OVIVO™
Bringing water to life℠

CONESEP® Technology

Externally regenerated condensate polishing technology

Key features & benefits

- Superior resin separation efficiency
- Allows Ammonium form operation
- Two vessel system
- Reliable operation, with over 150 installations
- No inert resin required

How we create value

- Highest quality condensate reduces corrosion
- Minimizes use of regenerant chemicals
- Minimizes Ammonia dosing
- Reduced operator intervention

CONESEP® Technology

CONESEP® installations

The Problem
The modern power station, operating with condensing type turbines, normally has a make-up rate of less than 3% total boiler evaporation. During normal operation the make-up can often be less than 1%.

When a generating set is started up (either during commissioning or after any subsequent shut-down, and particularly in multi-shifting stations) the production of corrosive products contaminates the condensate return. Contaminants can be in both suspended and soluble form. Contamination of condensate can also occur in cases of condenser leakage, allowing relatively high TDS cooling water ingress.

Deionisation techniques are applied to polish a portion of or the total boiler-feed flow, removing any solids from either of the contamination sources listed above.

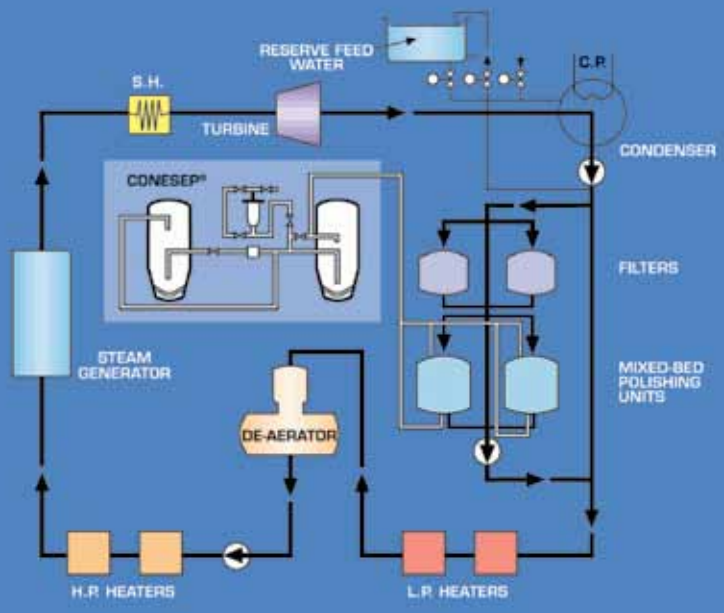
Because of the general low order of solids to be removed, and the extremely large volumes of water to be treated, these deionization plants are designed to operate at very high flow rates.

The solution: CONESEP® External Regeneration Technology
Deionisation at high flow rates presents challenges for the design of a suitable internal distribution system, particularly considering the very large ratio that would have to exist between the normal high operating flow and the necessary resin regeneration flow. The CONESEP system is designed to transfer ion exchange resins from the service polishing unit to entirely separate vessels for regeneration. The process is reversed when the resin is fully regenerated, transferring it back into the service unit.

The plant arrangement ensures there is no chance of any regenerant accidentally entering the boiler-feed system, allowing for the optimal design of the service and regeneration vessels.

CONESEP "S" – World leading resin separation technology
Resin separation is key to condensate polishing system performance. The patented CONESEP system has been supplied as part of the Condensate Polishing Plants (CPP) to power plants worldwide, and Ovivo is proud to continue this heritage.

Years of experience operating in over 80 installations have demonstrated that the unique design of the CONESEP technology outperforms all other systems in the elimination of resin cross-contamination. This allows for consistent operation in the ammonia cycle and a fully oxygenated regime, where control of sulfate and chloride ions to the lowest practicable levels is paramount to the integrity of the complete steam cycle.



Typical configuration of a high pressure boiler and associated condensate polishing plant, and CONESEP® external regeneration technology

Standard packages are designed for turbine sets up to 900 MW.

The CONESEP packages consist of:

- Resin separation/anion regeneration vessel
- Cation regeneration/mix and hold vessel
- Resin interface isolator
- Instrumentation, including conductivity and optical interface detection unit
- Service vessels designed to enable a 99.9% resin removal in to the external regeneration system

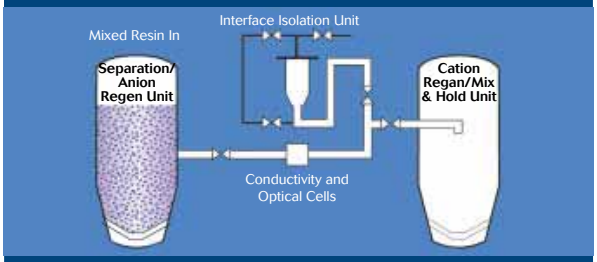
CONESEP installations
The CONESEP design has been widely accepted. Since the first plant was commissioned at Aghada Generating Station in Ireland in 1980, licenses have been granted to other water treatment specialists worldwide. There have been over 150 CONESEP installations in both thermal and nuclear power plants on all continents. The CONESEP system has been installed in many different environments, including sub and super critical fossil fuel plants, PWR and AGR nuclear plants.

CONESEP "R" – Retrofit option
Ovivo can provide superior external regeneration of any existing condensate polishing system by providing the CONESEP "R" retrofit option, improving performance and giving greater system operation flexibility.

