



Water Solutions for the Pharmaceutical Industry



Resourcing the world

WATER TECHNOLOGIES

Water solutions for the pharmaceutical industry

Water is the most common used liquid in the pharmaceutical industry, not only as an ingredient in many formulations, but also as a cleaning agent. The production of Purified Water, Highly Purified Water and Water For Injection to international pharmaceutical standards is widely recognised as a critical process.

Veolia Water Technologies offers solutions based on packaged or engineered systems. We cover the full water cycle in a pharmaceutical manufacturing facility, from process water to wastewater.

As a world leader in creating water solutions, we use the latest technologies available to improve manufacturing efficiency without compromising process security and product quality.

All aspects of our product development, project management and service offerings are managed to the highest quality standard to ensure that our dedicated team of experts are in tune with your needs.

We deliver complete water treatment solutions that meet and exceed these standards through compliance with:

- Latest USP, JP and Ph Eur (United States, Japanese and European Pharmacopoeia standards)
- ISPE (International Society for Pharmaceutical Engineering)
- cGMP (current Good Manufacturing Practice)
- GAMP (Good Automated Manufacturing Practice)
- CE marking (European Standards)
- IPCC environmental requirements (Intergovernmental Panel on Climate Change)
- FDA requirements (US Food and Drug Administration)
- TGA approved (Australian Standards)

High OH&S standards

We place the Occupational Health & Safety (OHS) of our customers, employees and third parties at our workplaces as our highest priority. We are certified to the following Standards by BSI Global:

- **BS OHSAS 18001: 2007** OHS Management Systems Standard
- **AS/NZS 4801: 2001** OHS Management Systems Standard
- **AS/NZS ISO 14001: 2004** Environmental Management Systems Standard
- **AS/NZS ISO 9001: 2008** Quality Management Systems Standard





Customer care

The pharmaceutical industry is one of the most demanding in the world. Veolia Water Technologies, as a total service company, understands that it's not just about our equipment complying with GMP, but also how we document what we do and ensure regulatory compliance.

Our service starts with professional project management and a comprehensive validation methodology. Validation is built into our contract management and service philosophies. Our in-house team of specialists prepare the essential documents needed to support the installation, commissioning and maintenance of your water systems. Our skid mounted water systems are designed to GAMP and GMP as a standard. Our proven validation package significantly reduces site installation and validation time, helping to minimize costs and shorten lead times.

We offer a variety of flexible, cost-effective service contracts with short guaranteed response times to minimize your downtime. And we provide Hydrex® Specialty Water Treatment Chemicals as well as parts from strategic spares to membrane replacements when you need them.

Service & Maintenance

It is important that once the water treatment plant is installed that regular service and maintenance is applied. We can implement a detailed operating and maintenance program to ensure that the plant works efficiently without any issue.

Applications

1. Purified water
2. Highly purified water
3. Water for injection
4. Wastewater
5. Reuse, Reclaim & Recycle

Markets

1. Pharmaceuticals
2. Healthcare and cosmetics products
3. Contact lenses
4. Biotechnology
5. Medical devices

Our technologies



Orion™

C-Series: Classic Orion - the most economic package

E-Series: provides standard features of reduced water to waste during recycle conserving both water and energy

S-Series: meets the ultimate requirement for sustainability - overall reduced energy & water consumption combined with long term operating efficiencies



Quattro™

Cost-effective solution for supplying up to 3,000 L/hr of high purity water (less than 0.7µS/cm conductivity); Skid mounted design combining: Softening + Filtration + Reverse Osmosis + Continuous Electro Deionisation; Chemical sanitisation for microbial control; No regeneration chemicals



IonPro™

Can produce from 500 to 1,000 L/hr (2.2 to 4.4 gpm) of multi megohm high purity water; Units can be connected directly to the mains water supply and produce high purity, bacteria-free water to feed a ring main or a storage tank; Combines Reverse Osmosis + Continuous Deionisation



Evaled™

Evaled™ evaporators allow high concentration ratios, good separation levels as well as recycling and a decrease in volumes to be disposed

Technological solution for: disposal cost reduction, product recovery: API, disinfectants, proteins, glycols, etc., water reuse and ZLD (Zero Liquid Discharge)



Polaris™

Range includes Multi-Effect Distiller (Polaris MED), Vapour Compression Distiller (Polaris VCD) and Clean Steam Generator (Polaris CSG); An efficient and effective pyrogen removal solution for water for injection



Rapide Strata™

Produce high quality water for healthcare and pharmaceutical applications; Unique design offering up to 40% savings on running costs; Short Cycle Ion Exchange technology enhancing bacterial control and maximising production time; Reduced treated water storage costs; Highly efficient use of chemical regenerants



