

Exile the troublesome and time-consuming maintenance work!

Etching Liquid **ELECTROLYTIC REGENERATION UNIT**

**I became familiar with
"Release From Unglazed Cylinders".**



Utility Model Act
Law number: Act No. 3146425



The etching solution used in the pretreatment of plastic plating is circulated and regenerated.

- It reduces troublesome maintenance.
- There is no decrease in current efficiency due to clogging.
- Replacing the unglazed cylinder currently in use is easy.
- Contributes to power cost reduction.
- The renewal cycle of the cathode solution is prolonged.
(sulfuric acid)

Introducing an epoch-making diaphragm unit that does not use an unglazed cylinder for **ELECTROLYTIC REGENERATION OF THE ETCHING SOLUTION** (chromic acid / sulfuric acid) used in the pretreatment of plastic plating.

In the electrolytic regeneration equipment using unglazed cylinders currently in use, dirt in the solution adheres to the unglazed cylinders, causing clogging. As a result, the electrical resistance value rises, making it difficult for current to flow.

Therefore, it is necessary to carry out regular maintenance of the unglazed cylinder, and even if there is a recognition that it is "troublesome work" at the site, I was forced to continue using it because there was no high-performance diaphragm to replace the unglazed cylinder.

This **"ETCHING LIQUID ELECTROLYTIC REGENERATION UNIT"** uses a highly durable **polymer charged film***.

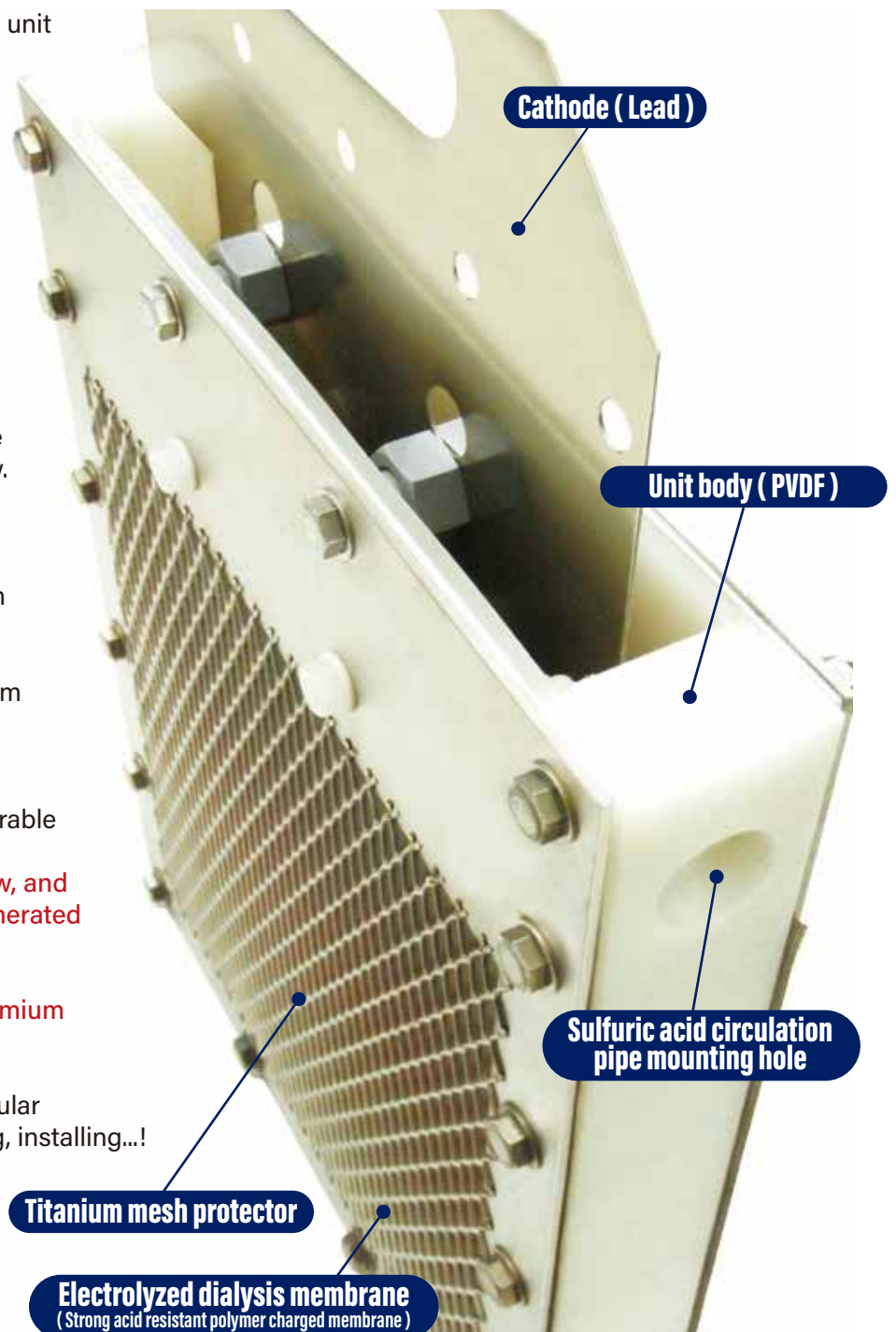
As a result, the electrical resistance is low, and clogging due to the resin component generated during etching is unlikely to occur.

