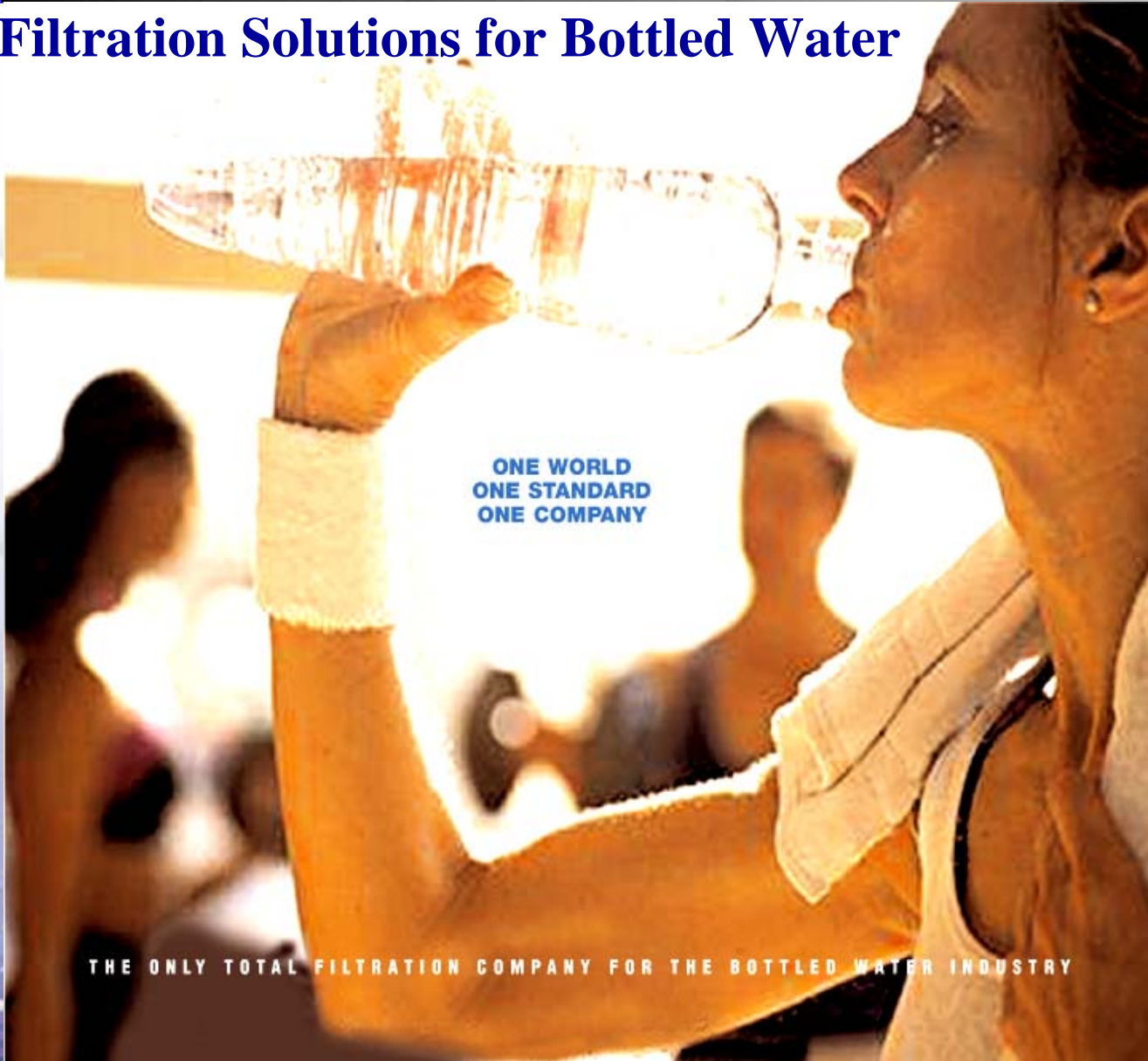




PALL Food & Beverage

Filtration Solutions for Bottled Water



**ONE WORLD
ONE STANDARD
ONE COMPANY**



Now Pall, the world's leading separations and purification company is the number one choice for the bottled water industry. The recent acquisition of Filenik, and Stahlwerk, the German manufacturer of Food & Beverage filtration systems, makes Pall the only company with all the right products for all process stages.

