ADVANCED SOFTENING
MATERIAL
FOR PROBLEM WATER

SIMPLE SOLUTION
FOR 5 PROBLEMS

- hardness
- iron
- manganese
- natural organic matter
- ammonium

Used by water treatment companies globally since 1998
WHAT IS ECOMIX®

ECOMIX® is a composite water treatment technology protected by 6 patents and with a global successful track record since 1998.

ECOMIX® effectively purifies well water and municipal water from iron, manganese, hardness and natural organic matter.

ECOMIX® consists of five ingredients, including two patented materials.

ECOMIX® is compatible with normal softener hardware and regenerates with regular softener salt.

Milestones:
- 82 materials researched during development
- developed and patented in 1998
- 6 patents obtained
- NSF/ANSI and LFGB health certificates
- successfully marketed and used on 5 continents

Ecomix® purifies water from:
- hardness
- iron
- manganese
- natural organic matter
- ammonium
HOW ECOMIX® WORKS

Delivered and loaded as a single media in bags

Stratifies in five layers after regeneration

Regenerates with plain softener salt*

Top basket

Inert layer enhances backwash

FerroSorb unique
removes iron and manganese compounds

HumiSorb unique
removes natural organic matter and organic iron

Cation exchange resin softens water

Gravel distributes flow uniformly across the vessel

Bottom basket

Do not use resin cleaner salt or chemicals

Potassium chloride at a higher dosage can also be used
IRON AND MANGANESE REMOVAL

FerroSorb is a proprietary sorption material for iron and manganese reduction

Mechanism of iron and manganese reduction

ADSORPTION – OXIDATION – ACTIVE LAYER FORMATION – AUTOCATALYTIC OXIDATION

The process chain removes soluble ferrous iron from clear influent water.

The surface layer of FerroSorb beads also contains active sites for binding manganese.

For best results pre-treat with a sediment filter only.

Aeration and oxidative pre-treatment must be avoided.

Treat water against iron bacteria before installing ECOMIX®.
Organic compounds and organic iron are retained through hydrophobic and ionic interactions with HumiSorb matrix.

Determine chemical oxygen demand before using ECOMIX® to purify high organic color water.

ECOMIX® is intended for the treatment of well water as well as municipal tap water from tannins.

ECOMIX® is not intended for surface water treatment (water from lakes, ponds, rivers, marshes etc).

Water from shallow wells located in vicinity of surface water bodies should be tested for Chemical Oxygen Demand/Total Organic Carbon, and microbial counts.

Microbiologically unsafe water cannot be treated by ECOMIX®.
ECOMIX® REGENERATION

ECOMIX® is regenerated with the same regeneration sequence used with regular softeners:

1. backwash
2. slow brine rinse
3. fast rinse
4. brine tank refill

Calcium and magnesium ions are retained by the cation exchange resin, then displaced with sodium ions and flushed during brine regeneration.

Iron and manganese hydroxides are removed from FerroSorb by friction. The beads rub against one another when the bed becomes fluidized during backwash.

HumiSorb retains organic molecules and organic bound metals by ion exchange, then the impurities are displaced with chloride ions and flushed during brine regeneration.
EFFICIENCY AND LIMITATIONS OF ECOMIX®

<table>
<thead>
<tr>
<th>ECOMIX® P</th>
<th>ECOMIX® A</th>
<th>ECOMIX® C</th>
</tr>
</thead>
<tbody>
<tr>
<td>For well or tap water with stable composition</td>
<td>For well or tap water with moderate organics content</td>
<td>For well or tap water with high organics</td>
</tr>
</tbody>
</table>
| Requires stable quality of water | Handles seasonal variations in water composition | Handles seasonal variations in water composition without significant impact on treated water quality!

<table>
<thead>
<tr>
<th>Water Quality Parameter Limitations</th>
<th>ECOMIX® P</th>
<th>ECOMIX® A</th>
<th>ECOMIX® C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardness, mg/l CaCO₃</td>
<td>750</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>Iron, mg/l</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Manganese, mg/l</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Chemical Oxygen Demand, mg/l O₂</td>
<td>3</td>
<td>8 (reduced ~50%)</td>
<td>20 (reduced ~80%)</td>
</tr>
<tr>
<td>Ammonium, mg/l</td>
<td>Is not removed</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Service life, years</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

OPERATING CONDITIONS:

- pH 5–9
- No limits on influent hydrogen sulfide or anion content
- Active chlorine ≤ 1 mg/l
- TDS ≤ 4000 mg/l
### Key design parameters for ECOMIX® systems

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service flow rate</strong></td>
<td>20-25 m/h</td>
</tr>
<tr>
<td><strong>Backwash flow rate</strong></td>
<td>10-15 m/h</td>
</tr>
<tr>
<td><strong>Brine (slow rinse) flow rate</strong></td>
<td>3-5 m/h</td>
</tr>
<tr>
<td><strong>Minimum bed depth</strong></td>
<td>500 mm</td>
</tr>
<tr>
<td><strong>Recommended bed depth</strong></td>
<td>800 mm</td>
</tr>
<tr>
<td><strong>Freeboard</strong></td>
<td>40% or more</td>
</tr>
<tr>
<td><strong>Salt dosage per bed volume</strong></td>
<td>100 g/L</td>
</tr>
<tr>
<td><strong>Brine concentration</strong></td>
<td>8-10%</td>
</tr>
<tr>
<td><strong>Water usage per regeneration</strong></td>
<td>max. 10 bed volumes</td>
</tr>
</tbody>
</table>

Rust removal additives, resin cleaner salt, and other aggressive chemicals will affect performance of ECOMIX® and should not be used.