A stable current supply is possible.

Therefore, **stable control of trivalent chromium values is possible.**

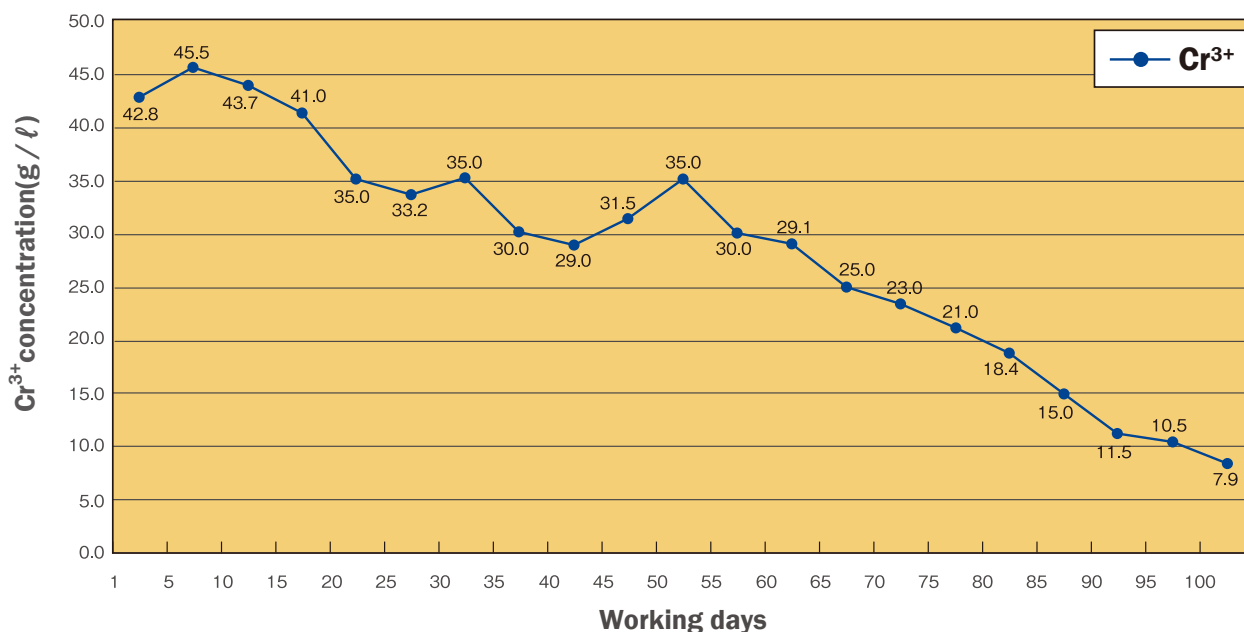
Free the work staff from troublesome regular maintenance such as taking out, cleaning, installing...!

*Polymer charged film:
Originally developed anti-strong acid polymer charged film with nano-order fine pores.



Operation example

Changes in Cr³⁺ after the introduction of the unit.



*With the cooperation of companies for the purpose of measuring the transition of Cr³⁺ from adverse conditions, this data has been tested under unusually high concentration conditions. Thanks to the experience and management technology of our partner companies, we have made it possible to collect live data through demonstration tests in normal operation.

