



WHY US

Our expertise in the water field allows us to offer our customers a bespoke package to meet their requirements and needs.

Horsol's ISO accreditation exemplifies our high level of engineering and manufacturing practices and our bizSAFE Star (highest of its kind) demonstrates our emphasis on safety.

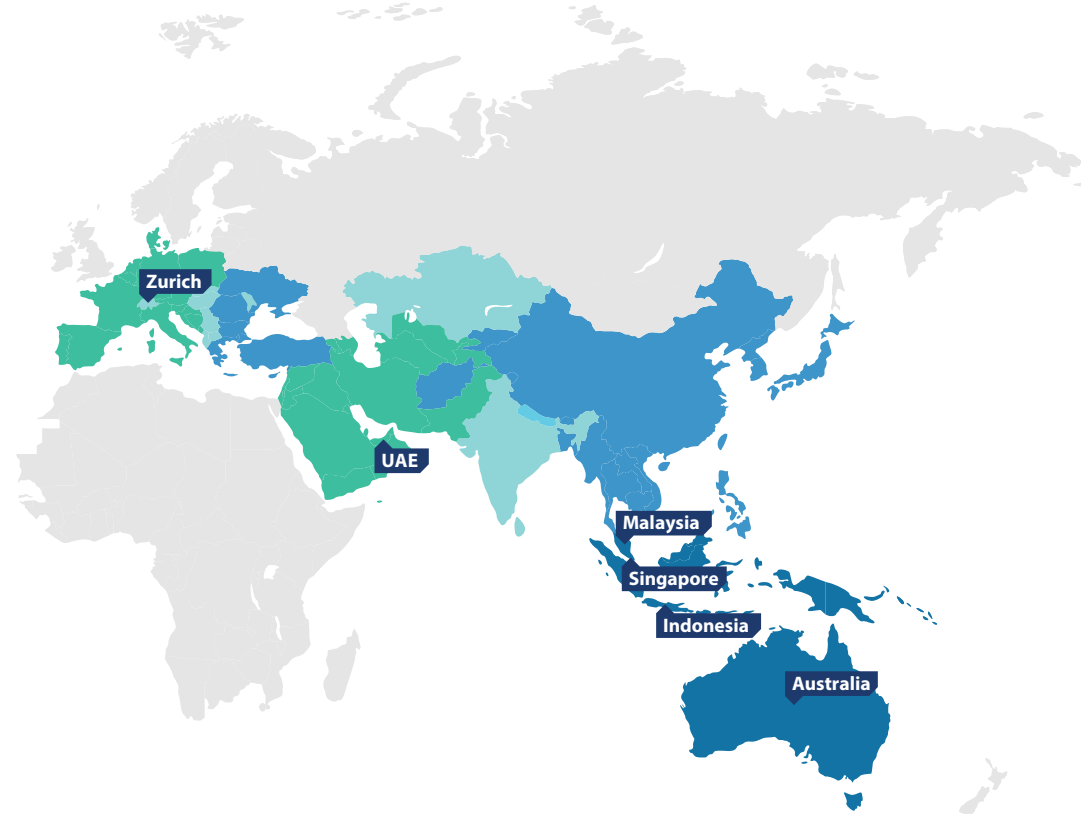
Horsol's multiple presence across different regions allow us to be easily accessible and react quickly for any after sales services.



PRESENCE

Headquartered in Singapore, with a regional presence in Australia, Malaysia, Indonesia, Vietnam, UAE and Zurich.

Our group has offices around the region to provide capabilities and support in various projects.



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Purified Water & Water for Injection Solutions



The Water Engineering Specialist

We bring with us four decades of experience, leveraging our expertise and know-how. Together with our in-house cutting-edge solutions, we manage challenges faced in extreme water conditions, consistently exceeding our customers' expectations.

ABOUT US

HORSOL is a Singapore-based company founded by a team of former water executives and engineers from Hyflux. It prides itself as a provider of engineering services centered on large-scale desalination solutions and specialized pharmaceutical water.

The team of bright-minded engineers is geared to replicate the same success stories using robust high-tech technologies and designs. This is how we align customers' requirements to achieve cost-effective outcomes.

We are committed to building long-term, sustainable businesses that will generate economic, clean, and green solutions, ultimately benefiting our customers' goals. We provide reliability in Design, Engineering, Procurement, Pre-commissioning, Testing, and Commissioning.