Pall manufactures the widest range of filter media and designs integrated filtration systems to enable peak performance consistently and reliably. These technologically advanced systems equip manufacturers to achieve optimal performance and cost savings while maintaining product consistency. Pall supports customers with local specialists to meet specific production and regulatory requirements, wherever the water is bottled. With Pall, you have one source and one standard everywhere in the world - the best.

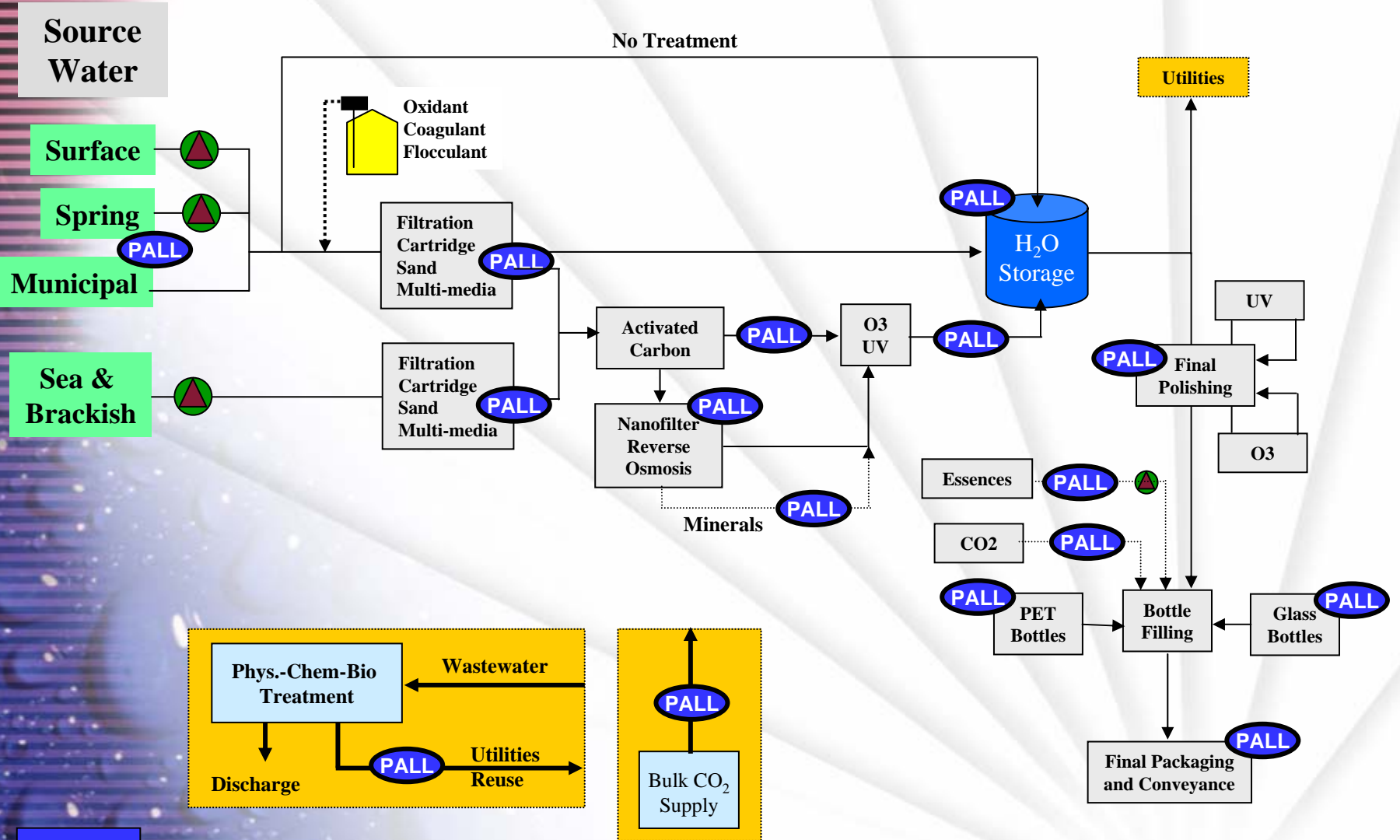
For the total solution call Pall at 1 515 404 5400, in the UK at (44) 200 330 3303 or visit us at www.pall.com.

