eco-Tec
A Kovalus Company

AnoPur™ Acid Purification System

A Comprehensive Solution for Sulfuric Acid Purification in Aluminum Anodizing

A Holistic Ion Exchange Offering

KOVALUS SEPARATION SOLUTIONS™ (KSS) is a global leader in innovative process separation technology. Kovalus has a comprehensive portfolio of advanced separation technologies, including membrane filtration, ion exchange, and thermal separation solutions to address the world's most complex processing challenges, delivering excellence and innovation across many markets.

Eco-Tec, a Kovalus Separation Solutions company, is a leader in the ion exchange industry for over 50 years. With expertise in water treatment, acid recovery and lithium brine purification, Eco-Tec delivers innovative ion exchange solutions across various sectors. Eco-Tec's ion exchange technology is the proprietary Recoflo® column design – a unique short, packed configuration for smaller footprint ion exchange systems with higher operational efficiency and separation performance.

Our capabilities extend beyond ion exchange technology to include:

- **Process Design:**
  With over 60+ years of expertise, we design ion exchange solutions tailored to your specific requirements, ensuring optimal efficiency and performance for your operation
- **Equipment Design and Fabrication:**
  Manufacturing high-quality equipment, built for durability and optimized to handle your demands with precision
- **Equipment Installation:**
  With over 10,000 global installations, we have regionally experienced professionals located throughout the globe to ensure your system is up and running efficiently and on schedule
- **Process Commissioning:**
  Comprehensive testing and commissioning to confirm that your treatment system meets all regulatory standards and operates at peak efficiency from day one

By integrating these services with our ion exchange and membrane technologies, Kovalus provides a holistic solution that ensures regulatory compliance, operational efficiency, and sustainability. From design through installation and beyond, Kovalus delivers innovative, reliable, and cost-effective solutions to tackle the toughest ion exchange challenges.

A Comprehensive Sulfuric Acid Purification Solution

Benefits

- Reduced sulfuric acid purchases
- Less process downtime
- Reduced neutralization and disposal costs
- Lower discharge of dissolved salt
- Improved anodize finish consistency
- Increased productivity
- Lower energy requirements & operating costs

Standard Features

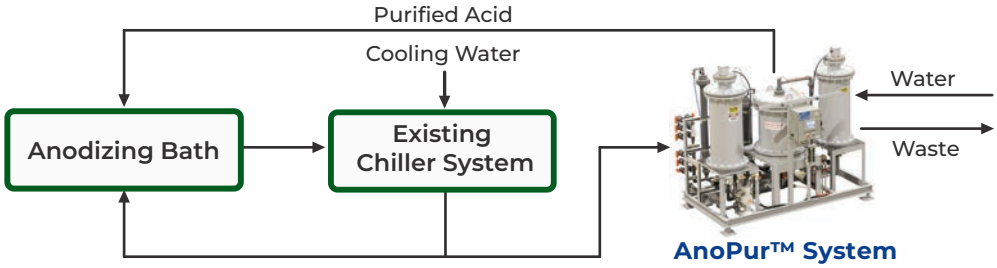
- Frame mounted, dual stage cartridge filters and diaphragm feed pump for feed acid
- 24V control panel with graphics
- Skid-mounted design with all piping and valves on a steel frame
- Remote start/stop (24V signal required)
- Spare parts kit

The AnoPur™ unit is a small, skid-mounted device that connects directly to an anodizing tank to continuously remove aluminum as it is dissolved in sulfuric acid. The system relies on Eco-Tec ion exchange resin technology to effectively remove metal contaminants and purify and recycle sulfuric acid.

The system first pumps filtered acid through the resin column to separate the acid and metal salt contaminants, which is followed by a water wash through the column to recover and recycle over 95% of the free acid back to the anodizing bath. This process reduces neutralization costs of the decanted bath solution and eliminates bath dumping. It offers greater safety to the operator by way of less acid usage and handling. Product quality, productivity, and process predictability are enhanced by controlling variable fluctuations in metal concentrations within the bath solution.

The AnoPur unit is available in six standard models and is easily installed. The system includes a control panel with a simple PLC and optional manual valves for both feed and product, as well as mounting hardware. A Mobile Kit is available for select models to make the AnoPur unit portable.

AnoPur Unit Typical Process



Average Capacities

Model #	Aluminum Removal (g/h)				Flowrate (L/h)	
	@ 6 g/L	@ 8 g/L	@ 10 g/L	@ 12 g/L	Bath Recirculation	Water Consumption & Waste
D10A	595	795	995	1,195	410	130
D11A	860	1,140	1,430	1,715	595	190
D13A	1,525	2,035	2,540	3,045	1,055	335
D15A	2,370	3,160	3,950	4,740	1,650	525
D8A+	140	180	230	275	110	57
D11A+	305	410	515	615	245	130

Note: Listed flowrates correspond to solution temperatures >10°C. Rates at temperatures between 0° - 10°C are reduced by 25%. Removal rates vary with the aluminum level; The AnoPur system can treat any level between 6 – 20 g/L. Models D8A+ and D11A+ are used where additive recovery is desired. Additives recovered include typical organic acids used to inhibit burning, such as oxalic and glycerin/glycolic acids. For applications where the anodizing solution is operated between 0°C – 4.5°C, a cold temperature adder is required. Temperatures below 0°C cannot be utilized with the AnoPur system.

