

high efficiency ~ simple package ~ proven reliability

AnoPur™

Acid Purification for Aluminum Anodizing Processes

Achieve maximum recovery, maximum cost reduction, and maximum quality consistency with Eco-Tec's acid purification system, AnoPur™



AnoPur™

Since 1976, large anodizers everywhere have used a system called the APU® to purify anodizing solutions. Now, all the benefits of the APU® are available to the smaller anodizer in a cost effective, pre-engineered design.

What is an AnoPur™?

The AnoPur™ System is a small, skid mounted device that connects directly to an anodizing tank, continuously removing aluminum as it is dissolved. The AnoPur™ unit has the flexibility to be connected to one tank or several tanks. It employs a simple PLC (programmable logic controller) in a control panel that uses a graphical display to indicate what the unit is doing at any given time.

The heart of the AnoPur™ unit is a column of ion exchange resin that can absorb acid while rejecting metal salts to waste. The acid is recovered from the resin using a simple water wash.

Why use an AnoPur™?

When aluminum is anodized, a portion of the metal dissolves into the sulfuric acid solution used in the anodizing tank. The aluminum gradually accumulates in the tank and, eventually, the solution must be dumped and replaced with fresh acid. An alternative solution is continuous purification. There are a number of benefits that can be realized by continuous purification:

- reduction in sulfuric acid purchases
- fewer line shutdowns
- reduced treatment and disposal costs
- lower discharge of dissolved salt
- improved anodize finish consistency
- simplified coloring
- reduced electrical and cooling requirements.

How does the AnoPur™ System Work?

A diaphragm pump mounted on the AnoPur™ unit transfers anodizing solution from the bath, through dual stage cartridge filters, to a storage reservoir located on the unit.

An AnoPur™ cycle consists of two basic steps. During the first step, filtered acid is pumped through the resin column. While the acid is absorbed by the resin, metal salt solution passes through the column to waste.

During the second step, water is pumped through the column, removing the acid. This acid stream is returned to the anodizing bath being treated. The cycle lasts two to five (2-5) minutes.

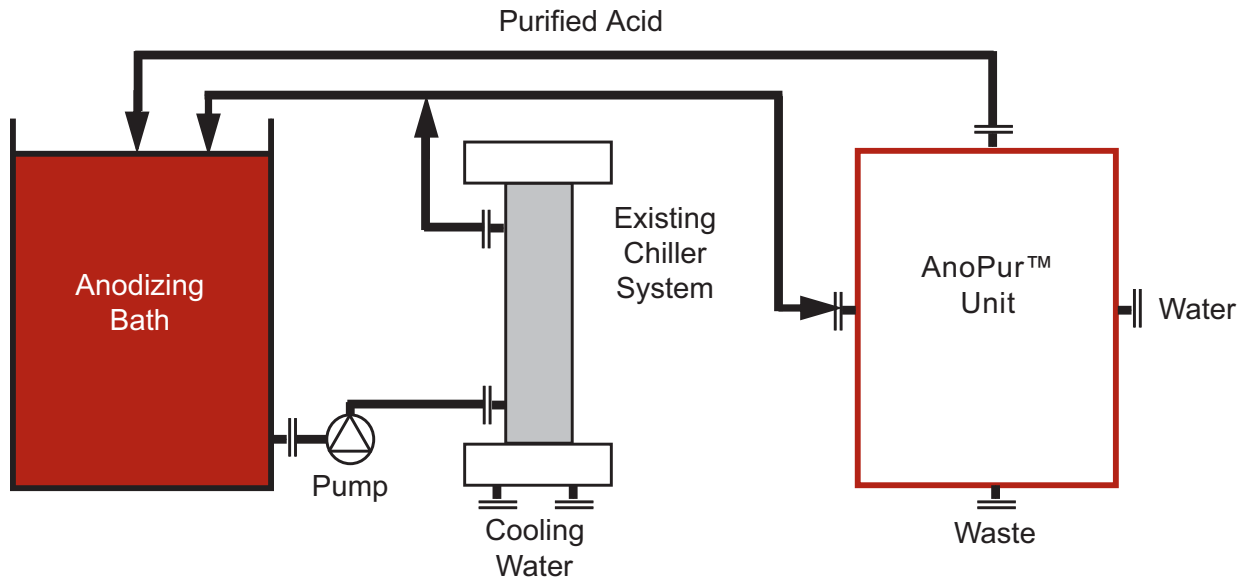
Control panels with simple PLCs employ graphical displays that indicate what the System is doing at all times. The panels have provisions for remote on/off switching.

