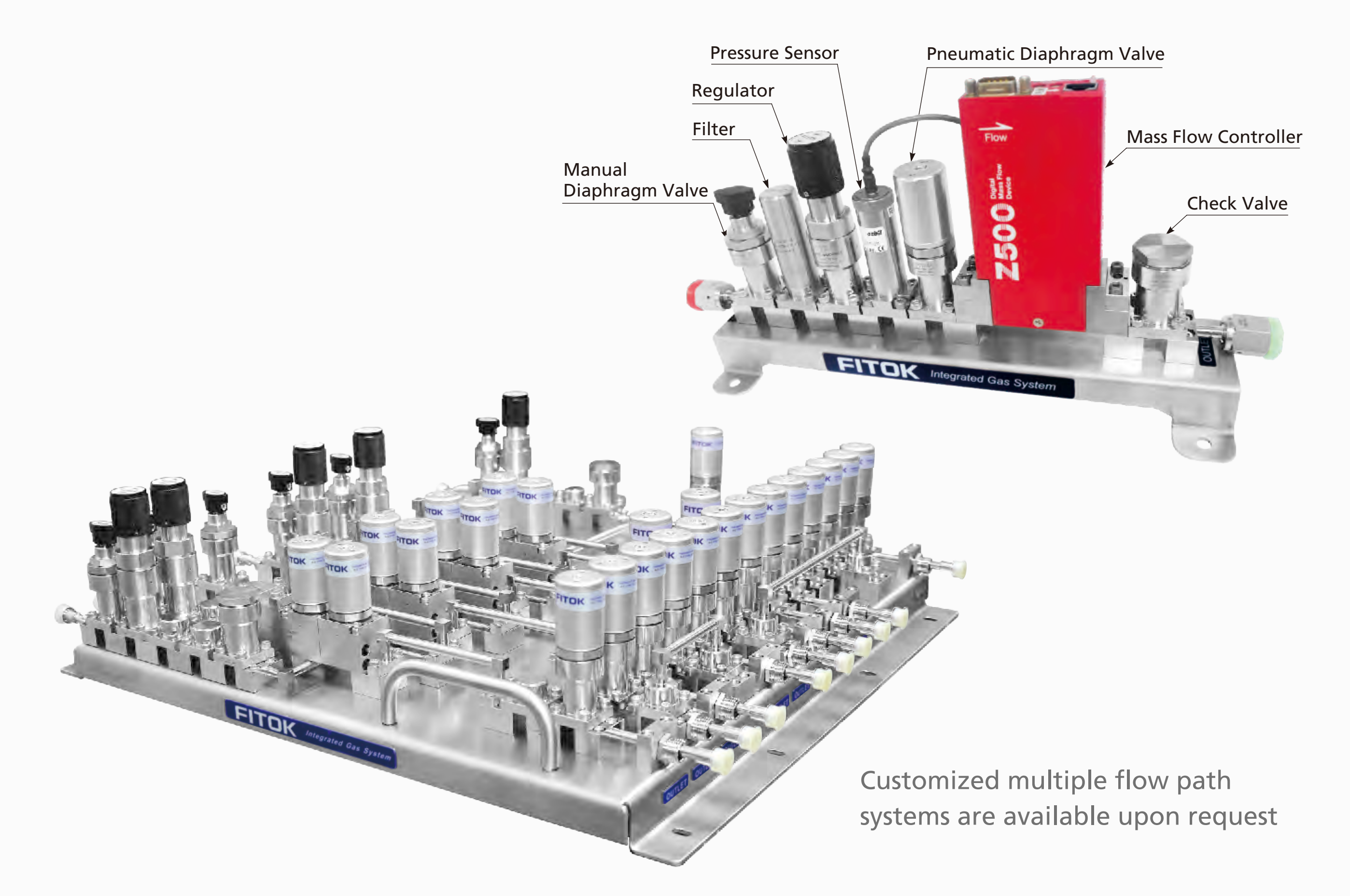
Wetted components are made of SEMI standard materials with electropolished flow paths (Ra 5 μin. / Ra 0.13 μm) and orbital welded connections.

W-seal / C-seal

W-seal or C-seal between components and substrates. Metal-to-metal seal with the sealing surface isolated from components receiving external force to achieve optimal sealing effect.

