Vortex Technology Improves Plant Safety and Measurement in Chlor-Alkali Electrolysis Cells

RESULTS

- Minimized leak points for improved plant safety
- Improved process efficiency
- Improved measurement reliability

The all-welded design reduced the number of potential leak points, increasing plant and environmental safety.

APPLICATION

Mercury flow in a chlor-alkali electrolysis cell

CUSTOMER

A global chemical company

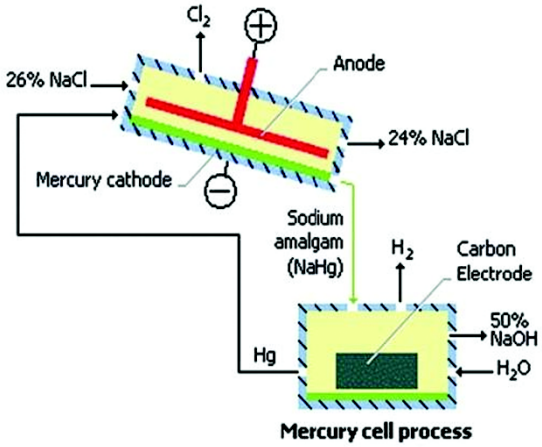
CHALLENGE

This chemical company had problems with inaccurate measurements of mercury needed to complete the electrolysis process. Accurate measurements are critical to maintaining the continuity of the cathodic membrane, prevent costly shutdowns due to explosion, and increase environmental safety. The cathodic membrane is needed to continuously and efficiently remove the sodium ions from the solution, which optimizes the separation process by reducing the hydrogen concentration in the cell.

Because mercury is a toxic substance, this company needed to minimize leak points in order to provide a safe work environment, and minimize the negative impact mercury has on the environment. In addition, safety needed to be ensured by reducing hydrogen present in the cell. This reduces the potential for an explosion.

Mercury cell electrolysis was the first method used to produce chlorine on an industrial scale. Titanium anodes are located above a liquid mercury cathode and a solution of sodium chloride is positioned between the electrodes. When an electrical current is applied, chloride is released at the titanium anodes and the sodium dissolves into the mercury cathode forming an amalgam.

After absorbing the sodium, the mercury amalgam is regenerated into mercury by reacting with water. This produces hydrogen and sodium hydroxide, which are also sold as by-products. If the mercury membrane breaks, the concentration of hydrogen in the cell can increase to potentially dangerous levels, creating an explosion.



Schematic of Mercury Cell Electrolysis Process

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SOLUTION

The Rosemount 8800 Vortex Flowmeter has an all welded, non-clog design which allowed this customer to minimize the number of leak points in the process. In addition, the mass balanced sensor design and Adaptive Digital Signal Processing (ADSP) of the Rosemount 8800 Vortex Meter provided a more reliable signal than the previously installed meter.

Lastly, in the event of a sensor failure of the vortex meter, the Rosemount 8800 meter design allows the sensor to be replaced without shutting down the process. This facilitates increased safety of the electrolysis cell as the mercury can still be fed into the cell while the sensor is being replaced.

Thus, safety is ensured, process efficiency is increased, and overall measurements are accurate.

The Rosemount 8800 Vortex Flowmeter provided a more reliable signal allowing for better process control and optimization.

RESOURCES

Emerson Process Management Chemical Industry

http://www2.emersonprocess.com/en-US/industries/Chemical/Pages/index.aspx

Rosemount Vortex Flowmeters

http://www2.emersonprocess.com/en-US/brands/rosemount/Flow/Vortex-Flowmeters/Pages/index.aspx

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Emerson Process Management
Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA
www.rosemount.com
Tel (USA) +1 800 522 6277
Tel (International) +1 (303) 527 5200
Fax +1 (303) 530 8459

Emerson Process Management
Blegistrasse 23
P.O. Box 1046
CH 6341 Baar
Switzerland
Tel +41 (0) 41 768 6111
Fax +41 (0) 41 768 6300

Emerson FZE
P.O. Box 17033
Jebel Ali Free Zone
Dubai UAE
Tel +971 4 811 8100
Fax +971 4 886 5465

Emerson Process Management Asia Pacific Private Limited
1 Pandan Crescent
Singapore 128461
T (65) 6777 8211
F (65) 6777 0947
Enquiries@AP.EmersonProcess.com

Emerson Process Management Latin America
Multipark Office Center
Multipark Office Center
Turrubares Building, 3rd & 4th floor
Guachipelin de Escazu, Costa Rica
T+(506) 2505-6962
international.mmicam@emersonprocess.com

ROSEMOUNT®

For more information:
www.rosemount.com

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