Process Specifications

Model #		AnoPur Stream		
	Constituent	Feed (g/L)	Recovered Acid (g/L)	Waste (g/L)
D10A D11A D13A D15A	Sulfuric Acid	160	154	16
		240	232	24
	Aluminum	6.0	4.6	4.6
		8.0	6.1	6.1
		10.0	7.6	7.6
		12.0	9.1	9.1
D8+A D11+A	Sulfuric Acid	160	157	5
		240	235	8
	Aluminum	6.0	4.7	2.4
		8.0	6.3	3.2
		10.0	7.9	4.0
	Additive	20 – 24	18 – 22	3.6 – 4.4

Average Sulfuric Acid Savings

Costs	Bath Dumping	AnoPur Installed
Acid lost by dumping	62%	7%
Acid used to dissolve aluminum	26%	26%
Acid lost by dragout	12%	12%
AnoPur savings	--	55%

Basis: Class II coating (0.4 mil) – 20 minutes @ 129 amps/m² (12 ASF). Dissolving rate = 7 g/m2 (1.4 lbs per 1,000 ft2). Dragout rate = 0.1 L/m² (2.5 U.S. gallons per 1,000 ft²). Sulfuric acid at start = 180 g/L Al. Aluminum at time of bath dumping = 12 g/L Al. Aluminum with AnoPur™ installed = 10 g/L.

Mechanical Specification

Model #	Footprint (L x W x H)	Electricity (110/220, 1, 50/60)	Comp. Air (5.3 bar/80 psig)	Water (2 bar/30 psig)
D8+A	112 cm x 94 cm x 181 cm / 44 in x 37 in x 71 in	5 amps	8.5 m^3/h (5.0 SCFM)	500 L/h (2.1 SGPM)
D10A			30 m^3/h (17 SCFM)	995 L/h (4.4 SGPM)
D11A	229 cm x 135 cm x 193 cm / 90 in x 53 in x 76 in		46 m^3/h (27 SCFM)	1430 L/h (6.3 SGPM)
D11+A			34 m^3/h (20 SCFM)	1100 L/h (4.8 SGPM)
D13A			62 m^3/h (36 SCFM)	2540 L/h (11.2 SGPM)
D15A			84 m^3/h (49 SCFM)	3970 L/h (17.5 SGPM)

Note: No provision has been made for the removal of oil, grease, or submicron particles from the anodizing bath solution or water fed to the AnoPur unit. Air supply must be clean, dry, oil-free and filtered to 40 microns (air filters can be supplied, if required, at additional cost). Water supply should contain <200 mg/L TDS, <135 ppm total hardness, and must be clean (i.e. municipal source filtered to 1 micron).

Choosing the Best AnoPur Unit for Your Needs

It is simple to select the AnoPur™ unit that best suit your needs. Our team of experts can assist you given your unique process specifications. Information collected and examined for this purpose includes:

- **Operating hours per week**
- **Dump volume per week**
- **Dump aluminum level**
- **Production output**
- **Anodize time**
- **Current density**

1) Determine the aluminum buildup rate using the guide below. There are two methods available to calculate the buildup rate - **Bath Dump Method** and **Production Data Method**.

2) Select an AnoPur unit from the performance specifications chart. Choose a unit that provides enough metal removal capacity to offset the buildup rate.

Required Information

- Operating hours per week
- Dump Volume (g/l)
- Dump Aluminum Level (g/l)
- Production (m^2/h)
- Anodize Time (minutes)
- Current Density ($amps/m^2$)

Conversion Factors

- Multiply gallons by 3.78 to get liters
- Divide ft^2/hr by 10.76 to get m^2/hr
- Multiply $amps/ft^2$ by 10.76 to get $amps/m^2$

Bath Dump Method

$$\frac{\textit{Dump Volume (l/week)} \times \textit{Dump Aluminum Level (g/l)}}{\textit{Operating hours per week}} = \textit{Build up rate (g/h)}$$

Note: Accuracy is important - remember to include any partial decant volumes. Ensure that your numbers reflect normal or expected production demands.

Production Data Method

$$0.25 \times \textit{Anodize time (minutes)} = \textit{Dissolving Factor } (g/m^2) \times \textit{Production } (m^2/h) = \textit{Build up rate (g/h)}$$

Note: This method assumes a standard dissolution rate of 15 grams of aluminum per square meter of production per hour of anodizing time. Your current density must be 100 - 150 $amps/m^2$. This method is not valid with alternating current (pulse) rectifiers.

Kovalus Separation Solutions™

We are excited to introduce Kovalus Separation Solutions, formerly Koch Separation Solutions. This evolution marks a pivotal moment for us as we continue our journey of pioneering advancements in separations technology. We're revolutionizing the field of separations through cutting-edge technologies like membrane filtration, ion exchange, evaporation, and drying. With over six decades of expertise, we provide comprehensive solutions for demanding applications in food and beverage, life sciences, and general industry sectors. Our extensive membrane portfolio features a range of pore sizes, enabling us to handle diverse process fluids, water, and wastewaters effectively. Collaborating with clients worldwide, we specialize in recovering high-value products, minimizing waste, reducing environmental footprint, enhancing productivity, and optimizing costs.

Kovalus Customer Support

We've got you covered with Kovalus support

With Kovalus-qualified personnel, we offer tailored expertise throughout the life cycle of your membrane filtration system, ensuring optimal performance, protecting your investment, and maximizing process efficiency. Our KSS ASSIST ™ program provides proactive site visits, remote monitoring, and operator training to keep your system running at peak levels, backed by global service and support. We're dedicated to delivering faster, more efficient solutions, forming lasting partnerships, and exceeding your expectations.

Additionally, we offer

The SepTrac™ Smart System which seamlessly integrates with any KSS system to collect live data, send notifications and alerts, store documentation, and manage influent logs, all while offering easy access to our customer service teams.

REACH US

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