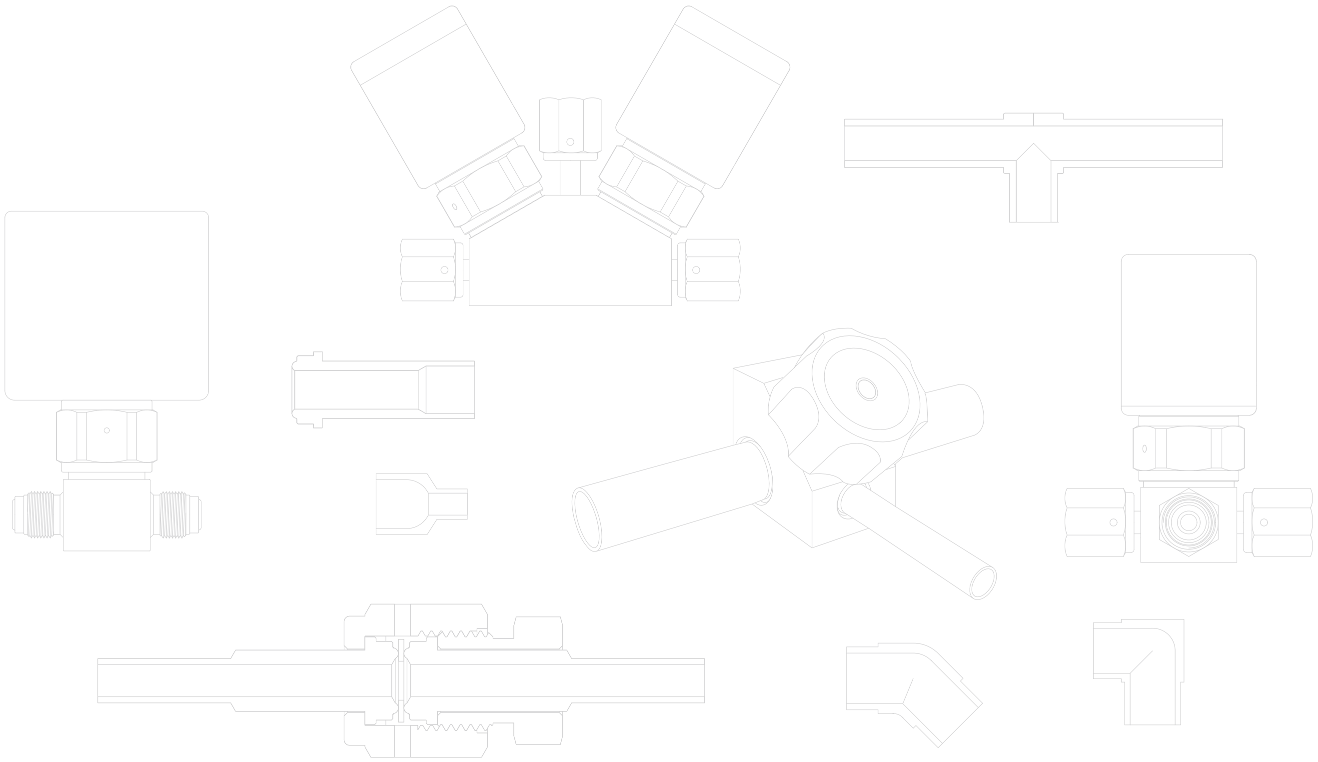
W-seal and C-seal configurations are available. Please contact FITOK or an authorized distributor for details.

FITOK can design and supply integrated gas systems according to customer P&ID diagrams, in which filters, pressure sensors and MFC can be provided by customers or purchased by FITOK under customer-provided brands.



Customized multiple flow path systems are available upon request

Main Components	Features
Diaphragm Valves	Cobalt alloy diaphragm Manual and pneumatic actuators available Body materials: 316L SS, 316L SS VAR Wetted components electropolished to a surface finish of Ra 5 μin. (0.13 μm) max
Check Valves	Body materials: 316L SS, 316L SS VAR Wetted components electropolished to a surface finish of Ra 5 μin. (0.13 μm) max
Regulators	Hastelloy poppet and diaphragm Reinforced diaphragm design improves sealing performance and service life Body materials: 316L SS, 316L SS VAR Wetted components electropolished to a surface finish of Ra 5 μin. (0.13 μm) max
Substrates	Tolerance compensation installation to ensure the sealing effect Body materials: 316L SS, 316L SS VAR Wetted components electropolished to a surface finish of Ra 5 μin. (0.13 μm) max
Gaskets	W-seal and C-seal optional Sealing surfaces isolated from components receiving external force Electropolished to a surface finish of Ra 5 μin. (0.13 μm) max



A full listing of our global operations and sales network is available on our website.

FK-BR-UHP-EN-26V1

info@fitok.com