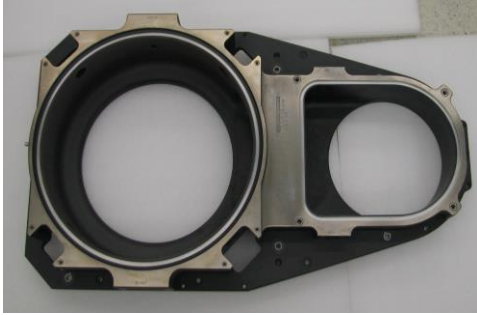




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# Anodization Technology

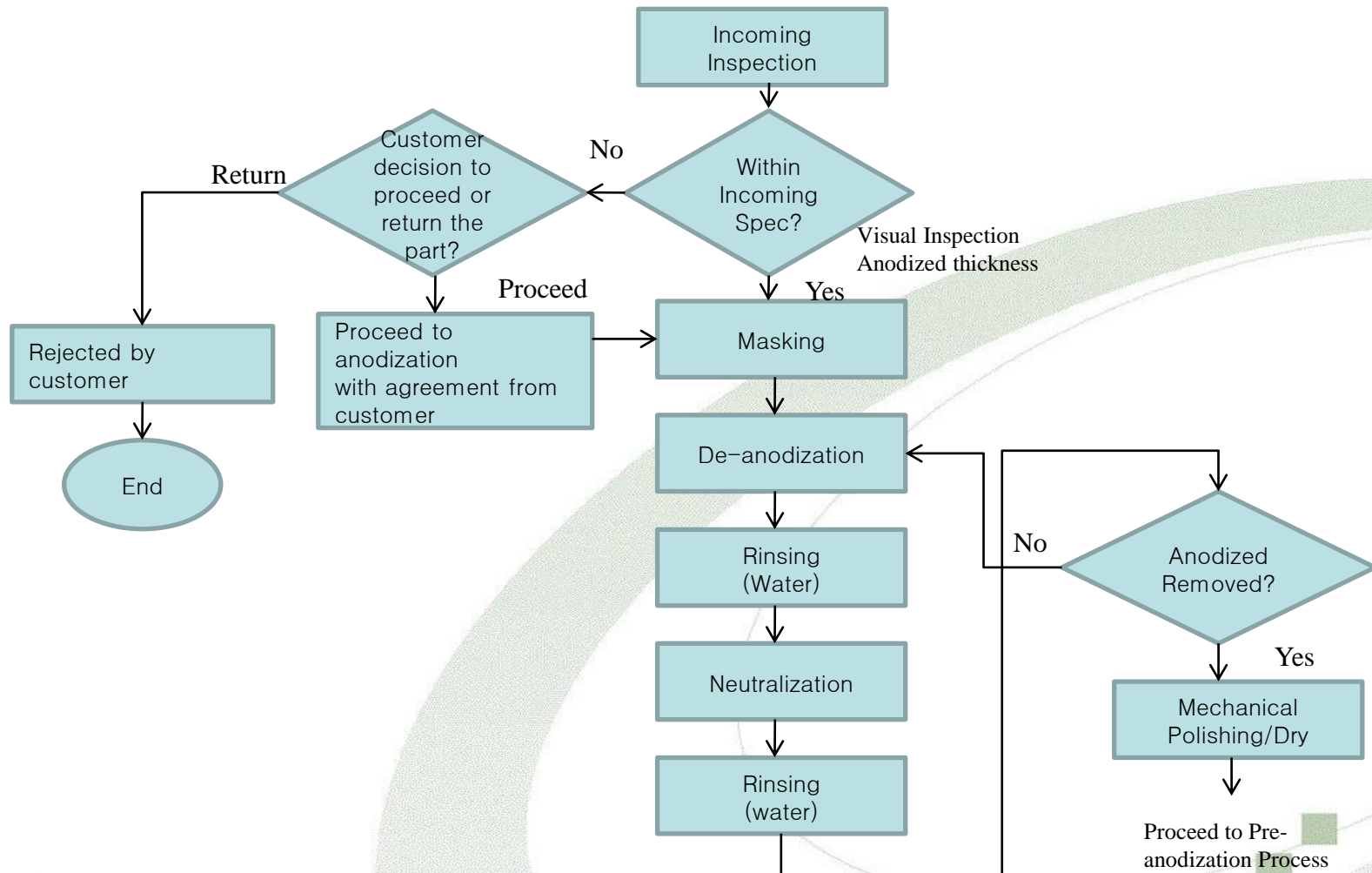


*Aldon Proprietary Information*

- Tank Capacity : 2.0m(L)x1.0m(W)x1.8m(H)
- Fully automated anodizing line for consistent and reliable process
- Capable of performing sealed Sulphuric anodize and Oxalic anodize



