WATER TREATMENT APPLICATIONS
Providing you increased efficiencies, lower operating costs and global support

FILTRATION, SENSING AND CONTROL
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Why Entegris?

For nearly 50 years, many high-tech industries have relied on Entegris to ensure the safety and purity of their technologies throughout the supply chain, from the raw chemicals to the final products. A portfolio of more than 19,000 products offers you a reliable, single-source provider with global manufacturing, customer services and technical support. With a broad product offering, advanced manufacturing capabilities, worldwide infrastructure and unmatched technical expertise, Entegris provides proven performance, efficiency and reliability in your processes.

History of Innovation
Experience You Can Count On

Contamination control is critical to your manufacturing processes and has a direct impact on production yields, productivity and the cost of manufacturing. Entegris focuses on understanding your processes, sources of contamination and on developing material-enabled solutions to ensure the cleanliness and integrity of your process.

To support your vital applications, Entegris utilizes more than 200 methods and applications, 300 analytical instruments and 30 collaborating laboratories focusing on separation and materials science to provide you with the highest-purity, quality and robust products.

**Separation Science:** Utilizing advanced knowledge in separation-science techniques to facilitate the separation, purification and analysis of complex mixtures of organic and inorganic compounds offers solutions to precisely control micro and molecular contamination. Incorporating these techniques into your process improves your manufacturing flexibility and decreases your costs, providing you with the highest level of contamination control.

**Materials Science:** By studying the characteristics and uses of high-performance materials such as polymers, metals, graphite, silicon carbide, coatings and carbon nanotube composites, we offer you high-quality products to improve performance, cost of ownership and your manufacturing yield. Sophisticated laboratory equipment and inspection techniques enable our scientists to thoroughly analyze materials for temperature capability, chemical compatibility, structural tolerance and maximum strength.

Proven Quality and Performance

With over 1,900 issued U.S. and foreign patents, Entegris works directly with you to develop process knowledge and products that enable innovation and efficiencies. Combining advanced engineering and design expertise with tools such as Finite Element Analysis (FEA), Computational Fluid Dynamics (CFD) and Moldflow® analysis and modeling enables us to optimize product design and speed technological advancements. In addition to innovative design, Entegris also utilizes R&D and quality lab analysis and testing capabilities to develop dependable solutions.

**QUALITY TESTING**
- Vibration and shock
- Safety and industry standardization
- Trace metals
- Electrostatic charge

**PERFORMANCE TESTING**
- Particle testing
- Flow rate optimization
- Ion chromatography
- Failure analysis

Ensuring product performance standards are met, proven techniques such as ISO 9001 certified manufacturing sites, documentation control, Lean Sigma processes and quality testing are utilized. Each manufacturing capability has been developed, tested and improved to create pure, durable, consistent and reliable products.

- Injection molding
- Rotational molding
- Blowmolding
- Extrusion
- Machining
- Welding and flaring
- Sheetlining
- Overmolding
- Prototyping
- Tool design/making

From the moment materials are delivered to Entegris to the time they are converted to products and installed in our customers’ production lines, we ensure that they meet stringent specifications.
Broad Offering

For nearly 50 years, Entegris has developed a broad offering of high-purity materials, contamination control solutions and material handling to purify, protect and transport the critical materials that enable applications in many industries. This experience offers you water treatment solutions in filtration, housings, fluid handling, sensing and control, and containers to meet your needs and provide a single source of flexible product offerings.

CONTAMINATION CONTROL

Housings  Filtration  Fluid handling  Purification  Sensing and control  Packaging

MATERIAL HANDLING

Shipping, storage and automation  Custom trays  Process and transport carriers

SPECIALTY MATERIALS

Silicon carbide  Specialty coatings  Graphite

Certifications

The Entegris Savana® MBV filters are tested and certified by the National Sanitary Foundation (NSF International) to ANSI/NSF standard 42 for components used in water applications. Entegris GRP housings are made per the ASME Section X Class II “Fiber-Reinforced Plastic Pressure Vessels” or EN13121 standards. Steel housings are made per the ASME Section VIII “Boiler and Pressure Vessel” code or the European 97/23/EC Pressure Equipment Directive. Certification is available for both GRP and steel housings as an option. The Entegris Savana lab disc disposable filters and the Savana MBV materials of construction conform to the U.S. Food and Drug Administration Code of Federal Regulations Title 21 Part 177. Certifications vary by application and product configurations; please consult product specific datasheets.
Close to You

Sales and Applications Support
Our global direct sales team, sales channel partners and local applications engineers give you the support and expertise when you need it. This intimacy allows us to better understand your needs through direct feedback and roadmap sharing. By aligning our materials science, engineering and R&D initiatives, we can develop indispensable contamination control and high-performance solutions to solve your roadmap challenges.

