Recoflo Softener

Recoflo® ion exchange technology utilizes fine mesh resin beads, a fully packed resin bed, and counter-current regeneration. These unique features help to improve exchange kinetics, reduce regenerate consumption, and increase the concentration of strip solutions.

Provide significant benefits in softener performance such as:
• 40-80% reduction in salt and waste for regeneration compared with conventional softeners treating an equivalent quality and quantity of water.
• Eliminate the use of acid and caustic for regeneration of WAC softeners.
• Compact, skid-mounted, factory assembled systems.
• Fully automated, easy to operate and maintain with easy adjustment to variable feed water conditions and effective in-situ resin cleaning.

Operational impact through proven product quality with:
• Operating cost savings
• Maintenance savings
• Time savings
• Installation savings
• Space savings
• Chemical consumption savings
• Waste reduction savings

Please Contact us for a price on this Refurbished Ion Exchange Softener!
Eliminate biological fouling and increase throughput. In just four easy cycle steps, the Recoflo® Water Softener outperforms other softeners with superior efficiency, reduced costs, half the brine, and twice the throughput.

**What is the Recoflo® Water Softener**

Eco-Tec’s Recoflo® Water Softener utilizes the next generation of ion exchange with compressed bed, counter-current technology. With the consistent philosophy of a simple package with proven reliability, the Recoflo® Water Softener produces softened water at lower operating and total installed costs.

The Recoflo® Water Softener can produce water with less than 0.1 mg/L total hardness using half of the brine required by other softeners. This high performance is the result of the rapid, proprietary, exchange kinetics of Recoflo®, that allows for the efficient use of brine and water while eliminating biological fouling.

**How Does the Recoflo® Water Softener Work?**

The Recoflo® Water Softener has proven, consistent performance with each of its key features offering up to 2 times higher throughput rates than other softeners:

**Short bed height and small resin volume**

Recoflo® resin beds are only 6 inches (15 cm) to 24 inches (60 cm) in depth, requiring only up to 15% of the resin volume required of conventional ion exchange systems.

**Low resin exchange loading**

Recoflo® uses less than 15% of the total exchange capacity of the resin compared to conventional ion exchange processes that use resin to near exhaustion.

**Fine mesh resin**

Recoflo® uses Eco-Tec specified resin with a resin bead particle diameter of one-quarter the size of resin used by conventional ion exchange systems.

**Compressed resin beds**

Recoflo® resin beds are at a state of compression at all times, with no freeboard.

**Counter-current regeneration**

Recoflo® uses counter-current regeneration to ensure that the cleanest and most effective, resin is at the bottom of the bed after regeneration.
<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-bed height</td>
<td>50% less floor space required and up to 70% less headroom</td>
</tr>
<tr>
<td></td>
<td>Better resin kinetics</td>
</tr>
<tr>
<td></td>
<td>Easy maintenance</td>
</tr>
<tr>
<td>Small resin volume</td>
<td>Better resin kinetics</td>
</tr>
<tr>
<td></td>
<td>Reduced replacement resin costs</td>
</tr>
<tr>
<td></td>
<td>Less time required for resin replacement</td>
</tr>
<tr>
<td>Compressed resin bed</td>
<td>Maximizes regeneration efficiency, ensures flow distribution,</td>
</tr>
<tr>
<td></td>
<td>reduces rinse requirements and provides longer resin life</td>
</tr>
<tr>
<td>Low resin exchange loading</td>
<td>Better resin kinetics</td>
</tr>
<tr>
<td></td>
<td>Resin efficiency</td>
</tr>
<tr>
<td></td>
<td>Longer resin life</td>
</tr>
<tr>
<td>Fine mesh resin</td>
<td>Better resin kinetics</td>
</tr>
<tr>
<td></td>
<td>Reduced cycle times</td>
</tr>
<tr>
<td></td>
<td>Stronger resin</td>
</tr>
<tr>
<td>Specifically designed piping</td>
<td>Eliminates “dead spots” and helps to prevent bacteria growth</td>
</tr>
<tr>
<td>Counter-current regeneration</td>
<td>Efficient resin</td>
</tr>
<tr>
<td></td>
<td>Effective resin rinsing</td>
</tr>
<tr>
<td>Pre-assembled, skid mounted</td>
<td>Easy installation</td>
</tr>
<tr>
<td>Full factory pre-testing</td>
<td>Fast installation</td>
</tr>
<tr>
<td>Fully automated</td>
<td>Remote monitoring</td>
</tr>
<tr>
<td></td>
<td>Reduced operator attention</td>
</tr>
</tbody>
</table>

### Why Use a Recoflo® Demineralizer?

**Operational impact through proven product quality with:**

- Operating cost savings
- Maintenance savings
- Time savings
- Installation savings
- Space savings
- Chemical consumption savings
- Waste reduction savings

**Contact Eco-Tec For More Details.**
Produced Water Treatment Systems

Advanced Filtration and Ion Exchange Softener Systems
Produced Water Treatment

Application

Extraction of heavy oil often involves the production of steam for injection into the formation (steam flooding, cyclic steam, SAGD). In order to minimize or eliminate the consumption of fresh water to feed steam generators, produced water (the water which comes to the surface along with the oil) is often treated and conditioned to a quality suitable for feed to a steam generator.

