



Food and Beverage



Food and Ingredients
Your Challenges—Our Solutions

Filtration. Separation. Solution.SM

FBFOODCAPABENa



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Your Challenges—Our Solutions

- Process Filtration
- Utilities Filtration
- Process Monitoring
- Laboratory Filtration
- OEM Materials
- Pall Global Services

Using these filtration, separation and purification products and services, Pall provides solutions to the filtration challenges of the food and ingredient manufacturing industry.

In an increasingly competitive and global environment, our customers benefit from well-selected and economically sound filtration, separation and purification solutions that help further their businesses.

Creating food products and ingredients that are safe, healthy, cost-effective and innovative is the challenge our customers face and we strive to meet.

With over 65 years of experience serving the food industry and multiple other markets, Pall offers the market-dedicated expertise, creativity, and portfolio to address simple to complex purification applications in the food industry.

Serving the Food and Ingredient Industry

On a daily basis, from over 70 locations around the globe, we serve the businesses that create agricultural commodities, ingredients, and value-added food and beverage products¹.

- Amino acids
- Organic acids
- Enzymes
- Yeast extract
- Other fermentation products
- Sweeteners
- Gelatin
- Flavors and seasonings
- Processed fruits and vegetables
- Hydrocolloids
- Processed foods
- Aseptic products
- Food plant utilities
- OEM equipment

¹For additional information about other major food and beverage markets served, please visit our website.

Experience the values we bring to our global customers.

(Click here.)

