

# INNOVATIVE Application Solutions



## Cleanroom

A cleanroom is used in a variety of industries where small particles, temperature change, humidity fluctuations, and pressure can adversely affect the manufacturing process.

Industries using cleanrooms include: Pharmaceutical, Medical, Life Sciences, Biotech, Optics, Semiconductor, Aerospace, Specialty Food and Beverage and the Armed Forces.

Cleanroom environments are designed to have a low level of airborne pollutants such as dust, microbes, aerosol particles and chemical vapors, so it is vital that cleanroom designers and contractors have extensive experience with the environment and designs being used.

When a market leader in plastic injection molding contacted Mokon about their cleanroom medical component application, we accepted the challenge. Mokon's sales and product line engineers went to work calculating the heating and cooling loads and selecting the right system and options to meet the customer's exact specifications. We were able to provide a comprehensive temperature control solution that minimized waste and reduced time required to change tools and start equipment. Production goals were exceeded and our extremely satisfied customer maximized product output and improved quality.



“Mokon's knowledge and engineering support made them the right choice for process temperature control of our cleanroom application.”

– A satisfied process engineer at a medical manufacturing company

Mokon's experienced application and product engineers are available to provide assistance in the selection and sizing of cleanroom process temperature control systems. We offer the following services:

1. Performing engineering assistance in calculating heating and/or cooling loads required for your specific application
2. Determining the added heat load that the Mokon equipment will add to the cleanroom's HVAC system
3. Provide a detailed quotation of the Mokon heating and cooling equipment that best meets your specifications
4. A variety of mechanical, electrical, and electronic options available to provide a durable and accurate temperature control system



Compact water system



Stainless steel heater/chiller



Designed to Perform. Built to Last.

## ISO 14644-1 Cleanroom Standards

Class	Maximum Particles/m <sup>3</sup>						FED STD 209E equivalent
	$\geq 0.1 \mu\text{m}$	$\geq 0.2 \mu\text{m}$	$\geq 0.3 \mu\text{m}$	$\geq 0.5 \mu\text{m}$	$\geq 1 \mu\text{m}$	$\geq 5 \mu\text{m}$	
ISO 1	10	2.37	1.02	0.35	0.083	0.0029	— —
ISO 2	100	23.7	10.2	3.5	0.83	0.029	— —
ISO 3	1,000	237	102	35	8.3	0.29	Class 1
ISO 4	10,000	2,370	1,020	352	83	2.9	Class 10
ISO 5	100,000	23,700	10,200	3,520	832	29	Class 100
ISO 6	1,000,000	237,000	102,000	35,200	8,320	293	Class 1,000
ISO 7	$1.0 \times 10^7$	$2.37 \times 10^7$	$1.02 \times 10^7$	352,000	83,200	2,930	Class 10,000
ISO 8	$1.0 \times 10^9$	$2.37 \times 10^8$	$1.02 \times 10^8$	3,520,000	832,000	29,300	Class 100,000
ISO 9	$1.0 \times 10^9$	$2.37 \times 10^9$	$1.02 \times 10^9$	35,200,000	8,320,000	293,000	Room Air

Mokon products can be installed inside or outside a cleanroom to meet the needs of many applications requiring accurate temperature control for the manufacture of critical components and products.

Typical applications include:

- Plastic injection molding
- Mixers and blenders
- Reactors and fermentors
- Bio and pharmaceutical packaging
- Electronic circuit boards and components
- Hybrid composite materials
- Medicine and vitamins
- Surgical equipment and devices



*Dual zone water system*



*Micro/tabletop water system*

## MOKON Products and Features:

- Water and Heat Transfer Oil Systems
- Portable and Central Chillers
- Control Panels
- Custom Designed/Engineered Systems
- Closed and open loop circuitry
- Single and multi-zone circuits
- Stainless steel cabinets and components
- TEFC motors and magnetic drive seal-less pumps
- Sealed reservoirs and welded or silver brazed piping
- Tri-clamp and flanged connections
- Heat exchangers and heat remover designs
- Non-marring casters and leveling legs
- Sound and heat insulation
- NEMA rated panels and components
- Audible and visual alarms
- SCR and solid state relays
- Remote set point and re-transmission controllers and communication ports
- Remote interface electrical enclosures



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