Biothane™

Highly efficient, cost effective biological methods to reduce pollution and recover energy with a minimal environmental impact; The anaerobic process enables removal of COD by converting it into biogas (= methane + carbon dioxide) at low operational costs and with a very compact plant design; No waste sludge production



MBBR™

Leading-edge biological solution for wastewater treatment, the Moving Bed Biofilm Reactor combines the advantages of activated sludge & fixed biofilm systems. The biofilm attached to a carrier achieves high BOD, organic & nitrogen pollutant removal



Hydrex®

Complete range of specialty water treatment chemicals for boiler & cooling water systems including Legionella control, Reverse Osmosis antiscalants, biocides, cleaners, inhibitors, dispersants and polymers

Case studies

Purified Water Treatment Plant & Servicing, Astra Zeneca, NSW

Purified water expansion project. Customised solution.

- Supply and commission 2 x Orion multi technology solution plants to feed the pure steam generator, the WFI distillation system and the analytical laboratory.
- The plants included: Stainless Steel (SS) activated carbon filters (off skid), SS duplex softeners, 5 micron depth filters, RO feed pump, single pass RO, Continuous De-Ionization (CEDI) and UV sterilizer.
- Hydrex® water treatment chemicals used for cooling towers, chillers and boilers to ensure long term equipment operational efficiencies

Quattro™-S Purified Water Generation Plant, Probiotec Pharmaceuticals, VIC

- Design, supply, commissioning and validation of the Purified Water Generation system
- Treat municipal town mains water to meet Purified Water Standards for use in pharmaceutical products
- The total treatment package includes a Quattro™-S unit featuring media filtration, cartridge filtration, softeners, activated carbon, reverse osmosis, CEDI and UV



Water For Injection (WFI) Plant, Pharmaxis, NSW

Transform Sydney town water into WFI by removing suspended solids and chlorine.

- Solution included pre-treatment station and a Polaris Vapor Compression Distiller (VCD)
- Technologies included multimedia filtration, activated carbon filters, reverse osmosis, CEDI feeding into the Polaris VCD to meet the European Pharmacopoeia standards.
- The new RO and CEDI units expand the current production rates without increasing plant footprint to assist Pharmaxis in moving from a clinically focussed development company to a fully integrated operating business

Orion™ Purified Water Generation System, CSL, VIC

- Design, supply, installation and commissioning of 2 x Orion multi technology solution plants with pre-treatment stations
- Customized operator training
- The 2 x Orion plants treat municipal town mains water to purified water standards to meet the specified needs of the pharmaceutical industry.
- Hydrex® chemicals are supplied on an ongoing basis to ensure long term operational efficiencies

Water Solutions for the Pharmaceutical Industry

1 PRE-TREATMENT & PROCESS WATER

- Screen, drum & disc filtrations
- Ultrafiltration
- Multi media filtration: sand, activated carbon
- Ion-exchange resins:
 - Softening
 - Co-current deioniser
 - Short cycle deioniser
 - Counter-current deioniser
- Reverse osmosis
- Continuous electro-deionisation CEDI
- Photo oxidation Ultraviolet
- Water treatment chemical
- Service Deionisation SDI

2 COMPENDIAL VALIDATED WATER

- **Critical and validated water production, storage and distribution**
- **Pyrogen-free water**
- **Pharmacopoeia compliant**

- Reverse Osmosis and Continuous electro-deionisation
- Distillation:
 - Multi effect distillation
 - Vapour compression
 - Clean steam
- Distribution and sanitisation skid:
 - Thermal or ozonation