AnoPur™ Flexibility

With the **Multi-Tank Selector Manifold**, an operator can conveniently select one of up to six (6) different tanks for purification. The manifold consists of six (6) sets of manual valves, each set consisting of valves for both the feed and product lines. The manifold is supplied with mounting hardware and instructions for easy hook-up.

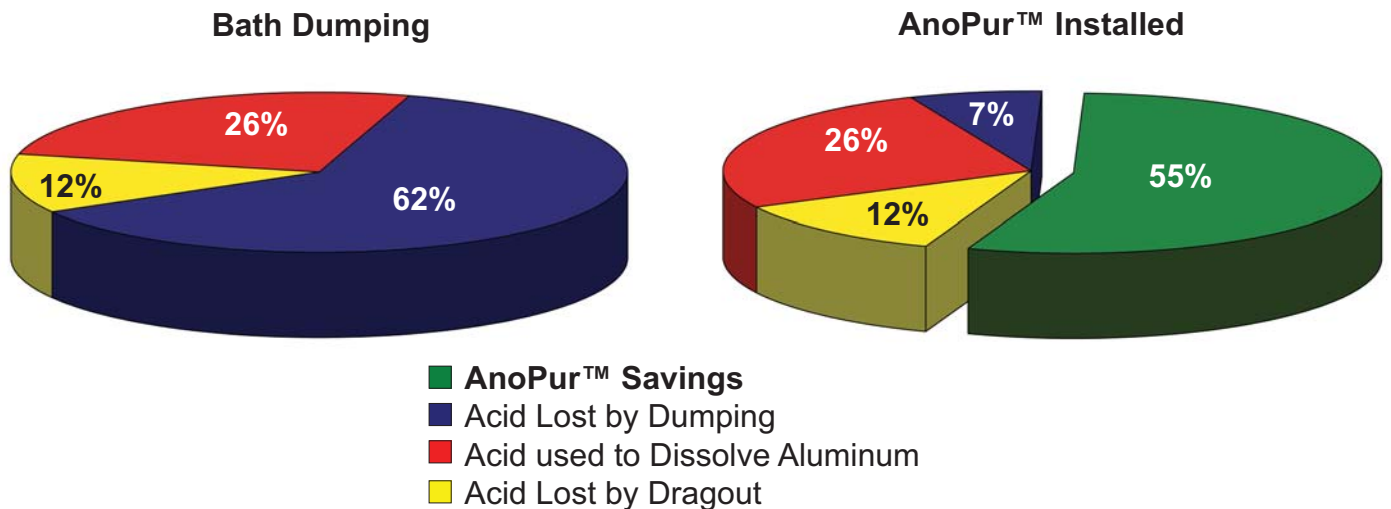
The **Mobile Kit** includes all the necessary items required to make the AnoPur™ unit completely portable. This option is available for the D8+ - D10 mode ls. Wheels, push handles, hoses and quick connect air fittings are supplied with mounting hardware and instructions for easy installation.

AnoPur™ Process Flow



Cost Savings

It is easy to work out the savings you can expect with the installation of an AnoPur™ System. Savings will vary depending on a number of factors such as hours of operation, chemical costs, and disposal methods. These charts show what happens to anodizing acid costs before and after installing the AnoPur™ System.



Basis:

- Class II coating (0.4 mil) - 20 minutes @ 129 amps per sq. meter (12 ASF)
- Dissolving rate = 7 grams per sq. meter (1.4 lbs per 1000 sq. feet)
- Dragout rate = 0.1 liters per sq. meter (2.5 US gals per 1000 sq. feet)
- Sulfuric acid = 180 g/l Aluminum = 12 g/l at time of dump
- Sulfuric acid = 180 g/l Aluminum = 10 g/l with the AnoPur™ System

Remember that the AnoPur™ System also makes it easier to achieve consistent finishes, so you may wish to factor in an allowance for reduction in re-work.

Installation and Use

Prior to shipment of the System, detailed operating manuals will be mailed out. These manuals include easy to understand installation instructions that offer helpful details on locating the system, piping and wiring. Installation and startup of an AnoPur™ System is simple and straightforward.