THE ONLY TOTAL FILTRATION COMPANY FOR THE BOTTLED WATER INDUSTRY





PALL Food & Beverage



The End



Primary Filtration

Objective

- Particle, Protozoan and Bacteria-free water
- Eliminate Water Variability

Pall Solution – Level One Filtration

- Aria (< 0.1 NTU)
- USV / UNA Hollow Fiber module

Typical Process Sizing Parameters

- Water Quality (Analysis- TSS, NTU, Metals, Temperature variation)
- Flow (Q)
- Water Quality Required (Product, downstream processes or machinery)

Typical Operating Process Parameters

- > 97% recovery
- 15-20 psi (Maximum 2.5 bar inlet pressure)
- Automated Flux maintenance & Enhanced Flux Maintenance

Competitive Customer Benefits

- Validated, Absolute Filtration
- Highest Permeability Fiber (Less Energy per m³ produced)
- Highest Production (Recovery) per square meter (ft²) & Lowest Waste
- Experience (More than 60 installations, all types of water)



Water Conditioning / Level Two Treatment

Objective

- Customer Process sensitive to salt, hardness, organics
- Organics, salt removal & Softening (multivalent – Ca, Mg)

Product Choice

- Integrated Nanofilter/Reverse Osmosis
- Assumes Primary Treatment (Aria or min.UHF 4.5)
- Size on permeate demand for customer process
- Integrate all other necessary treatment technology

Benefits

- Complete control of water quality (TDS / TOC)
- Predictable low chemical and maintenance cost
- Modular (compact) design
- Integrated 'one source' supply from Pall





Storage Tank Protection

Objective

- Bio burden control

Pall Solution

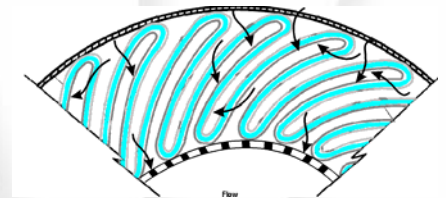
- 1 μ m, Ultipleat High Flow System

Typical Process Parameters

- Sizing: 20-30 m³/h/40"
- NTU 0.2 (SDI max 2-3)

Competitive Customer Benefits

- Absolute Filtration
- Highest production per m³ or ft² of footprint
- Low Operating Pressures and Costs (energy, less change-outs)
- Easy handling
- *Cryptosporidium* and *Giardia* protection
- No contamination from chemical or packaged particulate





Trap Filtration

Objective

- Removal of Slough Particles (carbon, silt)

Pall Solution

- Ultipleat High Flow UY045 4.5 micron

Typical Process Parameters

- Sizing: 20-25 m³/h/40"
- NTU 0.2 (SDI max 2-3)

Competitive Customer Benefits

- Absolute Filtration
- Highest production per m³ or ft² of footprint
- Low Operating Pressures and Costs (energy, replacements)
- Easier & Less Changeout
- *Cryptosporidium* and *giardia* protection
- No contamination from chemical or packaged particulate





Mineral Solution Filtration

Objective

- Particle free, sterile water for injection into main water stream

Pall Solution

- Pre-filter 1µm charged (GF+ U010Z)

Typical Process Sizing & Operation Parameters

- Code 7
- Sanitary style
- Sterilizable

Competitive Customer Benefit

- Product Safety & Protection

Nanofilter
Reverse
Osmosis

Minerals





Vent Filtration

Objective

- Prevent tank & solution recontamination

Pall Solution

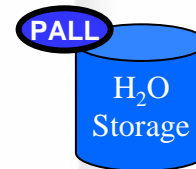
- Emflon PFR – critical applications
- Emflon PFA – large installations if following protection is enough in the process

Typical Sizing Parameters & Considerations

- Tank Fill / maximum flow / emptying rates (vacuum resistance)
- Cleaning procedure of the tank
- Working conditions