Total Fluid ManagementSM

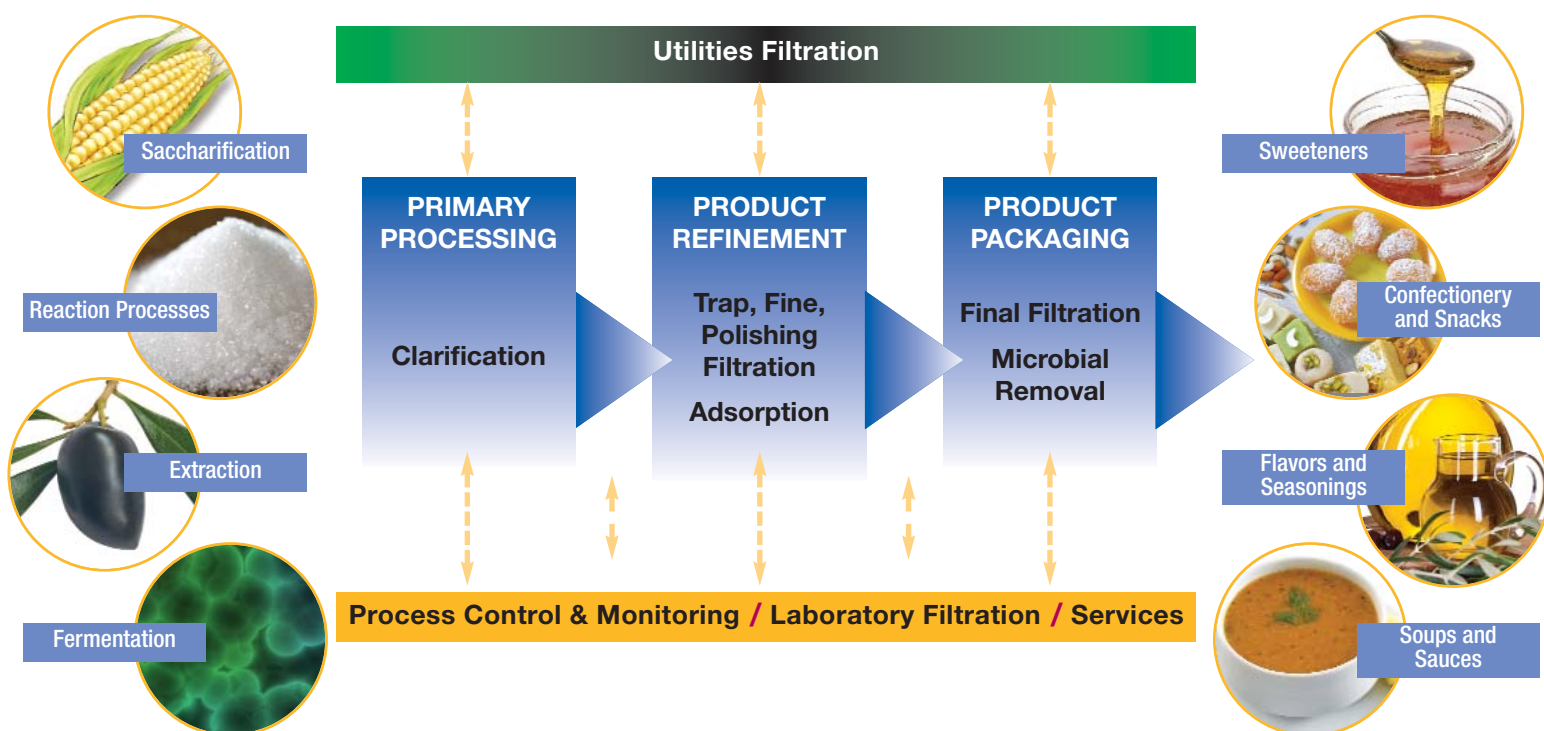




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Process Fluid Filtration — Solutions at All Stages of the Process



Clarification

Clarification typically involves applications in which the suspended solids loads are relatively high and particle sizes may be inhomogeneous. The separation target is bulk solids removal. This step mainly occurs upstream in a process, on aqueous, unconcentrated fluids such as fermenter broth (cell debris removal), gelatin (post-extraction), sweeteners (mud removal), and others. Clarification may also be required after product concentration.

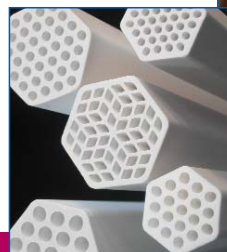
Membralox® Ceramic Crossflow Systems and Modules are closed systems for clarification applications.

- supplementing or replacing centrifuges
- replacing rotary vacuum drum filters, diatomaceous earth (DE) filters, plate and frame precoat filters, sparkler filters

Typical examples: enzymes, amino acids, organic acids, yeast extract

Membralox technology provides innovative solutions for many additional applications.

- MF or UF concentration of high temperature or high viscosity feed streams
- fractionation and recovery of high value ingredients
- diafiltration for extraction of dissolved solids or high value molecules



Membralox Systems and Modules



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Pall Microflow Hollow Fiber XL Crossflow Systems and Modules

are closed systems, which provide another alternative for clarification applications. Depending upon the suspended solids loads, fluid behavior on concentration, process temperature and nature of the contaminants, the selection of this technology is indicated.

Typical examples: vinegar, plant extracts, soy sauce, brine

Please consult Pall to determine the best technology fit for your application.



Microflow XL Hollow Fiber Systems and Modules

Trap, Fine, and Polishing Filtration ►

Organic and inorganic materials are sources of contamination and turbidity. There are a wide variety of solutions available to trap DE, carbon, resin, sand and other particles resulting from upstream treatment steps.

Excellent trap filtration benefits downstream equipment such as carbon beds, resin beds, UF and RO units by:

- improving in effectiveness of downstream carbon and resin beds.
- reducing in the cleaning requirements and change-out frequency of downstream UF and RO membranes.
- reducing in the need for post-concentration filtration.

Fine filtration removes submicron particles, to achieve quality specifications.

Polishing filtration ensures consistent product quality prior to packaging.

Filter Sheets and Sheet-Based Modules

Filter Sheets display extremely high void volume which translates to very high dirt holding capacity when compared to traditional cartridge products. Additionally, multiple filtration mechanisms are at work due to the special mix of constituents in sheet materials: surface, depth and adsorptive filtration takes place.

SUPRApak™ Modules are the newest closed system alternative to classical sheet filtration.

- up to 6 times higher throughput due to 'edge-flow' filtration
- higher product yields
- up to 95% reduced labor cost and 92% reduced maintenance cost

Typical examples: sweeteners, yeast extract, flavors, enzymes



SUPRApak Modules

SUPRADisc™ II Modules are the newest alternative to lenticular filtration.