Once-through-steam-generators (OTSG) can generally be fed produced water which has been filtered and softened. In some cases, initial treatment for silica is also employed.

Problem

Produced water filtration and softening systems which have been used over the past several years often encounter one or all of the following problems:

• Poor Filtration Quality:
  Media filtration using nutshells or sand media generally do not sufficiently or consistently remove oil or suspended solids to adequate levels required for effective ion exchange softening. This results in fouling of the ion exchange softener resins, which in turn results in:
  • Reduction in soft water quality which can affect OTSG performance and maintenance requirements.
  • Increased chemical consumption (salt, acid, caustic) for softener regeneration to try to compensate for partially fouled resin.
  • Lower softener capacity due to shorter service runs, longer regeneration and cleaning procedures.
  • Increased maintenance costs and downtime in order to clean or replace fouled resin.

• High chemical (salt, acid, caustic) consumption due to the limitations of conventional ion exchange softener designs especially when treating produced water with high hardness or with high total dissolved solids (TDS).

• Safety concerns and costs related to handling hydrochloric acid and caustic which are often used for regeneration of weak acid cation (WAC) softeners.

• Large waste volumes produced during regeneration require disposal.

• Large equipment which requires considerable space and site assembly.

Solution

Eco-Tec’s Spectrum Micro-Media Filtration

Greatly improves the quality of filtered produced water to eliminate many of the problems related to softener fouling.

Eco-Tec’s RecoPur Ion Exchanger Softeners

Provide significant benefits in softener performance such as:

• 40-80% reduction in salt and waste for regeneration compared with conventional softeners treating an equivalent quality and quantity of water.

• Eliminate the use of acid and caustic for regeneration of WAC softeners.

• Compact, skid-mounted, factory assembled systems.

• Fully automated, easy to operate and maintain with easy adjustment to variable feed water conditions and effective in-situ resin cleaning.
**Spectrum Micro Media Filter**

*Superior filtration performance to eliminate many of the problems related to ion exchange softener fouling*

<table>
<thead>
<tr>
<th>Typical Filtrate Quality</th>
<th>Conventional Media and/or Nutshell Filters</th>
<th>Spectrum Plus Micro-Media Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Oil</td>
<td>2 - 5 ppm</td>
<td>&lt; 1 ppm</td>
</tr>
<tr>
<td>Suspended Solids</td>
<td>2 - 5 ppm</td>
<td>&lt; 0.2 ppm</td>
</tr>
</tbody>
</table>

- Conventional Nutshell filtrate contains significant particles in the 0-10 micron size range
- Spectrum removes virtually all particles > 2 micron and significantly reduces < 2 micron particles

**Superior Design**

**Conventional Nutshell Filter**

- Particle Size: 20 - 30 mesh
- Nutshell Media

**Spectrum Micro Media Filter™**

- Particle Size: 80 - 230 mesh
- Spectrum Micro Media

*N *Spectrum Plus filter is used with oily water and has nutshell coarse media. When very little oil is present, a Spectrum Filter with anthracite as coarse media is used.*

The layer of micro media has a very small particle size and acts as a barrier to small suspended solid particles. The Spectrum micro media is proprietary, inert, long-life (virtually permanent) media. It is much heavier in density than nutshells or sand which ensures that it reclassifies (resettles below the nutshells after backwashing) and is virtually impossible to backwash out of the filter vessel.

**Designed for simple, low cost operation**

- Media is effectively scoured using air or gas - no separate pumps or agitators are required
- 15 standard models ranging from 1,500 - 60,000 BPD (50 - 2,000 gpm, 11 - 450 m³/hr)
Recopur softeners use Eco-Tec’s proprietary Recoflo ion exchange process which improves the performance of ion exchange.

Recoflo has been used for over 40 years in a variety of industrial water treatment and chemical process applications with more than 1,500 systems installed worldwide.

Key features include:

- **Fine Mesh Resin**
  Finer mesh resin pack more surface area into the same volume

- **Compressed Short Resin Beds**
  Compressed resin beds promote uniform flow distribution and plug flow conditions.

- **Counter-current Regeneration:**
  With counter-flow regeneration, the brine passes in the opposite direction to the service flow water.