Effect obtained

- Stable control of Cr³⁺ value is possible.
- Easy maintenance.
- There is little clogging of the membrane.
- Contributes to power cost reduction.

Cost comparison.

While the unglazed cylinder needs to be renewed twice a year, the etching solution electrolytic regeneration unit does not need to be renewed.

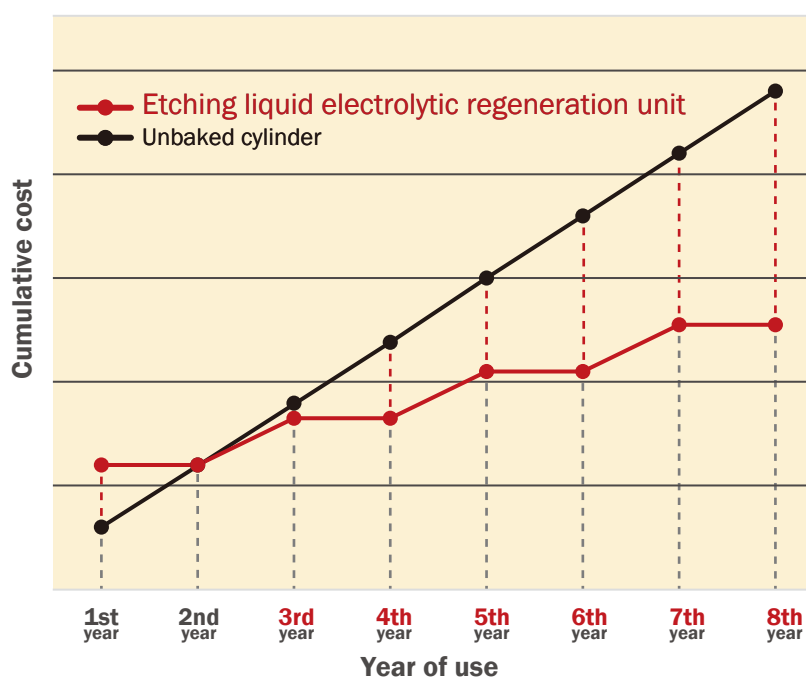
(However, we recommend updating only the membrane once every two years.)



After the third year of use, there will be a difference in cumulative costs.

Comparison of cumulative cost trends.

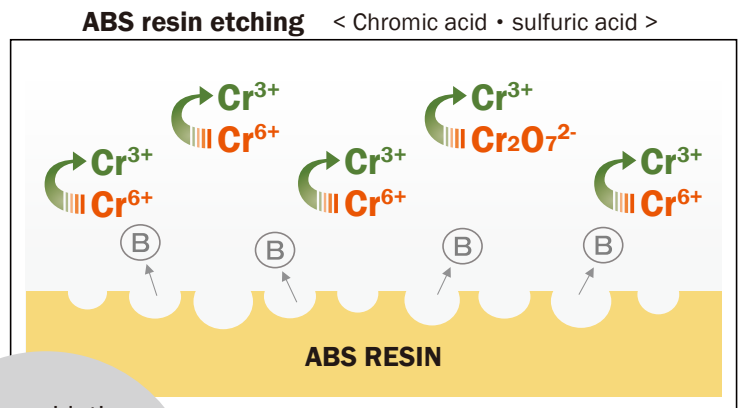
<Unbaked cylinder / Etching liquid electrolytic regeneration unit>



Principle of electrolytic regeneration unit

Etching process principle

In the etching process, which is one of the pre-treatments for plastic plating, butadiene on the surface layer of ABS resin is chemically eluted with chromic acid and sulfuric acid to form minute pores on the resin surface in order to improve the adhesion of the plating coating. Of the chromic acid and sulfuric acid used in this etching process, chromic acid is reduced from Cr^{6+} to Cr^{3+} .