- high throughput due to maximized utilization of the effective filter sheet area
- 20-50% longer service life possible due to backflush capability
- extremely high robustness during steaming, and high structural resistance to back pressure shocks

Typical examples: sweeteners, gelatin, peptides, enzymes, other ingredients



SUPRADisc Modules



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Cartridges

Cartridges accomplish a variety of particle and colloid removal tasks from both liquids and gases and are best suited to handling fluids with lower suspended solids loads.

- polymeric melt-blown cartridges and capsules
- pleated depth filter cartridges and capsules
- metal cartridges
- cotton string-wound cartridges



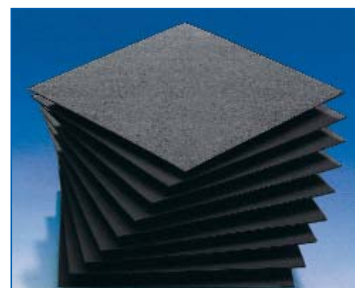
Cartridges and Capsules

Adsorption ▶

Some fluids require a small degree of color, flavor or odor correction, which can be achieved by the use of **carbon-impregnated filter sheets or modules**. Sized based on fluid residence time, these products provide improved adsorption efficiency when compared to bulk powdered activated carbon (PAC) treatment.

- up to 150% better color removal compared to PAC²
- excellent filtrate quality
- high permeability
- simplified handling and cleaning
- reduced process time
- higher product yield

Typical examples: sweeteners



Carbon-impregnated Sheets

Microbial Reduction / Removal ▶

Bacteria, yeast, and mold can cause sickness, product spoilage, and costly product recalls. Reducing microorganisms to acceptable levels, or removing them entirely, minimizes these risks.

Sterilizing-grade membrane cartridges provide maximum protection. Other choices such as sheet-based products, cartridges with specific titer reduction claims, or crossflow membranes provide bioburden reduction, dependent on process conditions, incoming microbial load, and microorganism type.

- microbial titer reduction claims are based on rigorous validation under harsh challenge conditions
- sterilizing-grade³ cartridges are 100% integrity tested prior to manufacturing release



Sterilizing-grade Membrane Cartridge

² Internal comparative study using the same carbon grade

³ Defined as 0.2 micron liquid rated filters capable of removing 10⁷ of *Brevundomonas diminuta* per cm² of effective filtration area, in laboratory tests



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Reliable Utilities Filtration – Back to Basics

Utility fluids such as air, other gases, steam, and water are the basic building blocks which support all manufacturing operations. Their quality and handling influences downstream applications and impacts plant performance.

Securing the quality of utility fluids proactively eliminates problems and safeguards the process.

Utility fluid filtration applications and solutions

Utility Fluids	Applications	Moisture Removal	Particle Removal	Microbial Removal	Bacteriophage Removal	Integrity Testing	Reuse & Recycle
Air/Gas	Tank Venting		●	●	●	●	
	Compressed Air/Gas in Aseptic Production	●	●	●	●	●	
	Instrument Quality Air	●	●				
	Compressed Air/Gas for Product Push	●	●	●		●	
	Fermentation Tank Protection	●	●	●	●	●	
	Sampling Air for Analytical Equipment Protection	●	●				
	Air/Gas for Incorporation into Food Products	●	●	●		●	
Steam	Direct Product Contact, Sterilization		●				
	General Use Steam		●				
	Steam Condensate Return		●				●
Water	Pre-RO Protection		●				
	Integrated MF/RO Treatment		●				●
	Equipment Seal Protection		●				
	Trap Filtration following Ion Exchangers, Carbon Beds, UV Treatment, Multimedia Beds		●				
	Water for Product or Ingredient Dilution		●	●		●	
	Water for Product Push		●	●		●	
	Process Water Recycling		●				●
	Sand Filter Backwash Water Recovery		●				●
	CIP Fluid Clarification		●				●



Pall Emflon® cartridges for storage tank protection



High capacity filters for particulate removal



Pall Aria™ systems for incoming plant water filtration, process water recycling and tertiary effluent treatment⁴.