Technical and Engineering Support
You’ll receive strong technical support and training from our local service groups and engineers consisting of field applications engineers, technical service groups and applications development groups. Our global field applications engineers work directly with you on product qualification and process improvements in your facilities. Also, in response to your needs for local technical service and fast turnaround time, we maintain regional applications laboratories. These applications laboratories maintain process equipment that simulate your applications and provide product evaluation.

Logistics Expertise
To support your logistics requirements, Entegris manages the infrastructure and partners with service providers, offering broad capabilities to ensure your supply chain door-to-door. Providing import processing, insurance and transportation, Entegris brings expertise in air, ocean, LTL, intermodal, small package and hazardous shipments. You’ll receive in-house, regional logistic support in the U.S., Germany, Israel, South Korea, Japan, Taiwan, Malaysia, Singapore and China, while our top-ranked freight partners provide import processing services and transportation to all the remaining locations around the globe.
In many parts of the world, access to fresh water is limited. In other areas, global requirements to decrease water consumption require improvements to water management, especially in industrial processes such as ultrapure water required for semiconductor applications or produced water applications in mining/oil/gas. Water treatment spans a large number of industries and applications. Each application presents unique challenges to meet the operating requirements in the most economical manner. Challenging applications, industry standards and the pressure to be efficient and environmentally friendly require highly-engineered solutions for water treatment or recovery.

For nearly 50 years, Entegris has served the most demanding water applications with broad capabilities in chemical handling, filtration and purification. Offering filtration capabilities that span from microfiltration to nanofiltration and covering a large breadth of materials and membranes, Entegris filtration capabilities address water challenges from 50,000 total dissolved solids (TDS) to removal of nanoparticles for the most demanding applications. Global laboratories, logistics and infrastructure enable the highest levels of technical support across the globe to optimize your water treatment operations.
Desalination

Seawater, brackish and other high salt content water offer an alternative source to meet the world's increasing fresh water needs.

As Sea Water Reverse Osmosis (SWRO) or Brackish Water Reverse Osmosis (BWRO) applications continue to grow, they bring a cost-effective alternative to distillation and condensation. Reverse osmosis (RO) operates ideally if the TDS are kept at low concentrations, as premature membrane fouling affects the RO function. Pretreatment becomes necessary to protect the desalination plant's RO core process, whether it is through coagulation, flocculation or any other clarification method. If your current pretreatment components that require chemical cleaning are not fully chemically resistant, they may demonstrate lower-than-projected filter life – increasing your overall costs.

Entegris offers corrosion-resistant multiround filter housings and reliable filters to enable decreased downtime, increased filter life and increased operational efficiencies from the laboratory to the largest municipal applications. These high-loading and low pressure drop filters improve the RO's efficiency and reduce the plant's overall energy consumption. For clean-in-place (CIP) filtration and chemical delivery, Entegris solutions provide capabilities to maximize system uptime and reduce operating costs.

Process Water

Water is a vital constituent of the process or product being produced.

Particles, organic compounds, impurities and other contaminants prohibit the use of tap water in laboratory applications, scientific research, sensitive process steps and industrial processes. It is vital to control certain constituents. Suspended or dissolved materials and organic or inorganic contaminants interfere with production efficiency and cause imperfections, while other undesired contaminants affect product quality or the cost to manufacture. Optimizing the performance of your process and equipment can dramatically minimize costs and maximize your return on investment.

Entegris provides filtration capabilities from removal of high solid streams to very tight low-loading applications for ultrapure industries such as pharmaceuticals and semiconductors. Process water treatment involves the proper selection of the high-purity filtration and fluid handling systems to meet both the water purity requirements and the operational needs. Utilizing its laboratories to analyze feed water, Entegris determines the optimum filtration solutions for your applications. For example, a filtration system may need adjustments to accommodate for filtrate changes, such as in cases where incoming surface water quality fluctuates due to seasonal variations or the water degrades with time from in-ground water source changes. Entegris capabilities in chemical delivery, filtration and housing solutions solve your most stringent water quality requirements, improve overall cost savings and increase energy efficiencies.
Municipal Water

Scarcity and tougher water quality regulations make municipal water treatment a constant challenge.