CUSTOMER BENEFIT

- Sanitary F&B housing at low installed cost (Advanta)
- Absolute rated, double layer filter 0.2 micron in liquid, 0.003 micron gas
- Biological validation (including phage) – Validation guide available
- Protect from product spoilage
- Hydrophobic media – no condensate / wetting problems
- Option - Integrity testable *in-situ* for ultimate control





Essences / Flavors Filtration

Objective

- Pump Protection (dosing pumps)
- Visible Particle Removal (HACCP)

Typical Process Sizing Parameters

- Low Flow, 1/2" lines
- Single Stroke Pumps

Pall Solution

- Pall HDC Pleated Depth Filters, 10 micron absolute (MCY4463J100)
- Sanitary Advanta F&B Housing (e.g. ALT4463)

Benefits

- Sanitary F&B housing at low installed cost (Advanta)
- Very High Area cartridge, long life (typically annual)
- Food Grade – minimal extractables
- Security / Reliability of Absolute filtration
- Protect accurate / sensitive pumps



Bore Hole Protection

Objective

- Bore hole protection against recontamination

Pall Solution

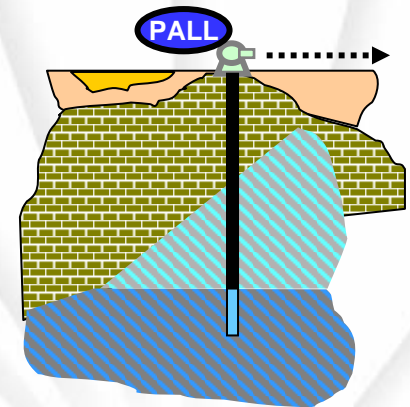
- Emflon PFA

Typical Process Sizing & Considerations

- 20" for longer life AB2 PFA 7

Competitive Customer Benefit

- Prevention against condensate (hydrophobic material)
- Avoid calling for borehole cleaning procedure if contaminated



Pre-Filtration

Objective

- Fine particle removal (1µm)

Pall Solution

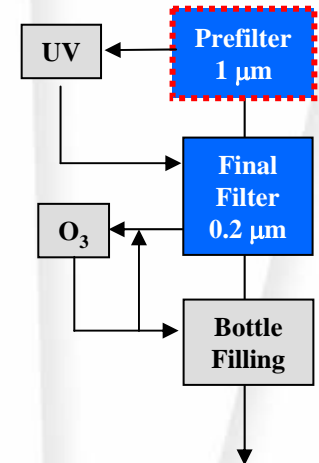
- Sanitary new application: Ultipleat High Flow (CAS) (>100 LPM)
- Retrofit situation: Ultipor GF + U010Z (<100 LPM)

Typical Process Sizing Parameters

- Position in front of final filter
- Flow rates: 10-500 LPM; Temperature: ambient
- Pressure minimum 2 bar
- Standardize on 40” cartridges: Up to 400 LPM / 40”
- Terminal DP for Changeout = 2 bar

Competitive Customer Benefits

- Protects downstream processes (final filter, UV shadowing, O₃ reactions)
- Low operating costs (fewer replacements, less disposal, less maintenance time)
- Small investment cost
- *Cryptosporidium* and *Giardia* removal





Final Filtration

Objective

- Pathogen removal

Pall Solution

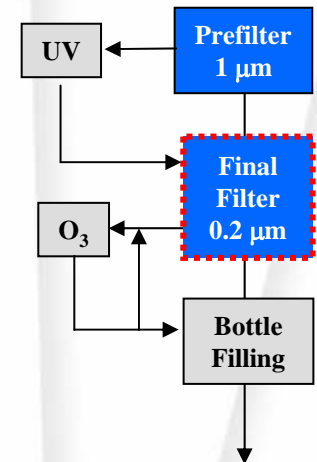
- NF and integrity test device
- Assemblies should be sanitary design

Typical Process Sizing and Operating Parameters

- On bottling line downstream of pre-filter
- Size using same criteria as pre-filter
- 15 LPM/10"
- Recommended Changeout DP = 2 bar

Competitive Customer Benefits

- Higher Production & Lower Operating Costs
- Brand protection & Safety
- Long shelf life
- Validated (micro claims & titre reduction of dimunitive forms)
- Scalable wetting and integrity test (nylon) in large scale