Robust, regenerable PSS® Porous Metal cartridges for steam filtration

⁴ Provide > 6 log reduction of *Giardia* cysts, *Cryptosporidium* oocysts, and *E. coli*. Based on third party testing.



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Process Control and Monitoring

Integrity Test Devices

Integrity test devices allow monitoring and documentation of membrane filter integrity before and after production. If critical filtration requirements are involved, as in aseptic processes, the use of integrity test devices is not only beneficial, but highly recommended.

- reduce the risk of microbial contamination, by verifying proper filter installation and performance



Palltronic® Compact Star — portable integrity test device, suitable for use with both liquid and gas membrane filters

Silt Density Index Testing

Silt density index measurement is an indirect measurement of the presence of fouling particles and colloids in water. The results of this test indicate the effectiveness of the filtration treatment being used.

- monitor and verify water quality



Silt Density Index Test Kit — enables simple water quality monitoring

PCR Rapid Detection Devices

The GeneDisc® Rapid Microbiology System provides simple, rapid, sensitive, and specific microbiological analytical tools for EHEC, pathogenic *E. coli* O157, non-O157 serogroups, *Salmonella* spp., and *Listeria* spp. including *Listeria monocytogenes* identification.

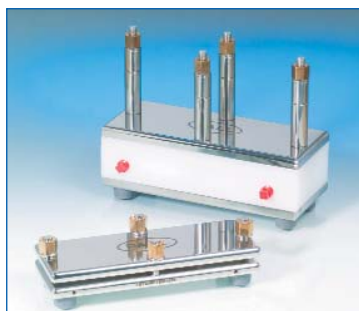
- complete microbiological assays in a matter of hours, allowing timely clearance of product shipments



GeneDisc system — real time PCR technology for rapid pathogen detection

Laboratory Filtration

Complementing Pall's wide array of process filtration solutions is our portfolio of filterability devices, funnels, capsules, membrane media and accessories. Pall assists customers in search of answers to real-world laboratory and application development challenges. Beginning at the lab scale, applications can later progress to pilot and process scale.



Small scale lab tangential flow filtration (TFF) systems are used in new product development and feasibility testing. Please consult Pall for full scale TFF system solutions.



SUPRAcap™ — sheet media filterability device



Mini Profile® Capsule — meltblown depth filter filterability device



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Pall Global Services

Market-dedicated services link filtration science to our customers' goals.

Technical and Process Services (TPS)

With more than 25 scientific and laboratory services labs worldwide, the Pall Food and Beverage Technical and Process Services team delivers consistent, market-focused and high quality local support to our customers. Linking the science of filtration to its implementation in process development or daily manufacturing processes, the team focuses on providing technically sound solutions, which realize the important values you seek.

- Laboratory Testing Services
 - Calibration
 - Filterability Testing
 - Cleanliness Testing
 - Compatibility Testing
 - Particle Counting and Size Analysis
- Training and Educational Seminars
- Filtration Audits
- Piloting
- Technical Consultancy

PASS (Pall Advanced Separations Systems) Services

PASS is the applications, engineering and procurement entity for Pall's global process systems business, providing integrated process solutions that meet regulatory, industry and customer requirements at all levels.

PASS teams are located around the globe, providing filtration expertise locally and enabling rapid response to process safety needs.

