EVALED™
Evaporator and Crystallizer
Evaporation Technologies

Evaporation is not only a natural phenomenon but also a clean separation technology that has been recognized as a best available technique in several wastewater treatment processes. Veolia’s Evaled™ evaporators are industrial systems that help accelerate the natural evaporation process.

Evaled evaporators are low in energy consumption and also have a low CO₂ footprint. Capacities can range between 1-200 tons per day of industrial wastewater.

The Evaled* evaporators can achieve:
• disposal cost reduction
• high separation levels and outlet quality
• wastewater volume reduction
• water recycling and reuse
• ZLD (Zero Liquid Discharge)
• valuable components recovery

A world of advantages:
• standardized and modular units
• different reliable heat transfer technologies and sizes to fit better your needs
• low energy consumption
• low carbon footprint
• high automatization
• remote control modem
• can be combined with RO plant for ZLD projects
• different manufacturing materials to treat even the most aggressive effluents
• quality certification (ISO 9001/2008)

*All evaporators undergo a Factory Acceptance Test (FAT) with water three days before installation.

We have three different evaporation technologies to best fit our clients’ water treatment needs.

> Evaled PC – Heat Pump
> Evaled AC – Single or Multiple Effect Steam/Hot Water
> Evaled RV – Mechanical Vapor Recompression

Industries of application:
• Mechanical & Surface Treatments (automotive, aviation, appliances, parts for furniture)
• Healthcare (pharma, cosmetics)
• Chemical
• Waste, biogas, biofuels
• Photovoltaic & Microelectronics
• Food & Beverage
• Graphic Arts
• Power
• Oil & Gas
• Mining & Primary Metals
• Other industrial processes
EVAPLED PC Evaporators

The Evaled PC is the range of evaporators which uses a heat pump for the treatment of many different types of wastewater. This technology has been refined over many years in terms of flexibility, low energy consumption and reliability.

The PC range is available in two sets of series. Each using different heat transfer technologies.

> Evaled E Series

The E series is designed to produce maximum distillate quality with minimum capital and operating costs. The model consists of a compact skid-mounted unit that is easy to move.

It is controlled by a PLC that includes the functions of feed and discharge thus allowing for automatic operation and minimum supervision. All models are designed for continuous operation and require just electrical supply and compressed air.

These evaporators operate in a high vacuum condition with the boiling chamber pressure set at 5-6kPa (absolute vacuum) in order to save the thermal energy produced by the heat pump. This allows the boiling temperature of the wastewater to be approximately 40°C (104°F) which considerably reduces and/or eliminates the typical phenomena (scaling, precipitation, corrosion) that reduces performance.

> Evaled R Series

The R series evaporators have a heating system based on a heat pump and operate under vacuum at 5kPa and around 30°C (86°F).

Heat exchange occurs within a conical jacket, and the boiling chamber inside part is cleaned by internal scrapers that continuously stir concentrate. This configuration is designed to produce a concentrate with a final high concentration and a distillate with low conductivity.
_Evaled AC evaporators_

The Evaled AC range consists of single and multiple effect steam/hot water evaporators for industrial wastewater treatment. It utilizes low cost energy sources such as the ones from cogeneration plants.

The AC range is also available in two sets of series. Each using different heat transfer technologies.

> Evaled EW Series

The EW is a hot/cold water evaporator with forced circulation and an external shell and tube heat exchanger. The heat necessary to boil the wastewater is supplied by hot water running into the heat exchanger; the cooling necessary to condensate the steam is supplied by cold water running into the heat exchanger at the top of the boiling chamber.

> Evaled RW Series

The RW is a hot/cold water evaporator/crystallizer with a stirred and scraped heat exchanger surface that transfers heat by a heating jacket containing circulating hot water.

This series is designed to treat wastewater containing a high concentration of suspended and dissolved solids. For that reason, the boiling chamber wastewater is stirred continuously by an Archimedes screw type scraper thus preventing any fouling of the heat exchange surface.

The evaporator produces a recyclable distillate, free of dissolved salts, and a solid or semisolid concentrate with water content lower than 15%. The RW evaporator is designed to work both continuously and by batch, using either a pump to discharge the concentrate or by stopping the evaporation process by opening the front door and leaving the screw working.