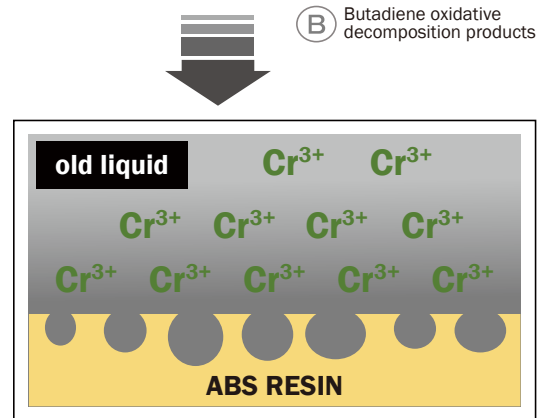


Cr^{3+} is an impurity and reduces the etching ability.

It leads to deterioration of processing quality.

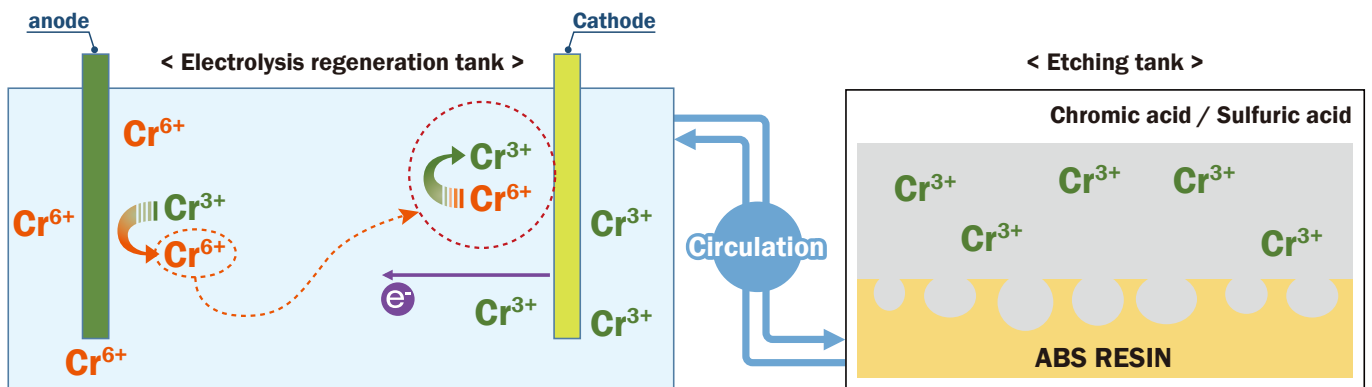
If the oxidation treatment is not performed, trivalent chromium increases and accumulates, and the etching solution ages.

By electrolytic oxidation, Cr^{3+} is oxidized to Cr^{6+} at the anode, and Regenerate the old liquid and return it to the etching tank.



Step 1 When there is no diaphragm on the cathode.

If the cathode is electrolyzed with no diaphragm, the Cr^{6+} oxidized at the anode is reduced to Cr^{3+} at the cathode again.



Hexavalent chromium produced by oxidation is reduced to trivalent chromium again in one pole.

At the same time as the reoxidation reaction ($\text{Cr}^{3+} \rightarrow \text{Cr}^{6+}$) occurs at the anode, the reduction reaction ($\text{Cr}^{6+} \rightarrow \text{Cr}^{3+}$) occurs at the cathode.

