Ion Exchange Systems

Water • Brine • Oil Removal • Deaerators • Cooling Towers • Parts & Retrofit

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Conventional Design

Conventional Ion Exchange has been a mainstay design of Ecodyne Water for nearly 60 years.

Applications include boiler feedwater, condensate polishing, brine decalcification, brackish water softening, oil flood produced water softening and specialized ion exchange applications such as metallurgical solutions and waste treatment. Options include weak and strong acid/base resin columns, layered beds and mixed beds.

Co-current Downflow Service & Regeneration

This is the basic Demineralizer and covers a wide variety of applications. In some instances this process is the most suitable where enhanced regeneration techniques offer no capital or chemical cost savings such as standalone, weak acid/base resin columns or where augmentation of existing conventional systems is required. These units are backwashed, in place, every regeneration cycle. Water quality from a 2-bed cation/anion system is typically <10 µS/cm and regeneration chemical requirements are >300% of stoichiometric.

Countercurrent Downflow Service/Upflow Regeneration with Air Block

Ecodyne installed the first air block countercurrent regeneration system in North America in 1970. Low pressure oil free plant air is used to hold the resin bed in place during upflow regeneration. A variant of this enhanced regeneration technique has been adopted by every major equipment manufacturer in North America but other manufacturers use water block or split flow. Water block has the disadvantage of needing additional water for the blocking flow and extra load on the neutralizing system. Split flow directs a portion of the regenerant chemical to the top of the bed and a portion to the bottom of the bed, where it is collected near the middle of the bed. With air block no additional water is wasted and 100% of the regenerant chemicals pass through the bottom polishing resin zone. CCR units require backwashing once every 20 to 30 regeneration cycles. Water quality is typically <2 µS/cm and regeneration chemical requirements are >200% of stoichiometric.

Mixed Beds

Designs include Working, Polishing and High Rate Deep Bed Mixed Beds for boiler feedwater and condensate polishing. Regeneration includes in-place and external regeneration. External regeneration can include special resin separation and regeneration techniques.
Packed Beds

For best quality, lowest use of chemicals and minimum waste volume then Countercurrent Ion Exchange using packed beds is the process of choice.

**Upflow Service/Downflow Regeneration**

Packed bed technology uses uniform particle size fixed resin beds with minimal freeboard which optimizes outlet quality as well as the efficiency of the ion exchange process. Over half a century of operating experience in Europe and North America with over 4,000 installations has proven this technique to be the best ion exchange process. Downflow regeneration provides optimum distribution and rinsing of the denser acid and caustic. This advantage is not realized in systems using upflow regeneration. Upflow service packs the resin into Primary and Polishing zones. The packing rate and service flow turndown ratio are easy to control and maintain.

*Ecodyne is the industry leader in packed bed technology and can provide innovative solutions for all of your process needs.*

**Best Water Quality**

The wide band Polishing layer of highly regenerated resin separated from the outlet collector with a layer of inert resin provides consistent near Mixed Bed quality water. Packed beds have a total dissolved solids removal efficiency of >99.9% vs about 98-99% for either conventional ion exchange or reverse osmosis. Packed Bed conductivity can be as low as 0.5 µS/cm and SiO2 of <20 ppb, so in some cases Mixed Bed Polishers can be eliminated. Conventional ion exchange and RO will always require polishing to give comparable quality. If Polishers are needed Packed Beds can increase their run length by up to 10 times compared to conventional ion exchange and RO. In some cases packed bed units use cation polishers only in lieu of mixed beds.

**Lowest Chemical Consumption**

Superior regenerant distribution and the use of weak and strong resin grades in separate compartment in the same vessel can reduce the chemicals to as little as 115% of stoichiometric vs well over 200% for conventional ion exchange.

**Minimum Waste Volume/High Water Recovery**

Efficient use of chemicals with vessels designed to reduce hideout along with downflow regeneration reduce displacement rinse water. Final rinse recycle, in a closed loop, is used so no final rinse water goes to the neutralizing system. Waste generated is as low as 2% of the total water treated. Compare this to over 10% for conventional ion exchange and 25% waste water for a typical RO.

**System Modernization**

Improve water quality and increase capacity of your existing demineralizer with a System Modernization from Ecodyne. Return on investment is typically justified by reduced waste volumes and chemical savings.
The Ecodyne Difference

• Custom Engineering
• Shop Assembly and Trial Fit Capability
• Global Experience
• Industry Leader
• Spare Parts
• ISO 9001 Certified