# De-anodization Process Flow

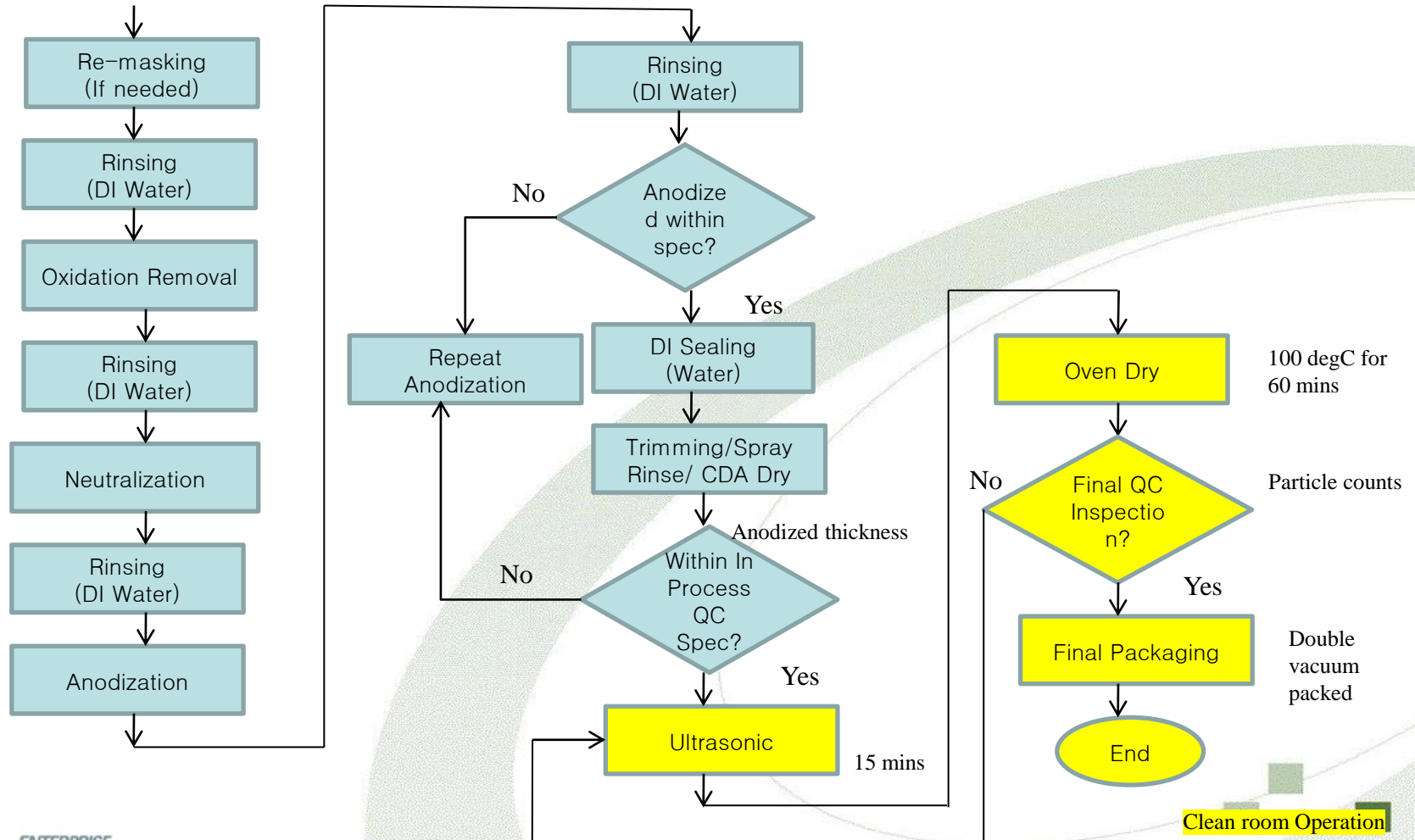




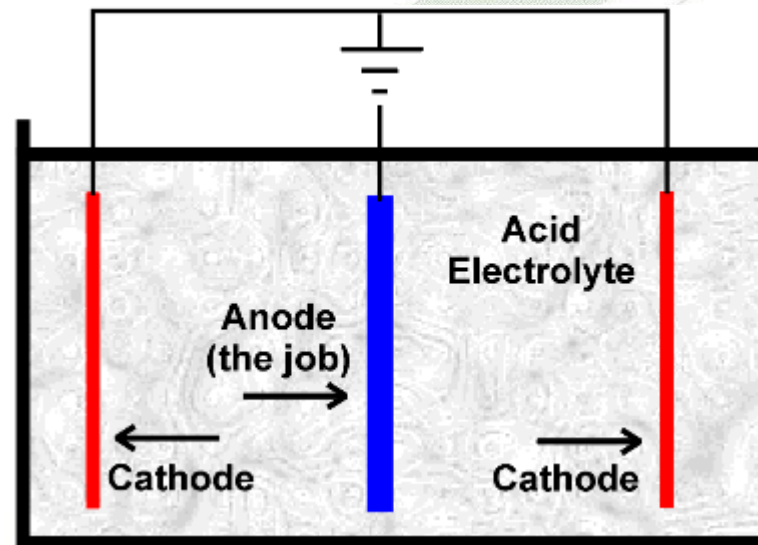


ALDON TECHNOLOGIES SERVICES PTE LTD

# Anodization Process Flow



- Anodizing is achieved by immersing the aluminum workpiece into an electrolytic bath and with passing through an electric current.
- A cathode is mounted to the inside of the anodizing tank.
- The aluminium workpiece acts as an anode.
- The current releases hydrogen at the cathode (the negative electrode) and oxygen at the surface of the aluminium anode, creating a build-up of aluminium oxide



- Oxygen from the electrolysis of water reacts with surface aluminum.
- $2\text{H}_2\text{O}_2 + \text{Electrons} \rightarrow \text{O}_2 + 2\text{H}_2$
- $4\text{Al (Aluminium)} + 3\text{O}_2 \text{ (Oxygen)} \rightarrow 2\text{Al}_2\text{O}_3 \text{ Aluminium Oxide}$
- As Al atoms are extracted from the surface of Al workpiece, pore-like pits are formed.
- The surfaces of these pits are very reactive due to the availability of electrons for bonding.
- The in-processing forming  $\text{Al}_2\text{O}_3$  with electrons, bonds with metal surface to form a stable structure.