- Remove the crate and packing materials.
- Move the AnoPur™ System into position.
- Attach any pipework that has been removed for shipping purposes.
- Connect single phase electrical supply, 5.5 bar/ 80 psig air supply and water supply.
- Install piping
 - to and from the anodizing tank
 - for the waste line.
- After hookup is complete, the system can be started. The manual includes checklists and troubleshooting guides.
- **No special adjustments are required as the system is fully tested and calibrated prior to shipment.**



Routine monitoring is recommended and logsheets are provided for this purpose. Preventative maintenance schedules are also included in the manual.

Regular maintenance primarily involves filter cartridge replacement. The replacement frequency is difficult to predict as solids levels vary from plant to plant. The System is supplied with replacement parts kit that includes a supply of cartridge filters.

AnoPur™ Systems also include free access to 24/7 customer service. Onsite training and assistance are available, and a full stock of replacement parts can normally be shipped within twenty-four hours.

Selecting the Appropriate AnoPur™

It is simple to select the right AnoPur™ for your needs.

- 1) Determine the metal buildup rate using the guide below.
- 2) Select an AnoPur™ unit from the performance specifications chart on the following page. Choose a unit that provides enough metal removal capacity to offset the buildup rate.

<h3 style="margin: 0;">Required Information</h3> <p>a) Operating hours per week _____</p> <p>b) Dump Volume (l/week) _____</p> <p>c) Dump Aluminum Level (g/l) _____</p> <p>d) Production (m²/h) _____</p> <p>e) Anodize Time (minutes) _____</p> <p>f) Current Density (amps/m²) _____</p> <p>* Three methods are available to calculate the aluminum buildup rate.</p> <p><u>Conversion Factors:</u></p> <p>i) multiply gallons by 3.78 to get liters</p> <p>ii) divide ft²/hr by 10.76 to get m²/hr</p> <p>iii) multiply amps/ft² by 10.76 to get amps/m²</p>	<h3 style="margin: 0;">1. Bath Dump Method</h3> <p>Dump Volume (l/week) _____</p> <p>x</p> <p>Dump Aluminum Level (g/l) _____</p> <p>÷</p> <p>Operating hours per week _____</p> <p>=</p> <p>Build up rate (g/h) _____</p> <p>Note:</p> <ul style="list-style-type: none"> Accuracy is important; remember to include any partial decant volumes. Ensure that your numbers reflect normal or expected production demands.
<h3 style="margin: 0;">2. Production Data Method</h3> <p>0.25</p> <p>x</p> <p>Anodize time (minutes) _____</p> <p>—</p> <p>1.0</p> <p>=</p> <p>Dissolving Factor (g/m²) _____</p> <p>x</p> <p>Production (m²/h) _____</p> <p>=</p> <p>Build up rate (g/h) _____</p> <p>Note:</p> <ul style="list-style-type: none"> 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/m². This method is not valid with alternating current (pulse) rectifiers. 	<h3 style="margin: 0;">3. Current Density Method</h3> <p>0.0024</p> <p>x</p> <p>Anodize time (minutes) _____</p> <p>x</p> <p>Current Density (amps/m²) _____</p> <p>—</p> <p>1.0</p> <p>=</p> <p>Dissolving Factor (g/m²) _____</p> <p>x</p> <p>Production (m²/h) _____</p> <p>=</p> <p>Build up rate (g/h) _____</p> <p>Note:</p> <ul style="list-style-type: none"> This method assumes that a constant portion (40%) of the current used in the anodizing process results in aluminum dissolution. Your current density must be 100 - 150 amps/m². This method is not valid with alternating current (pulse) rectifiers.

AnoPur™ Performance Specifications

Typical Unit Capabilities

Model Number	Aluminum Removal (g/h)				Flowrates (l/h)	
	@ 6 g/l	@ 8 g/l	@ 10 g/l	@ 12 g/l	Bath Recirculation	Waste
D10A	595	795	995	1195	410	130
D11A	860	1140	1430	1715	595	190
D13A	1525	2035	2540	3045	1055	335
D15A	2370	3160	3950	4740	1650	525
D8A+	140	180	230	275	110	57
D11A+	305	410	515	615	245	130

Notes:

- Removal rates vary with the aluminum level. AnoPur™ can treat any level between 6-20 g/l.
- Models D8+ and D11+ are used where additive recovery is desired. Additives recovered include Novamax SC-700, SC-705 and Anomax, Sandoz Anodal EE, and Reynolds MAE formulations.
- For applications where the anodizing solution is operated cold (0°C to 4.5°C), a cold temperature adder is required. Temperatures below 0°C can not be utilized with AnoPur™.