With the addition of an optional intermediate heat exchanger, the RW evaporators can also utilize steam as a heat source.
The Evaled RV range consists of mechanical vapor recompression and forced circulation evaporators for industrial wastewater treatment. This range is ideal when large quantities of waste – which can cause fouling, precipitation and crystal formation – has to be treated.

The RV range is also available in two sets of series. Each using different heat transfer technologies.

> Evaled C Series

The C series is based on the mechanical vapor compression technology and uses a falling film heat exchanger. The falling film carries out the pre-concentration of the solution—up to 30% of the total dissolved solids. The distillate is continuously produced and discharged by both stages.

The main benefit of the falling film technique is the possibility of treating heat-sensitive products with very low temperature differences between the heat exchanger and the boiling liquid. Therefore, the liquid is not affected by any heat shock.

> Evaled F Series

The F series evolves from the MVR range, itself the pinnacle of technological excellence within every industry using water within its process. This series is designed to notably reduce the volume of wastewater and its disposal costs, and to stringently comply with the discharge limits imposed by the numerous environmental regulations worldwide. It utilizes forced circulation and mechanical vapor compression.
**Technical data**

<table>
<thead>
<tr>
<th>EVALED PC</th>
<th>E Series</th>
<th>E 700</th>
<th>E 1400</th>
<th>E2400</th>
<th>E4000</th>
<th>E6000</th>
<th>E 8000</th>
<th>E12000</th>
<th>E24000</th>
</tr>
</thead>
<tbody>
<tr>
<td>R Series</td>
<td>R 150</td>
<td>R 500</td>
<td>R 1000</td>
<td>R 2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVALED AC</td>
<td>EW Series</td>
<td>EW 20000</td>
<td>EW 40000</td>
<td>EW 30000</td>
<td>EW 60000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RW Series</td>
<td>RW 3000</td>
<td>RW 6000</td>
<td>RW 12000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVALED RV</td>
<td>F Series</td>
<td>F 15</td>
<td>F 40</td>
<td>F 60</td>
<td>F 120</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TC Series</td>
<td>TC 10000</td>
<td>TC 30000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Series</td>
<td>C 100</td>
<td>C 200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Materials**

Veolia, in co-operation with respected materials research centers, selects the most suitable materials for the safe management of aggressive liquids. The resistance to corrosion is the main feature of every Evaled evaporator. This is essential when dealing with extremely concentrated liquids.

> **Austenic stainless steel AISI 316L**  
* (Number: 1.4435 – X2 CrNiMo 18-14-3)  
Austenic weakly bound structure, non-hardening, non-magnetic. The low percentage of carbon in this alloy reduces the risk of intergranular corrosion at high temperatures.  
*Uses*: alkaline liquids, acid liquids (pH>4) with a low percentage of chlorides, oil emulsions, liquids from flexographic printing.

> **Superduplex stainless steel**  
* (Number: 1.4410 - X2 CrNiMo 25-7-4)  
Austenic-ferritic structure, magnetic. The high percentage of chromium gives excellent resistance to localized corrosion.  
*Uses*: acidic liquids (pH>3) with high chlorides and metals content, galvanic wastewater, landfill leachate.

> **Nickel alloy**  
* (Number: 2.4819 – NiMo 16 Cr15 W)  
High flexibility Cr-Ni-Mo steel. The low carbon content ensures resistance to the formation of carbides at zones exposed to thermal variation. It has excellent resistance to localized corrosion, both in oxidizing and reducing environments, even at high temperatures.  
*Uses*: very acid liquids (pH>2) with high content of chlorides, fluorides and metal, anodizing wastewater, special applications.

> **Silicon Carbide (SiC)**-  
*PC type only (KT-Series)*  
Chemically inert material resistant to almost all aggressive substances, usually matched with another chemically inert material, PTFE, a fluoride co-polymer used for coating the inner surfaces of the boiling chamber.  
*Uses*: pickling wastewater, galvanic wastewater, and aggressive liquids.
Resourcing the world