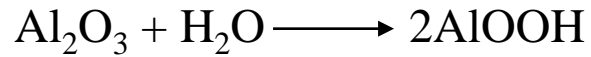


ALDON TECHNOLOGIES SERVICES PTE LTD

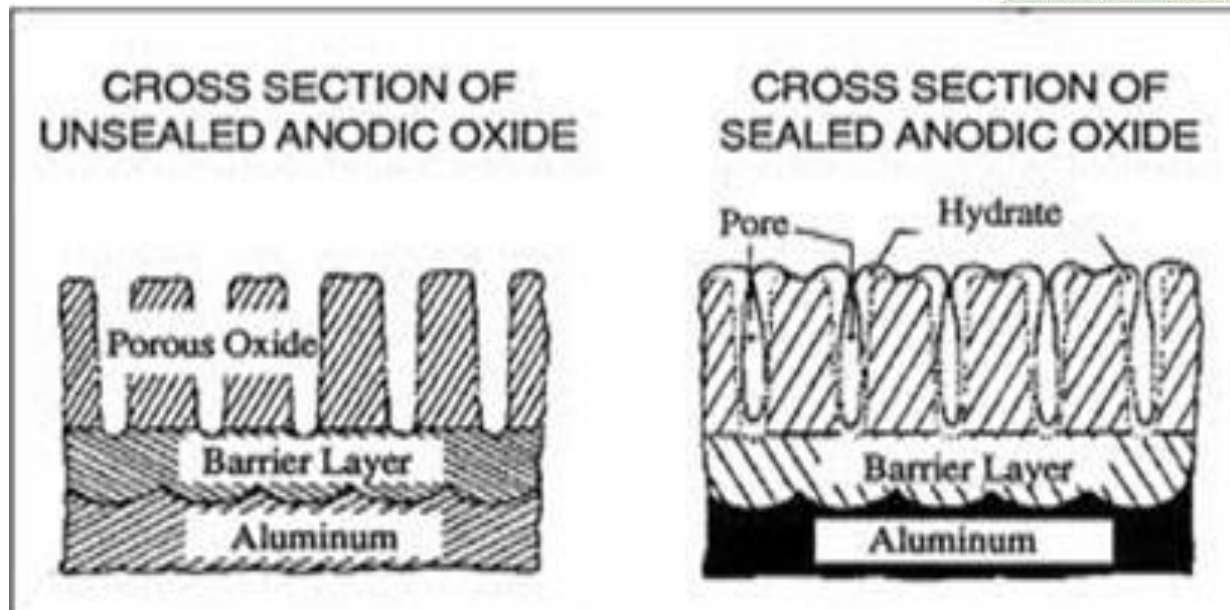
## DI Sealing

- In hot DI sealing, the part is immersed into hot DI water (Spec: 95-105 °C)
- The anodized coating (Aluminum oxide,  $\text{Al}_2\text{O}_3$ ) are made up of small pores.
- Hot DI sealing converts the aluminum oxide in the pores to hydrated aluminum oxide (Boehmite) which is a larger molecule and fills up the pore with hydrated aluminum oxide.
- Hot DI water seal is often used for which low particle contamination is important.



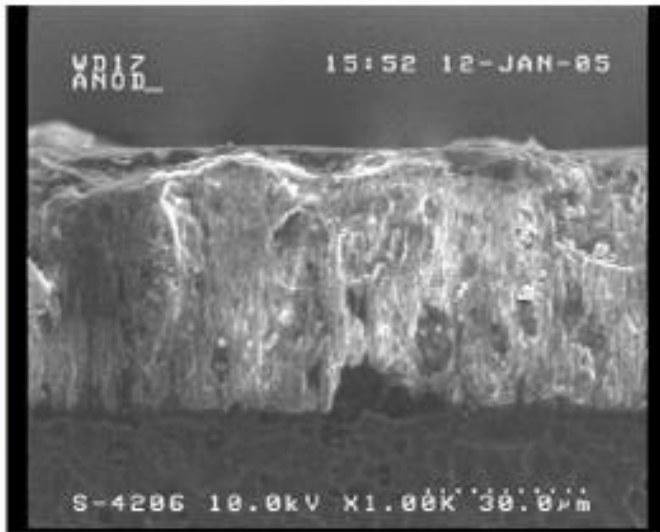


- Below depicts DI water sealing of anodic oxide coating.

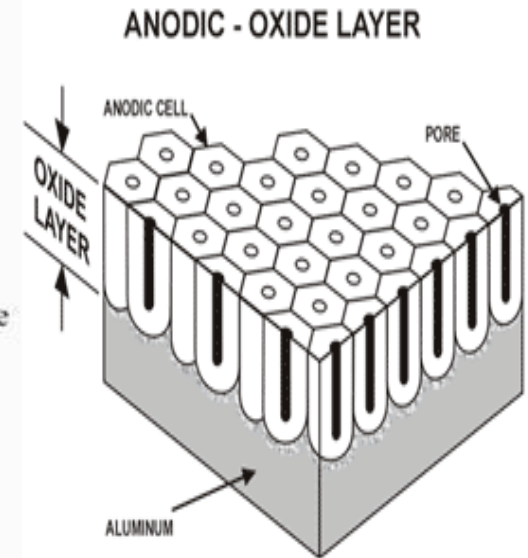
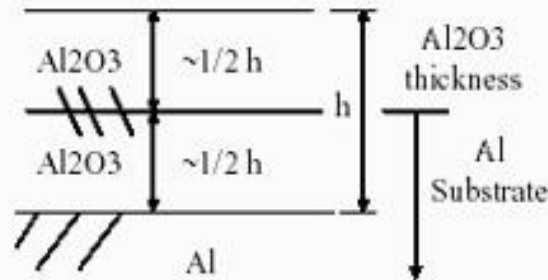




# Microstructure of Anodization Layer



SEM





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# Anodization Properties

- Insulation Resistance
- Particle Control
- Wear Resistance
- Temperature Resistance
- Corrosion Resistance
- Aesthetic Effect



*Aldon Proprietary Information*



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# Anodization General Specifications