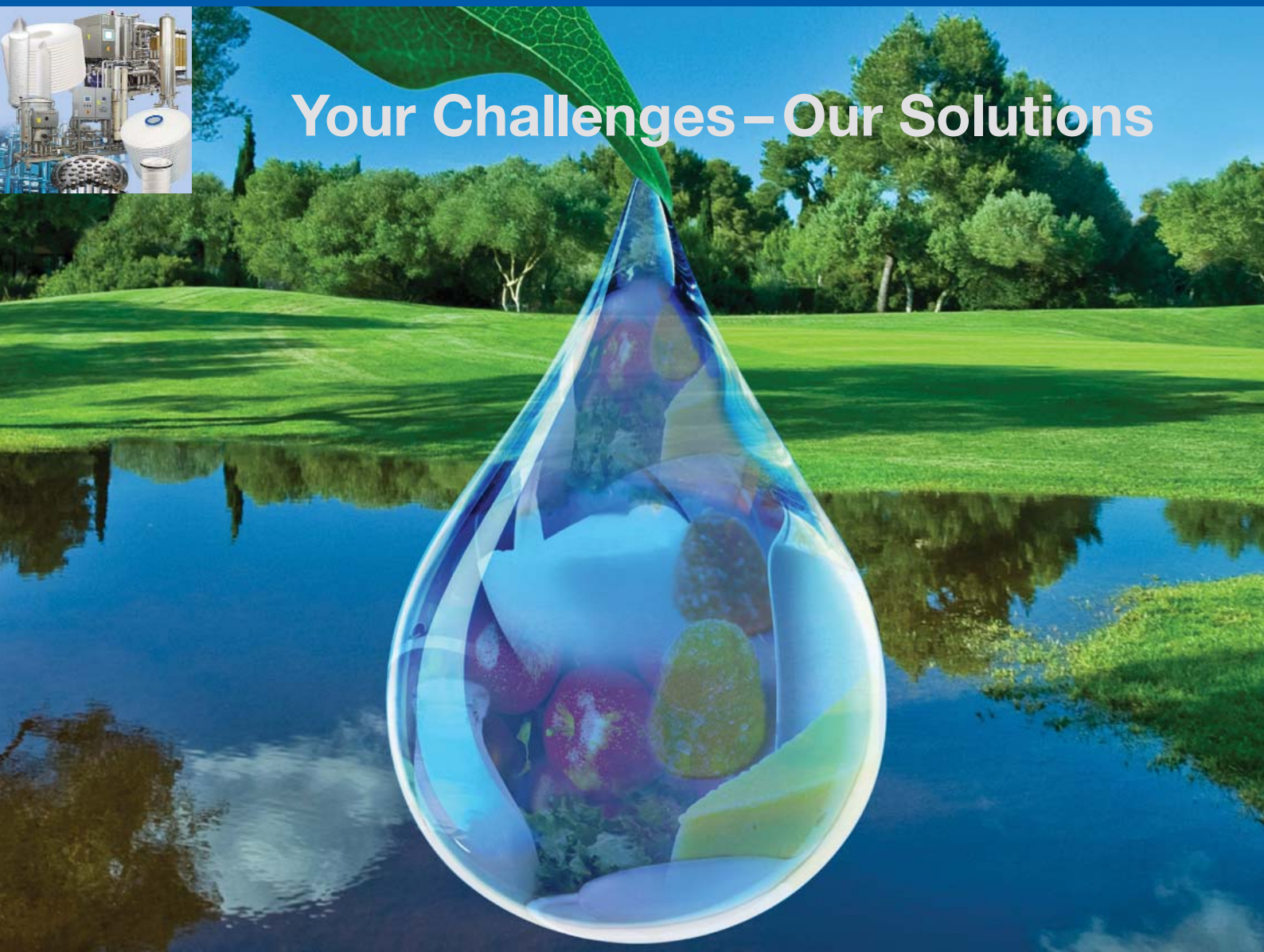
- Process Solutions, Piloting – New Applications
- System Optimization – Installed Systems
- Water Technology Appraisal and Development for sustainable and secured water management
- Troubleshooting and Consultancy
- Training
- Service Contracts
- System Maintenance and After-Sales Support



Piloting systems ranging in size from laboratory to process scale are useful for testing and process development. A Pall Aria Mobile Water Treatment Unit provides a "plug and play" option for piloting the Pall Aria technology and understanding its benefits. Availability of piloting units varies globally; please consult Pall for options.



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Pall Corporation has offices and plants throughout the world. For Pall representatives in your area, please go to www.pall.com/contact

Please contact Pall Corporation to verify that the product conforms to your national legislation and/or regional regulatory requirements for water and food contact use.

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