Water treatment applications are complicated by variation in feed water quality. As an integral part of the process, microfiltration assists in producing safe drinking water by improving the water quality through removal of protozoa, algae and other contaminants.

Choosing the correct components to function with other process variables and optimize water purity is important. To meet your challenging process and operational efficiency demands, Entegris offers filtration products tested and certified by the National Sanitary Foundation for municipal and industrial applications. This ensures that they meet the highest industry standards for water purity and safety.

Additionally, the water treatment systems require CIP capabilities, and it is critical that the components utilized are chemically compatible to maximize the lifetime of the system. Entegris provides the best cost of ownership solutions by minimizing operating cost through reduced energy requirements and improved component lifetimes. From high flow, depth, pleated, or melt-blown fibers to membranes of various materials and thicknesses, Entegris filters offer a variety of lengths, diameters, flow rates and connections for your housing and system requirements.

Ultrapure Water

As technology advancements increase, so do ultrapure water (UPW) cleanliness requirements in industries such as semiconductor and pharmaceuticals.

Feed water contamination may include bacteria, particles, and organic and inorganic sources. These contaminants can cause defects in some applications or affect process capabilities or final product specifications. Metallic and anionic contaminants can cause failure in electronic products, corrode equipment and interfere with bioprocesses. Making the right component or filtration choice is critical to your manufacturing. You require high contamination removal efficiency, consistency from batch to batch and products that will not contribute to contamination levels.

As a leading supplier to the most demanding industries, Entegris utilizes the highest-purity materials to provide contamination control. Focusing on your process, Entegris develops filtration and chemical delivery products to provide performance, efficiency and reliability in your UPW applications. Providing high flow, prefiltration and final filtration designed for applications requiring non-dewetting, hydrophilic properties, metal ion removal, asymmetric shape and deformable particle holding, Entegris offers a flexible product offering and broad capabilities. With nearly 50 years of experience in filtration, Entegris offers high retention, low pressure drop, compact designs and contamination control to the ppm and ppb levels.
Water is often used or produced during industrial processes.

Before this water can be either discharged or recycled, it often requires treatment. The type of treatment required varies with local regulations and/or its designated applications, but all treatments require microfiltration to reduce total dissolved solids as part of the water treatment system. Waste water treatment involves the proper selection of the microfiltration and fluid handling systems to meet water purity requirements, overall costs and operational needs.

Entegris provides filtration capabilities from removal of high solid streams to very tight low-loading applications in ultrapure industries such as pharmaceuticals and semiconductors. Utilizing its laboratories, Entegris offers effluent analysis to determine the optimum filtration solutions in your applications. In addition to initial process optimization, a filtration system may need adjustments to accommodate for filtrate changes, such as in produced water applications where the organic/solid content varies with the age of the operation. Offering you innovative chemical delivery, filtration and housing solutions, Entegris solves your most stringent water quality requirements, improves overall cost savings and increases energy efficiencies.
Entegris in Water Treatment Processes

Membrane Pretreatment Systems

As you strive to protect the RO process from dissolved and colloidal foulants (iron, manganese, silica and others) and natural organic matter, your pretreatment system components need to be cost-effective and reliable. Depending on your source water quality, the fouling potential could be quite variable and challenging. If your current pretreatment components need frequent chemical cleaning, demonstrate lower-than-projected membrane filter life and water quality targets, the pretreatment efficiency is lower, while the overall costs increase.

Entegris offers corrosion-resistant multiround filter housings and reliable filters to decrease downtime, increase filter life and increase operational efficiencies. These high-loading and low pressure drop filters improve the RO’s efficiency and reduce the plant’s overall energy consumption.

Filtration

Solid contents vary, and the appropriate filtration technology needs to be applied to achieve the most efficient and cost-effective solution. Entegris offers nearly 50 years of experience in filtration and provides a wide range of filtration technologies and products designed to meet the needs of your form factors, water qualities, chemical resistance and process specifications. From high flow, depth, pleated or melt-blown fibers to membranes of various materials and thicknesses, Entegris filters offer a variety of lengths, diameters, flow rates and connections for your housing and system requirements.