If using potassium chloride, increase salt dosage to 150 g/L.

ECOMIX® will not affect water pH.
### COMMONLY USED VESSELS

<table>
<thead>
<tr>
<th>Size of vessel</th>
<th>1035</th>
<th>1054</th>
<th>1252</th>
<th>1354</th>
<th>1465</th>
<th>1665</th>
<th>2162</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ecomix® volume, L</strong></td>
<td>25</td>
<td>37</td>
<td>50</td>
<td>62</td>
<td>75</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td><strong>Service flow rate, m³/h</strong></td>
<td>1.0</td>
<td>1.3</td>
<td>1.8</td>
<td>2.2</td>
<td>2.5</td>
<td>3.3</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>System capacity, kg, CaCO₃</strong></td>
<td>0.88</td>
<td>1.32</td>
<td>1.7</td>
<td>2.2</td>
<td>2.6</td>
<td>3.5</td>
<td>5.25</td>
</tr>
<tr>
<td><strong>Salt per regeneration, kg</strong></td>
<td>2.5</td>
<td>3.8</td>
<td>5.0</td>
<td>6.2</td>
<td>7.5</td>
<td>10.0</td>
<td>15.0</td>
</tr>
<tr>
<td><strong>Backwash flow rate, m³/h</strong></td>
<td>0.6</td>
<td>0.6</td>
<td>0.9</td>
<td>1.1</td>
<td>1.2</td>
<td>1.6</td>
<td>2.7</td>
</tr>
</tbody>
</table>

*ECOMIX® is supplied in two bag sizes:
- Bag — 0.88 cu. ft. (25L)
- Half bag — 0.42 cu. ft. (12L)*

Please pay attention to the **backwash flow rate** and choose the right **drain line flow control** (DLFC).

Visit [ecosoft.com/ecomix](http://ecosoft.com/ecomix) to use the ECOMIX® calculator.
VOLUME CAPACITY OF ECOMIX® SOFTENER

Volume capacity is calculated with only influent hardness and ECOMIX® IX capacity.

**Ion Exchange Capacity by Type**

- **ECOMIX® P** — 40 g CaCO₃ / L
- **ECOMIX® A** — 35 g CaCO₃ / L
- **ECOMIX® C** — 30 g CaCO₃ / L

**Volume Capacity, m³** = \[
\frac{\text{Quantity of Ecomix, L} \times \text{Ion Exchange Capacity, g CaCO}_3}{\text{Influent Hardness, mg/l CaCO}_3}
\]

Iron and manganese determinands are not necessary for calculating volume capacity of Ecomix unit.

Average service life is 5 years.
**ECOMIX® SETUP**

**Treated water**

**Input water hardness**
in control valve settings

**Regenerate after installation**

**Drain line**
tube diameter equal to tube drain connection and should not exceed 2.5 m. If longer, increase drain line tube diameter

**Sediment pre-filter**
PP cartridge filter for clear water
*For water with high turbidity and iron content (over 10 ppm) application of filter with Filter Ag media is recommended

**Feed pressure**
2.8-4.0 bar recommended

**Raw water**
ECOMIX® IN RESIDENTIAL ENVIRONMENT

**STANDARD SOLUTIONS**

1. Sediment filter for sand, rust and silt removal
2. ECOMIX® system for hardness, iron, manganese, natural organic matter & ammonium removal
3. Centaur activated carbon system for removal of hydrogen sulfide

**MULTISTAGE SOLUTIONS**
ECOMIX® IN COMMERCIAL AND INDUSTRIAL APPLICATIONS

ECOMIX® is used to treat raw water before reverse osmosis systems, to soften and reduce iron from boiler feed water, to purify utility water in hotels, apartment buildings and business centers.
The manufacturing process includes surface activation of FerroSorb and HumiSorb.

Digital control of ingredient mixing ensures consistent quality of finished product across batches.

ECOMIX® is certified in EU for compliance with LFGB requirements for food-contacting materials by TÜV SÜD.

ECOMIX® is certified in compliance with NSF/ANSI standards:
- NSF/ANSI 61 Drinking Water System Components – Health Effects
- NSF/ANSI 44 Residential Cation Exchange Water Softeners
- NSF/ANSI 372 Drinking Water System Components – Lead Content Scheme
ECOMIX® IN NUMBERS

- simple volume capacity formula requiring only raw water hardness
- high effectiveness regardless of water pH (5...9), H$_2$S presence, and anionic composition
- no acid, caustic, or deironing chemical products required for regeneration, just regular softener salt
- no oxidant pre-treatment required for iron and manganese removal
- no iron or manganese dumping if volume capacity is exceeded
- usable with ordinary water softeners
- low salt demand — typically 100...120 g NaCl per liter (6...8 lbs/ft$^3$) per regeneration
- low water demand — typically 5-10 bed volumes per regeneration
- NSF/ANSI and TÜV SÜD health certificates

ECOMIX® is not only a unique water treatment technology, ECOMIX® has been a firm foundation for sustainable development of numerous companies around the world.
SIMPLE SOLUTION
FOR 5 PROBLEMS

- hardness
- iron
- manganese
- natural organic matter
- ammonium

ECOMIX® is certified in compliance with NSF/ANSI standards

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meets the requirements
LFGB
EU Guideline 2002/72/EG

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