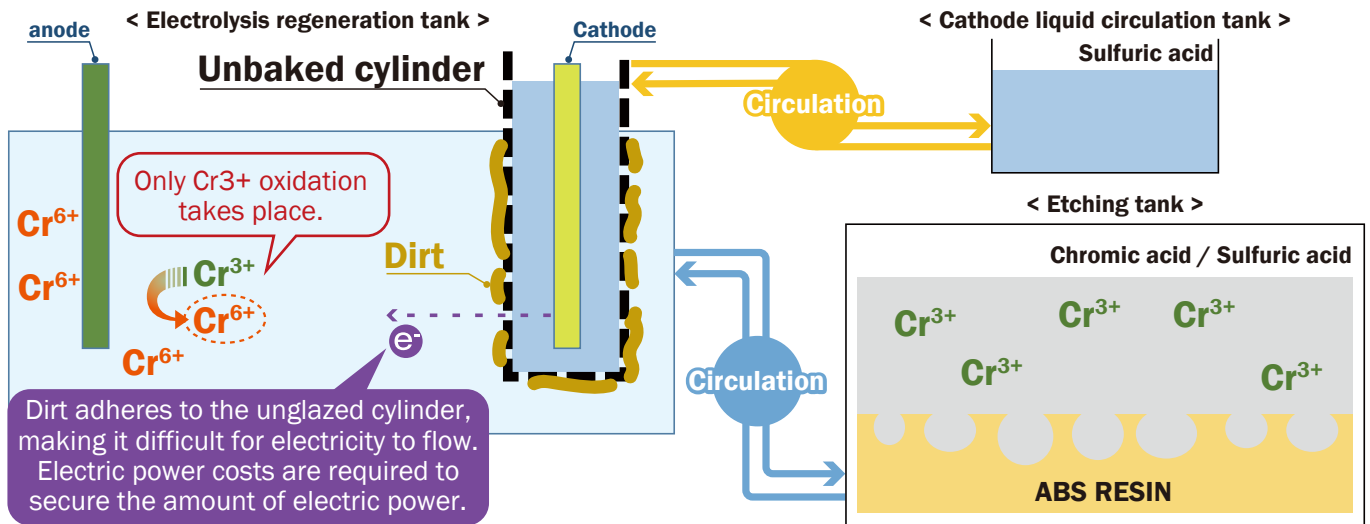
It is difficult to quickly reduce the Cr^{3+} concentration.

In order to solve this problem, unglazed or ceramic is applied and put into practical use as a diaphragm.

Step 2 When the cathode is surrounded by [Unglazed cylinder]

When the cathode is surrounded by a unglazed cylinder, Cr^{6+} is not reduced by the cathode. However, dirt in the solution adheres to the unglazed cylinder and causes clogging. As a result, the resistance value rises and it becomes difficult for the current to flow. In order to secure the required current, the voltage is increased to deal with it, but working under high voltage increases the cost of electricity. Working at high voltage

can cause damage to the unglazed cylinder. Since the oxidation reaction efficiency at the anode depends on the amount of energization, it is necessary to keep the performance of the unglazed cylinder constant in order to secure the amount of energization at the assumed voltage. Therefore, it is necessary to maintain the unglazed cylinder on a regular basis. The force or unglazed cylinder is vulnerable to impact and easily cracked.

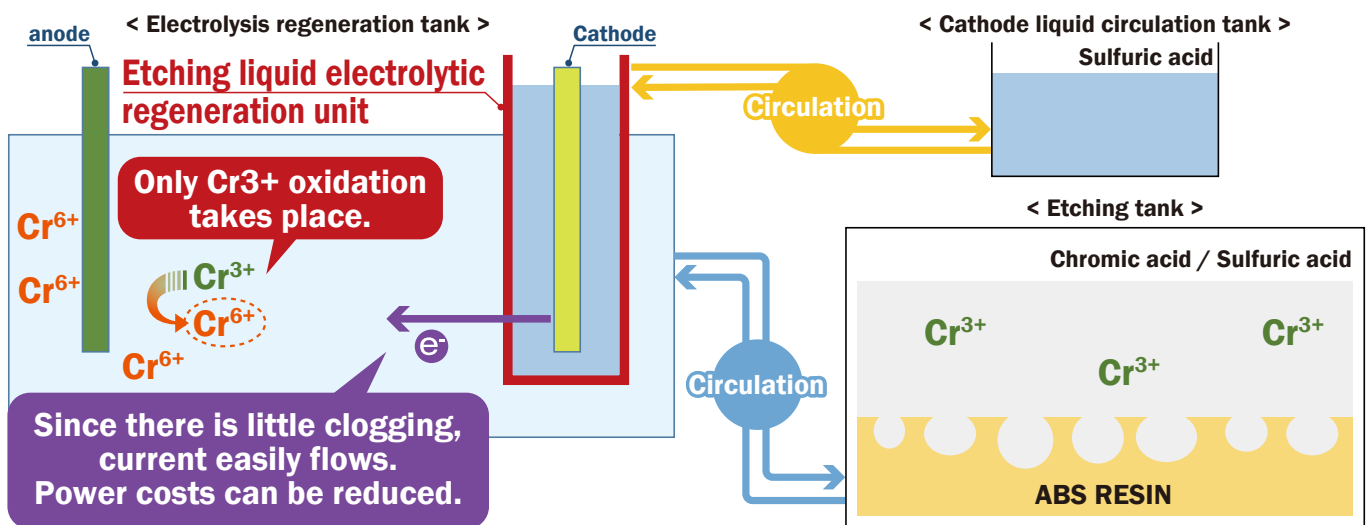


In order to increase the energization efficiency, the plate thickness is being reduced, When the thickness is reduced, the mechanical strength is weakened and the risk of cracking or breakage increases.