Point of Use CO₂ Protection

Objective

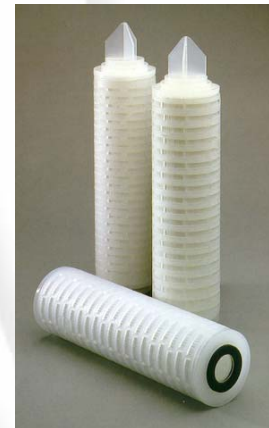
- Bio protection P.O.U.
- HACCP

Pall Solution

- Emflon PFR – Advanta Housings
- Size on flow

Competitive Customer Benefits

- HACCP compliance
- Product protection
- Validated performance
- No packaged particulate contaminants





Bulk CO₂ Treatment

Objective

- Prevent product contamination (HACCP)
- Brand Protection

Pall Solution

- Multi (5) Stage Purification System

Typical Process Sizing & Operating Parameters

- Size per application based on volume used
- If not a bulk application, see POU solution

Competitive Customer Benefits

- HACCP compliance
- High Security



5 Stage System

- Prefilter (UY100)-Resin-Activated Carbon-Coalescer-PFR

Water Recovery from Bottle Rinsing

Objective

- Remove visible particulate from washing/rinsing process (>40um)

Pall Solution

- Low flow: PSS
- High flow: Rigimesh (316L SSI, Viton seals, changed with KF)
- Reinforced for reverse flow

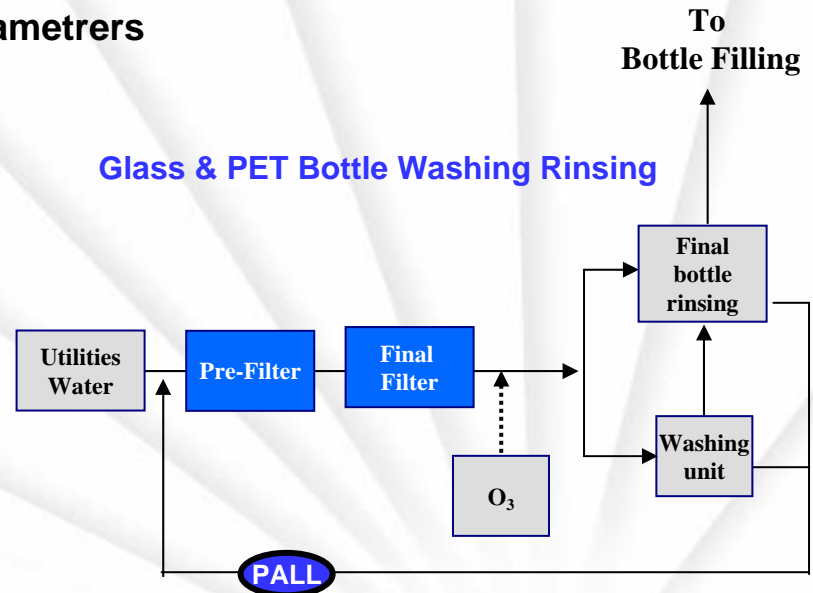
Typical Process Sizing & Operating Parameters

- Position upstream of ozonator
- O₃ content: -0.5 to 1 ppm typical
- Flow : up to 300 LPM (1/3 bottling flow)
- P = minimum 2 bar; T = ambient
- Change-out = Every six months

Competitive Customer Benefits

- Brand protection (No cosmetic defects)
- Low Operating Cost
- Saves water (less waste)

Glass & PET Bottle Washing Rinsing



Cooling Water for Bottle Molding

Objective

- Particle removal

Pall Solution

- UHF (UY400)