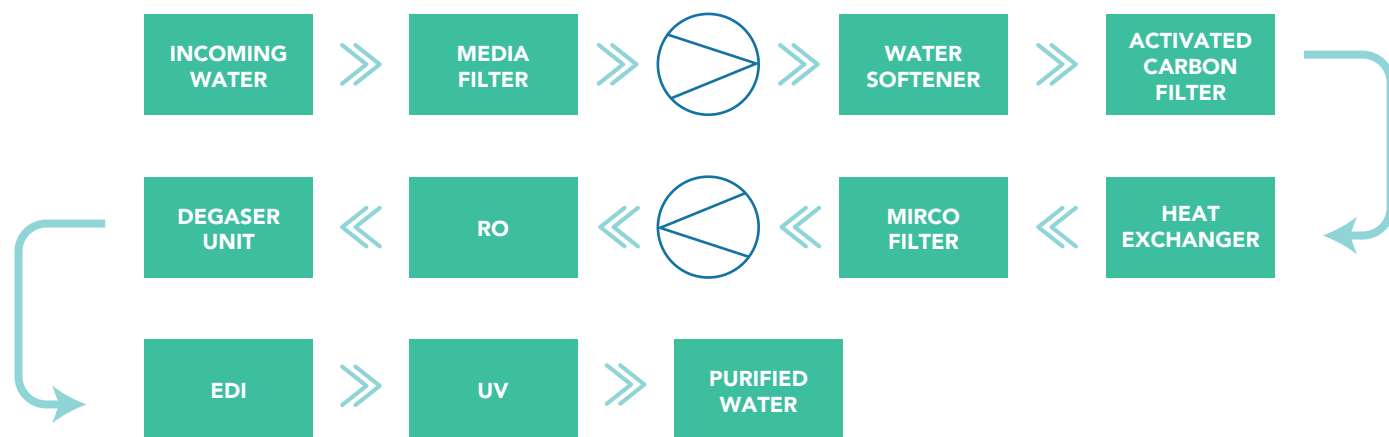
MISSION & VALUES

To be a trusted partner in engineering services through our expertise.

We are committed towards achieving Functional and Optimized Plant Design through

Trustworthiness
Customer-Centric
Excellence
Collaboration
Innovation

PROCESS DESCRIPTION



1. Pre-Treatment

- Influent will pass through the MultiMedia Filter for removal of suspended particulate contaminants.
- The filtered water will then have to be “soften” by going through the ion exchanger to remove Calcium and Magnesium ions.
- Activated Carbon Filters will be used to lower molecular weight organics in the water, remove colloids and any chlorine present which might affect the downstream process.
- Cooling Heat Exchanger(s) may be used to cool the feed water to minimize risk of bacterial proliferation.

2. Purified Water Generation

- The pre-treated water will be fed through a micron filter before entering the Reverse Osmosis system.
- A high-pressure pump (10-15 barg) will be deployed to generate sufficient pressure for the pre-treated water to go through the RO membranes where most of the dissolved solids will be removed.
- The RO permeate will then be fed through the Membrane Degasser to remove carbon dioxide.
- Subsequently, the RO permeate will go through the Continuous Electrodeionization (CEDI) for removal of ionic contaminants by using ion selective membranes, ion exchanges resin and electricity.
- The Purified Water (PW) will go through the Ultraviolet (UV) unit to eliminate any viable bacteria.
- At this stage, the Purified Water will meet the requirements specified in the US and European Pharmacopoeia.

3. Water for Injection (WFI) and Pure Steam Generation

- To generate the WFI, the PW will go through the Multiple Effect Distillers which comprises of a series of columns whereby evaporation and condensation will take place.
- Heat will be introduced to produce Pure Steam (PS). A labyrinth separator is present at each column to separate the steam from the liquid droplet.
- Condensation is achieved by means of thin, falling-film system and the condensate will meet the requirements for the Water for Injection.

OUR SYSTEM

To minimize the timing required for site installation and the tight footprint limitation, we make use of our state-of-the-art technologies and innovation to design each system in a modular skid.



Pre-Treatment Units

- Modular units
- Robust designs to precondition water
- Designed according to incoming water qualities and capable of producing pretreated water suitable for pharmaceutical grade water generation system
- Media Filters, Softener, Activated Carbon Filter, Heat Exchanger are designed to customer's needs



Multi-Effect Distillation

- Multi-Effect stills produce distillate for WFI that meets US Pharmacopeia (USP), European Pharmacopeia (EP) and Japanese Pharmacopeia (JP) guidelines
- In line with FDA and EMEA requirements
- Energy efficient, ensuring optimal use of energy resources without compromising quality.
- Capacity of up to 8,000 kg/hr



Pure Steam Generators (PSG)

- Delivers the highest level of sterility
- Compliance with pharmacopoeial specifications and meets USP & EP requirements
- Eliminates contamination
- Capacity of up to 8,000 kg/hr
- Able to integrate with MED with single system controls



Purified Water (PW) And Water For Injection (WFI)

- Standard modular units with proven, state-of-the-art technologies
- Cold and Hot WFI that complies with all pharmacopoeial specifications
- Fully automated heat sanitisation
- Capacity of up to 20,000 l/hr
- Full compliance with international cGMP guidelines as per FDA and EMEA, EP, JP and USP requirements
- From softened water to point of use



Other Systems

- Compact modular storage skids
- Reverse Osmosis
- Electro-deionization (EDI)
- Ion Exchanger