Step 3 When the cathode is surrounded by [Etching solution electrolytic regeneration unit]

When the cathode is surrounded by the etching solution electrolytic regeneration unit, Cr^{6+} can supply current at the cathode.

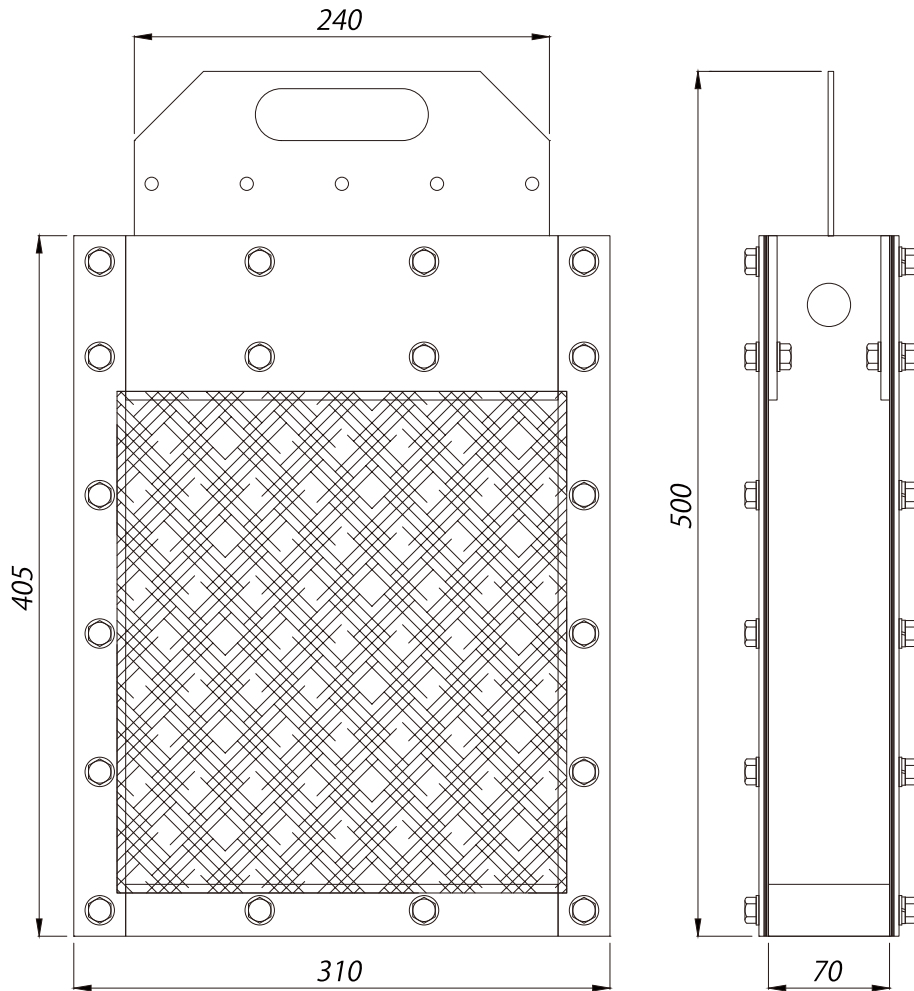
It will not be reduced. Furthermore, the adoption of a special thin film (polymer charged film) enables stable control of the Cr^{3+} value.



Since this membrane mainly transmits only electricity, it is less likely to be clogged with dirt. Maintenance is very easy.

(*A small amount of metal ions permeate.)

Unit standard specifications



Main items	Material
Electrolyzed dialysis membrane	Strong acid resistant polymer charged membrane
Cathode	Lead
Unit body	PVDF
Mesh protector	Titanium
Packing	PTFE soft packing
Construction	Cathodic fluid overflow circulation



Total System Planner
for plating and surface treatment.

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