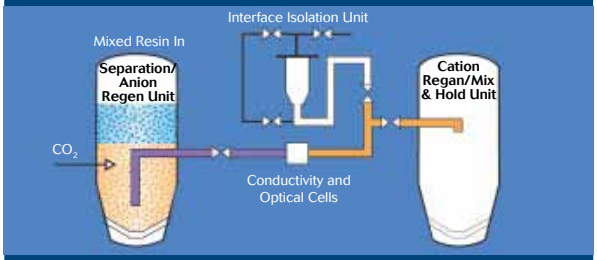
The CONESEP "R" package includes:

- Resin separation/anion regeneration vessel
- Resin interface isolator
- Instrumentation, including conductivity and optical interface detection probes
- Local control panel, including resin interface detection unit
- On-skid pipework and valves

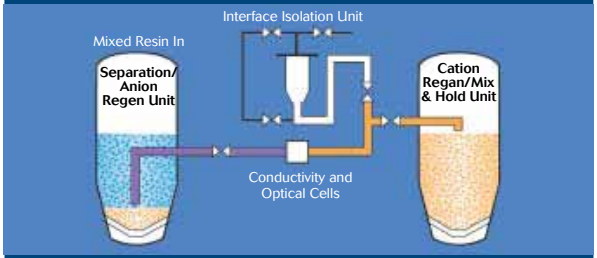
How it Works



Exhausted, mixed resin is transferred to the resin separation/ anion regeneration vessel. A small amount of mixed resin, isolated during the previous regeneration, is added from the resin isolation pot. The resins are backwashed and air scoured to remove particulates.



The resin is backwashed again without air scour and the denser cation resin sinks to the bottom of the vessel. The interface is visible through a sight glass in the vessel.



Carbon dioxide is carefully injected into the vessel and the resin transfer line is opened. The cation resin flows into the second vessel. The unique cone design of the vessel bottom gradually reduces the diameter of the resin interface and directs it into the outlet branch.

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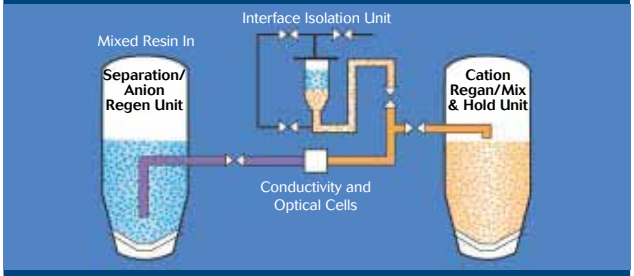
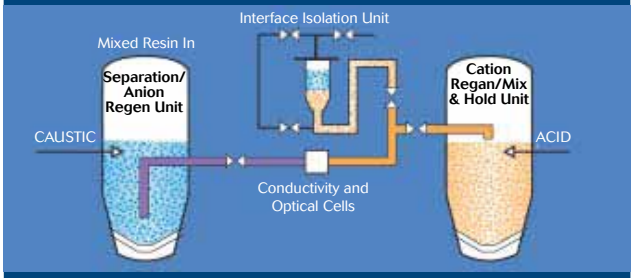
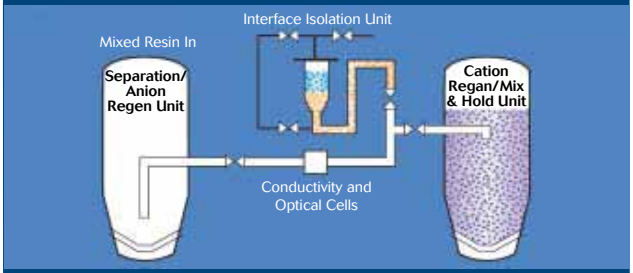
How it Works (Continued)



As the resin interface moves into the transfer line the difference in conductivity between the resins is detected. The transfer line is closed and the small amount of resin in the line is diverted to the interface isolation pot. A back-up optical cell detects the interface by color difference in the unlikely event of the conductivity cell failing.



The cation and anion resins are regenerated simultaneously and rinsed to drain. Any cation resin still in the anion is now very dense, and settles at the bottom of the vessel. The resin is then transferred to the interface isolation pot to achieve the quoted cross-contamination levels.



The regenerated anion resin is transferred to the cation regeneration/mix and hold vessel, the two resins are rinsed to final quality, and then transferred back to the next available polisher service vessel.

CONESEP® benefits

- The CONESEP system is an externally regenerated technology that fully isolates the resin regeneration process and chemicals from the condensate lines
- Full flexibility in resin ratio employed
- One CONESEP system can service a number of service polishers
- Allows for a spare charge of resin to be transferred back into the service vessel as soon as the exhausted resin is removed, to minimize polishing down time
- High resin separation efficiency: anion resin in cation resin < 0.1%; cation resin in anion resin < 0.1%
- The CONESEP system does not require inert resins or 3-bed systems to achieve high resin separation levels. Only 2 vessels are needed
- Resin separation process can be monitored locally
- The system can be factory-assembled with break down and re-build kept to a minimum
- The CONESEP system can achieve optimum resin separation that is independent of the ratio of anion and cation resins used, enabling different resin types to be used
- Simple procedures for the removal of resin fines
- Resin interface isolated from the transfer of resins back into service

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