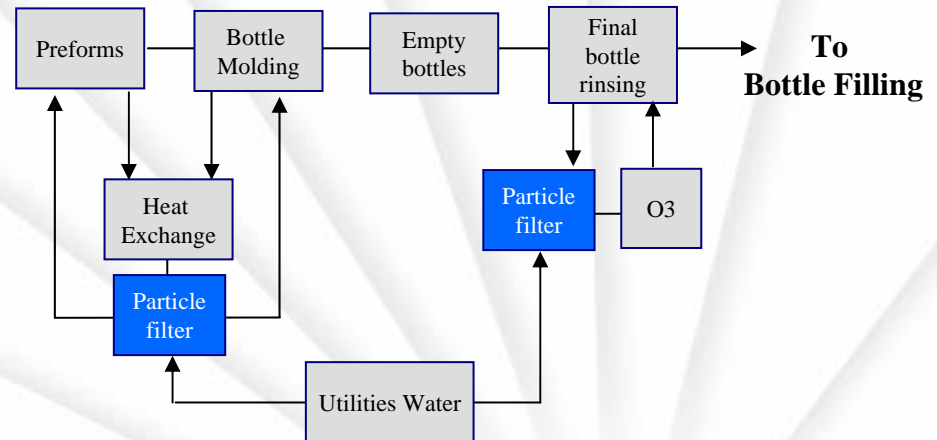
Typical Process Sizing and Operating Parameters

- Flow rate depends on attached machine
- T = 10°C; P = 2 bar

Competitive Customer Benefits

- Maximize bottle yield
- Maintain consistent heat exchange
- Reduce downtime & operating costs

PET Bottle Cooling Recycle and Make-Up Loops



Ink Jet Filtration

Objective

- Jet Protection (particles)

Pall Solution

- FLP6001 BPP (3 types)
- PSS (2 types)
- See datasheet IPG-2

Competitive Customer Benefits

- Reduced downtime
- Lower costs
- One source supply of all filters

A rectangular box with a black border containing the text "Final Packaging and Conveyance". To the right of the box is a blue oval with the word "PALL" in white, which is partially overlapping the box's right edge.

Final Packaging
and Conveyance

PALL



Hydraulics Filters

Objective

- Protection of moving parts
- Prevent excessive servicing

Pall Solution

- 6 um and 12 um
- More info to be found

Competitive Customer Benefits

- Absolute Protection
- Single Source of Filtration Supply
- Cost Saving (machine protection, minimal downtime)

Final Packaging
and Conveyance

PALL

Wastewater Reclamation

Objective

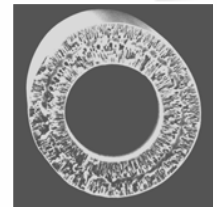
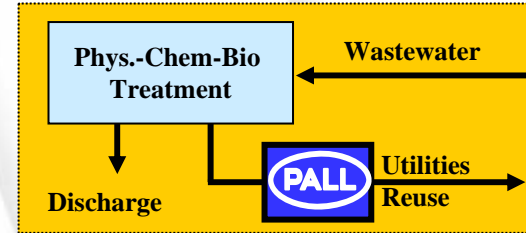
- Local Water Cost & Regulations Justifies
- Reduce Water & Waste (surcharge) Costs
- Reduce Net Water Demand (make-up)
- Regulatory Compliance

Pall Solution

- Aria AP [1, 2 (shown), 3, 4, 6]
- Membrane - USV6203, UNA 620 A, 0.1 μm , PVDF
- Size on flow & feed quality (TSS, BOD, COD) from treatment plant (3-4 $\text{m}^3/\text{hr}/\text{module}$)

Competitive Customer Benefits

- Reduce Fresh Water Use
- Reduce Waste & Water Fees
- Regulatory Compliance &
- Environmental issues (e.g. ISO14001)
- Water re use for cooling / wash-down, boiler feed, etc.
- Fully automated system
- Low Cost Operation



Additional Waste Treatment

Objective

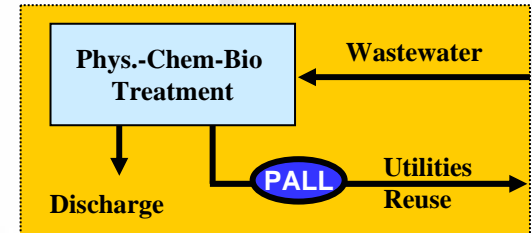
- Control of TDS (regulatory compliance)
- Reduce wastewater volume & surcharge costs

Pall Solution

- For TDS free water – Pall NF / RO
- Assumes Aria Waste Treatment or equivalent

Competitive Customer Benefits

- Reliable Regulatory Compliance
- Low cost operation & consumables
- Flexibility of operation
- Modular (Compact) Design
- Fully automated (low labor) system





PALL Food & Beverage

Filtration Solutions for the Bottled Water Industry