Multiround Filter Housings

For pretreatment, the filtration system needs to protect the RO unit with consistent performance and quick maintenance. Entegris glass fiber reinforced plastic (GRP) filtration housings deliver ease-of-use and reliability thanks to their mechanical strength and corrosion resistance properties. With quick filter replacement and minimal intervention, Entegris housings reduce operation and maintenance (O&M) costs. Designed specifically to decrease filters in the same diameter body, GRP housings provide increased flow capacity and longevity. Entegris also offers stainless steel housings for high-pressure applications or custom requirements.
Clean-in-Place (CIP)

Even with coagulation, precipitation or microfiltration steps, organic and inorganic compounds, colloids, slime and particle fouling still happen. Because of this issue, you utilize harsh alkaline or acidic chemistries for removing organic fouling and low-pH chemicals (for example, citric acid, hypochlorous acid, sulfuric acid, hydrochloric acid) for removing inorganic foulants. To continue to keep your process running efficiently, you need rugged, chemically inert and reliable filters with broad capabilities that also provide for easy disposal. Filters with a high loading capacity and low pressure drop would improve the RO's efficiency and reduce overall energy consumption. Entegris offers GRP housings, a full range of highly retentive membranes and nearly 50 years of technical and manufacturing experience in the filtration of high-temperature, aggressive chemicals. Improve your operational efficiency and ensure the integrity of your RO process with Entegris’ contamination control components.

Fluid Handling

Chemicals, though pure when delivered, may be contaminated by process components while transported to and through the process. Choosing the correct components to function with other process variables and optimize chemical compatibility is important. From valves, fittings and tubing to flowmeters, Entegris offers the highest-purity, best-performing fluid handling components available to meet your processing requirements.

Filtration

For aggressive, high-temperature chemistries, all-PTFE membrane filters provide chemical resistance and retention performance, as well as a high loading capacity and low pressure drop. Choose from the cost-competitive, high-performing Savana filters for application flexibility and to improve your operational efficiencies. Entegris filters offer high flow capability, simple installations, lower cost of ownership and reduced downtime.

Multiround Filter Housings

Designed specifically for mechanical strength and corrosion resistance during water treatment, Entegris GRP filtration housings offer ease-of-use and reliability in various sizes and orientations. Now, with the Entegris corrosion-proof GRP housings, there is no need to repair the inner liner or replace rusted parts. Additionally, Entegris offers stainless steel housings for high-pressure applications or custom requirements. The simplified Entegris housing designs ensure quick filter replacement to reduce your operation and maintenance costs.
Chemical Delivery

Controlled manufacturing processes and facilities depend on many key parameters. The facilities department is the engine room and nucleus of the plant; a well-designed, well-maintained facilities area ensures operational excellence and operational costs that meet expectations. With water treatment, the facilities group has the responsibility to provide and distribute a number of key services in order for the plant to run effectively and efficiently. If one of these key components fails, it is inevitable that the end product will be impacted or some area of the production line will be closed down. The worst-case scenario is shutting down the entire production line until a solution is found. In a cost-competitive market, over-engineering or duplication of components is not possible due to the high investment costs and low return on investment (ROI). Making the right selection at the design stage of the facility is imperative. To solve your process and cost of ownership issues, Entegris offers a full range of contamination control solutions for chemical compatibility and high performance.

Fluid Handling

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Containers

High-purity PFA containers deliver safety and purity as you handle corrosive and hazardous chemicals from storage and transport to point-of-use and packaging processes. Providing easy connections and quick changeouts, Entegris’ innovative key-coded dispense heads allow for safe, clean and easy fill and dispense processes. Entegris offers the safety, purity and reliable performance for your process, while at the same time improving your operational costs and ensuring the integrity of your chemicals.

Sensing and Control

Ensuring accurate chemical delivery, Entegris NT® sensing and control solutions enhance both the productivity and safety of your chemical delivery applications. By directly measuring chemical concentration through an optical refractive index technology, Entegris sensors ensure your chemical blends and validate system flushing after a clean-in-place operation. Entegris Espy® sensors optimize your chemical delivery systems by measuring critical process variables, while level sensors enable predictive chemical replacement and maximize system uptime. Entegris offers a full line of high-purity, chemically-compatible sensing solutions for your most demanding sensing and control applications.
Managing Your System
Just Got Easier

Discover increased efficiency, lower operating costs, global logistics and technical support. Entegris utilizes proven filtration, sensing and control experience for maximized uptime and reduced operating costs. This proven experience offers you water treatment solutions optimized for your application.

- Filtration
- Housings
- Fluid handling
- Sensing and control
- Containers

For More Information

Visit www.entegris.com for the latest technical papers, application notes or the Customer Service Center nearest you and discover how to manage your system better.