The combination of Recoflo features allow:

- High capacity, compact equipment.
- Production of high purity water.
- Low chemical consumption.
- Low waste production.
RecoPur Ion Exchange Softeners

A Variety of Softener Configurations:

SAC (Strong Acid Cation)

Features:
- Very simple system with compact footprint.
- Salt consumption is typically 30-60% less than conventional softeners.
- No need for two stage (SAC/SAC) to achieve performance.

Typical Application:
- Feed TDS < 12,000 ppm
- Feed Hardness < 1,200 ppm
- Softened Water Quality < 0.5 ppm

SAC/WAC
(Strong Acid Cation/Weak Acid Cation)

Features:
- Achieves very low hardness.
- Use only brine for WAC regeneration.
- Less brine consumption than SAC only configuration.
- No hydrochloric acid or caustic used.

Typical Application:
- Feed TDS < 14,000 ppm
- Feed hardness < 1,200 ppm
- Softened Water Quality < 0.2 ppm
RecoPur Ion Exchange Softeners

**A Variety of Softener Configurations:**

SAC/WAC/BDH
(Strong Acid Cation/Weak Acid Cation/Brine Dehardener)

Features:
- Achieves very low hardness.
- Uses less brine than SAC / WAC configuration so greater economy for larger capacity systems.
- Can be configured to any salt – even salt containing hardness
- No hydrochloric acid or caustic used

Typical Application:
Feed TDS < 14,000 ppm
Feed Hardness < 1,200 ppm
Softened Water Quality < 0.2 ppm

**How Is WAC Regeneration Achieved Using Only Brine?**

- Since WAC is only a polisher, it has low hardness loading.
- A large excess of brine is used for the WAC but the waste brine from the WAC is used directly to regenerate the SAC efficiently.
- Brine must contain low hardness by either using low hardness salt or by softening brine with the Brine Dehardener (BDH).

SAC/WAC Skid-mounted Softener
RecoPur Ion Exchange Softeners

A Variety of Softener Configurations:  
WAC/BDH(Weak Acid Cation/Brine Dehardener)

Features:
- Allows softening of very high TDS water.
- No hydrochloric acid or caustic required.

Typical Application:
Feed TDS < 25,000 ppm  
Feed Hardness < 800 ppm  
Softened Water Quality < 3 ppm

What is a Brine Dehardener (BDH)?
A Brine Dehardener (BDH) is a RecoPur ion exchanger (fine mesh resin, compact, packed resin bed) using a proprietary resin that can separate hardness salts (CaCl₂, MgCl₂) from brine (NaCl) using only water for regeneration. This allows waste brines to be treated and reused to minimize salt consumption and brine waste. The waste solution contains the dissolved hardness salts and can be injected into a waste well since it contains no solids.

Eco-Tec has supplied hundreds of water regenerated resin systems for acid-salt (APU) and salt-salt (SSU) separation.

Hardness removal from brine  
(separation of CaCl₂/MgCl₂ and NaCl)
Offering The Complete Package

Innovations

- Eco-Tec has been building Recoflo® ion exchange systems for industrial treatment and water purification applications since 1970 with more than 1,500 systems installed in over 55 countries
- Eco-Tec continues to develop product improvements and new processes with its in-house Research and Development facility

Quality Design and Construction

- ISO 9001 registered design and manufacturing facility in Pickering, Ontario
- Built to global industrial standards
- Compact, skid mounted (including resin installation) and wet tested at Eco-Tec’s ISO factory

Technical Service and Support

- On-site commissioning supervision, performance demonstration, and operator training
- Performance monitoring and technical support program (Eco-SERV™)
- 24/7 telephone access to technical services support
- Extensive spare parts inventory for next day shipment of most replacement parts

For more information, or to request a proposal, visit our website or contact:

Eco-Tec Inc.
1145 Squires Beach Road
Pickering, Ontario
Canada L1W 3T9
Phone: (1) 905-427-0077
Fax: (1) 905-427-4477
ecotec@eco-tec.com

Eco-Tec Solutions - India
No 5 City Center,
930 Synagogue Street, Camp,
PUNE, India 411 001
Phone: (91) (020) 64001056
Fax: (91) (020) 26052160
eco-tec@eco-tecsolutions.com

Prosep Technologies Limited
Unit 6A, Zone 4, Burntwood Business Park
Burntwood, Staffordshire
England WS7 3XD
Phone: +44(0)1543 675731
Fax: +44(0)1543 679484
ptl@eco-tec.com

www.eco-tec.com

Revised: 11 06 03

All statements, information and recommendations contained herein are, to our knowledge, true and accurate. However, no guarantee or warranty is given, expressed or implied. Nor shall any statement, information or recommendation constitute a representation unless set forth in an agreement signed by Eco-Tec. Recoflo is a registered trademark of Eco-Tec Inc. All rights reserved.