Enviro-Chem Systems has been a leader in the design and construction of sulfuric acid plants for the last 60 years, with over 740. Monsanto designed plants built in 56 countries around the world. Since 1979, we have designed and built over 175 shell and tube acid coolers for all applications in sulfuric acid. Our close association with the operation of these plants and our understanding of specific issues involved in optimizing efficiency and reliability has allowed us to design equipment that answers the concerns about each individual plant. This is the same approach we have taken in designing our acid coolers. The unique advantage of being able to offer a total systems approach to all plant equipment has made us the world leader in responding to acid cooling concerns. Our focus is to engineer solutions first and then offer equipment to meet those goals.
Every cooler we build is designed to meet your specific process conditions. The selection of materials is a critical step in ensuring trouble-free service from both the cooling water and the process sides of the cooler. To meet these goals, we have developed several materials with the appropriate characteristics for all applications.

Enviro-Chem coolers have been used successfully in the following services:

- Boiler Feedwater Preheaters
- Seawater Coolers
- Heat Recovery Systems
- Conventional Cooling Tower Water Systems
- Brackish Water
- River Water

Enviro-Chem offers both anodically protected and non-anodically protected coolers for all sulfuric acid cooling applications. The choice of coolers is dictated by process conditions, economics and customer preference.

Remote monitoring and support capability
FEATURES OF THE ENVIRO-CHEM ANODICALLY PROTECTED ACID COOLER

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>BENEFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display</td>
<td>Color graphics display with touchscreen, presenting all electrode readings and control parameters for multiple coolers concurrently. Voltage and current readings trended and displayed graphically, providing operating history.</td>
</tr>
<tr>
<td>Controller</td>
<td>Alarm and control set points changed by simply touching the screen. Critical set points are password protected to avoid tampering. Self-diagnostics provide quick identification and recovery remote diagnostic and support available.</td>
</tr>
<tr>
<td>Power Pac</td>
<td>A single enhanced Power Pac to passivate large coolers High reliability and minimal maintenance.</td>
</tr>
<tr>
<td>Reference Electrodes</td>
<td>Three reference electrodes provide accurate readings over the entire cooler area.</td>
</tr>
<tr>
<td>Cathode Seal</td>
<td>Special &quot;O&quot; ring seal provides total protection against leaks and offers easy removal.</td>
</tr>
<tr>
<td>Nozzle Cathode</td>
<td>Separate control for nozzle cathode to balance passivation.</td>
</tr>
<tr>
<td>Components</td>
<td>All components conform to US and International standards.</td>
</tr>
<tr>
<td>Options</td>
<td>Stand alone and DCS control packages available.</td>
</tr>
</tbody>
</table>

Anodic Protection (A/P).

Ferrous metals can have their corrosion rates significantly reduced in certain environments by applying direct current to make them an anode in an electrical system. In an anodically protected acid cooler, the wetted acid surfaces (shell and tubes) are maintained at the proper voltage potential. This creates a passive film that reduces the corrosion rate as depicted by the polarization curve below. Enviro-Chem A/P coolers installed to date have exhibited corrosion rates of well below 1 mpy (.025 mm/yr).

TYPICAL POLARIZATION CURVE
NON-ANODICALLY PROTECTED ACID COOLERS

We also offer non-anodically (non A/P) protected acid coolers for all applications. At Enviro-Chem, we have carefully examined, tested and developed several alloys for their corrosion performance in sulfuric acid. Some of these alloys are being used in our non-anodically protected acid coolers. With our knowledge and expertise, we have provided many non A/P cooler installations where corrosion rates of less than 1 mpy (.025 mm/yr) have been realized. These coolers require no electrical components and subsequently require less maintenance. An additional advantage of the non A/P cooler is that the passive film is less sensitive to acid velocity. As a result, we can obtain higher heat transfer coefficients with lower cooler surface area.

CUSTOMER SERVICE AND SPARE PARTS:

Technical service is available to all of our customers through our marketing and technical services department. Assistance for start-ups and turnarounds, training, and maintenance service is readily available. Spare parts for all of our coolers are shipped with short lead times with critical parts stocked for immediate shipment. The Enviro-Chem quality commitment to you: All our coolers are designed and built to meet or exceed TEMA “C” and ASME standards for heat exchangers and pressure vessels. The tube to tube sheet joint is unique in the methods we utilize to ensure the integrity of this joint. Enviro-Chem subjects all of our coolers to stringent quality control tests above and beyond those required by code to guarantee their integrity and reliability. We constantly strive for the optimum design to maintain the delicate balance between performance and cost that will give you the best overall solution to your cooling requirements. As a technology-based company, our strength lies in providing the best technology available. Our charter and commitment to you is to maintain this goal.

ENVIRO-CHEM SYSTEMS
Monsanto

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