3 EFFLUENT TREATMENT

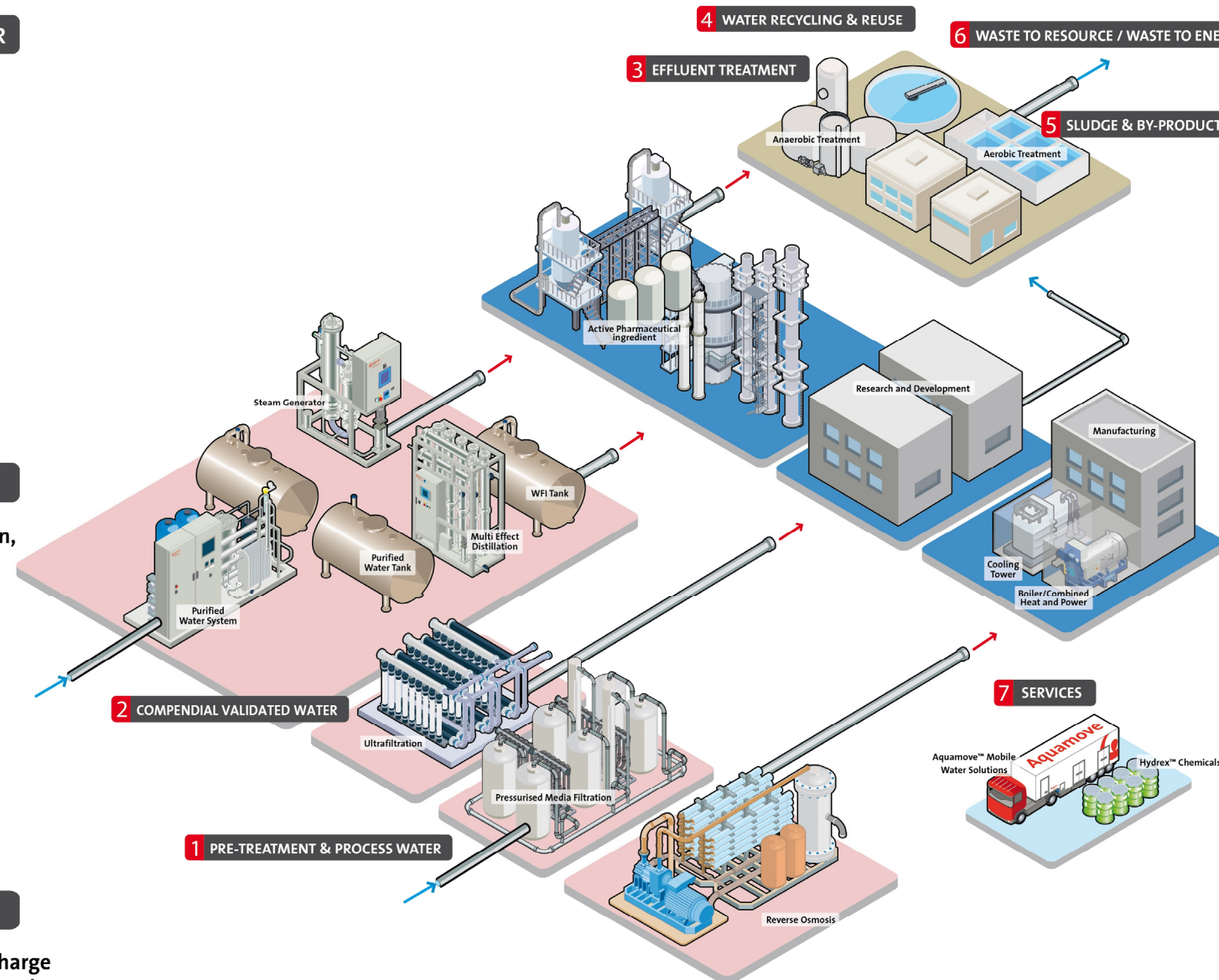
- **Meet strengthen local regulation discharge**
- **COD, BOD, TSS, toxicity, chemical removal**
- **Endocrine (EDCs) and pharmaceuticals (PPCPs) removal**

- Coagulation/Flocculation/Decantation
- Flotation
- Evaporation and crystallisation
- Biological treatment:
 - Activated sludge
 - Membrane biofilm reactor
 - Moving bed biofilm reactor
- Ozonation
- Reverse osmosis
- Ceramic micro filtration and ultra filtration
- Photo oxidation UV

7 SERVICES

- **Total validated system lifecycle compliance**

- Service contracts
- Re-validation of existing plant
- 24/7 service and support infrastructure
- Remote monitoring of installations
- Local support staff
- Spare parts and consumables
- Replacement media
- Water analysis service
- Equipment leasing
- Service Deionisation
- Expansion and modification of treatment plants
- Refurbishment & update of validated systems
- Site audits
- Mobile and temporary solutions
- Water treatment chemicals
- Complete water cycle management & outsourcing



4 WATER RECYCLING & REUSE

- **Preserve natural resources**

- Tertiary filtration
- Multimedia filtration
- Evaporation and crystallisation
- Membranes: nanofiltration, reverse osmosis

5 SLUDGE & BY-PRODUCTS

- **Residuals management**
- **Energy recovery**
- **Product reuse (land disposal, composting, storage)**

- Drainage, centrifugation, filtration
- Anaerobic digestion (biogas recovery)
- Drying
- Fluidised bed incineration

6 WASTE TO RESOURCE / WASTE TO ENERGY

- **Biogas generation for CHP, boiler**
- **Nutrient recovery**
- **Solvents recovery (phenol, ethanol, benzene, methanol)**

- Anaerobic treatment
- Liquid / liquid extraction
- Macro porous polymer extraction
- Biopolymer
- Electrodialysis

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