Typical Stream Compositions with the AnoPur™ System (Models D10A - D15A)

AnoPur™ Stream	Composition (g/l)					
	Sulphuric Acid		Aluminum			
Feed	160	240	6.0	8.0	10.0	12.0
Recovered Acid	154	232	4.6	6.1	7.6	9.1
Waste	16	24	4.6	6.1	7.6	9.1

For Additive Recovery (Models D8A+, D11A+)

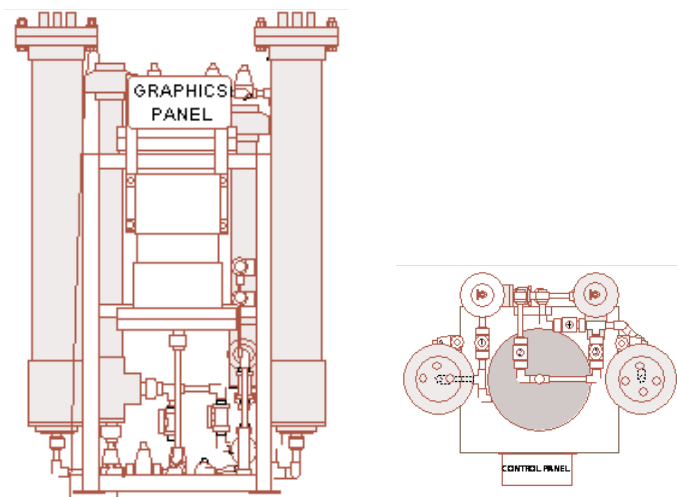
AnoPur™ Stream	Composition (g/l)					
	Sulphuric Acid		Additive	Aluminum		
Feed	160	240	20-24	6.0	8.0	10.0
Recovered Acid	157	235	18-22	4.7	6.3	7.9
Waste	5	8	3.6-4.4	2.4	3.2	4.0

Specifications

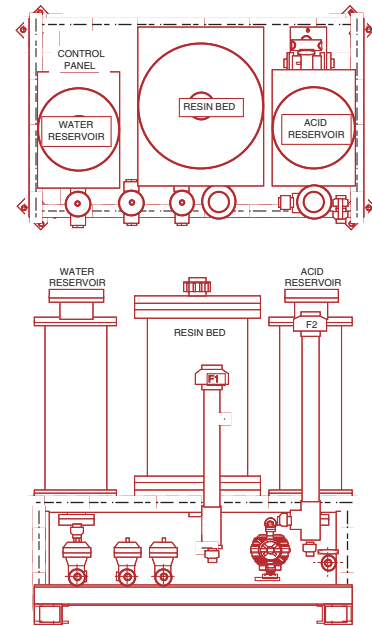
The Eco-Tec AnoPur™ System includes:

- 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
- operating & maintenance manuals (3)
- spare parts kits
- remote start/stop (24v signal required)

D8-D10



D11-D15



Model Number	Dimensions (cm/in)			Electricity (110/220, 1 , 50/60)	Comp. Air m ³ /h/SCFM 5.3 bar/80 psig	Water l/h/USGPM 2 bar/30 psig
	Length	Width	Height			
D8+	112/44	94/37	181/71	5 amps	8.5/5.0	500/2.1
D10					30/17	995/4.4
D11	229/90	135/53	193/76		46/27	1430/6.3
D11+					34/20	1100/4.8
D13					62/36	2540/11.2
D15					84/49	3970/17.5

Notes:

- 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 must be clean, dry, oil free and filtered to 40 microns. Air filters can be supplied, if required, at additional cost.
- Water should contain less than 200 mg/l Total Dissolved Solids, 135 ppm total hardness (as CaCO₃) and must be clean (i.e., municipal source filtered to one micron).

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Features	Benefits	Impacts
Short bed height and small resin volume	Small equipment size with easy maintenance	Low operating costs
Counter-current operation	Simple, effective performance	Maximum acid recovery
Pre-assembled, skid mounted	Easy installation	Simple startup and interface with anodizing baths
Fully automated with full factory pre-testing	Fast installation, consistent operation	Minimal installation and setup costs

AnoPur™ Partial User's List

Customer	Location
Meyer Industries Ltd	Sriracha, THAILAND
Seco Manufacturing Co Inc.	California, USA
Surf-Tech Industries	British Columbia, CANADA
Izumi Techno	Nagano, JAPAN
Walgren Company Multiple Units	Michigan, USA
Olympus Multiple Units	Nagano, JAPAN
Technova Imaging Systems	Maharashtra, INDIA

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