## TYPICAL ANODIZATION SPEC. FOR SEMI-CONDUCTOR APPLICATION

Type	Process Temp	Electrolyte	Film Thickness mm	Breakdown Voltage	Colour	Application in Process Kits
2	15~20°C	Sulphuric Acid	0.005~0.01	>300VDC	Light Grey	-CVD Shower Head -Cooling Plate -Hi Temp Isolation Sheet Shield
3.1 Hardcoat	-5~0°C	Sulphuric Acid	0.05~0.01	>1,000VDC	Almost Black	-Electrode -Clamp Ring -Chamber Liner -Upper Chamber -General Application
3.2 Hardcoat	15~20°C	Oxalic Acid	0.02~0.03	>1,000VDC	Yellowish Grey	-GDP -Susceptor -Chamber Liner





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# Anodization Technology Applications

- Semi-conductor & Flat Panel (LCD) improvement
- Aviation Parts
- Clean-Energy (Solar)
- Oil/Gas and Petro-chemical repair
- Repair and Overhaul
- Coating to Customer's Requirements



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# ATS Recommendations

- Majority of the parts fall in anodization thickness range of 50-60um
- Able to withstand breakdown voltage of 1000 VDC.
- Recommended limit to refurbishment: 3 times (subject to customer)
- Recommended minimum part thickness for processing: 1mm



*Aldon Proprietary Information*



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# ATS Quality Management



**Coating Thickness Meter**



**Breakdown Voltage**



**Roughness Check**



**Clean-room Assembly**



**Vacuum Packing**



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# Incoming QC Inspection Report

ALDON TECHNOLOGIES SERVICES PTE LTD

 A Company of Aldon Group			Incoming Inspection Report Anodize & Y2O3 Coating				Ref No: JOA1802282-02A																	
Part No. 0041-12166		Serial No. 300911N-1310-0030		Customer		Module		AMAT Parts																
Name Wall Liner		EGP No. 2018028278		Date In (yyyymmdd) 20181001		Date Out (yyyymmdd)																		
Check Point	Anodizing Thk. (µm)	Pictures & illustrations:																						
Spec	Ref only	 																						
1																								
2																								
3																								
4																								
5																								
6																								
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Notes:		<table border="1"> <thead> <tr> <th colspan="2">Visual Inspection</th> </tr> </thead> <tbody> <tr><td></td><td>Scratches</td></tr> <tr><td></td><td>Dents</td></tr> <tr><td></td><td>Cracks</td></tr> <tr><td></td><td>Chips / Peel off</td></tr> <tr><td>X</td><td>Stains</td></tr> <tr><td>X</td><td>Anodized coating damage</td></tr> <tr><td></td><td>No Abnormalities Found</td></tr> </tbody> </table>							Visual Inspection			Scratches		Dents		Cracks		Chips / Peel off	X	Stains	X	Anodized coating damage		No Abnormalities Found
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X	Anodized coating damage																							
	No Abnormalities Found																							
Insp. Result	ACCEPT																							
Inspected by	Li Ting																							
Reviewed by	ADAM																							
																								
*Y0041-12166-s300911N-1310-0030-d20181001-JOA1802282-02A*																								



ALDON TECHNOLOGIES SERVICES PTE LTD

# Final QC Inspection Report

ATS A Company of Aldon Group		Final Inspection Report Anodize & Y2O3 Coating			Ref No: JOA1802282-02A	
Part No.	0041-12166	Serial No.	300911N-1310-0030	Customer	Module	
Name	Wall Liner	EGP No.	2018028278	Date In (yyyymmdd)	20181001	Date Out (yyyymmdd)
					20181008	AMAT Parts
Check Point	Anodizing Thk. (μm)	Pictures & illustrations:				
Spec	Ref only					
1	200 / ± 30					
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
Min.						
Max.						
Avg.						
						
						
		300911N-1310-0030				
		Notes:				
Surface Roughness (Ra 3.5 - 5.5 μm)						
Surface Particle <5 cnt/cm² @ >0.3 μm						
Insp. Result	ACCEPT					
Inspected by	Li Ting					
Reviewed by	ADAM					
		Visual Inspection				
		Scratches				
		Dents				
		Cracks				
		Chips				
		Stains				
		Anodized coating damage				
		X No Abnormalities Found				
		*Y0041-12166-s300911N-1310-0030-d20181001-JOA1802282-02A*				





# Final QC Inspection Report

ALDON TECHNOLOGIES SERVICES PTE LTD

 A Company of Aldon Group		<b>Final Inspection Report</b> <b>Anodized Coating</b>				Ref No:	JOA1900003-01			
										
Part No.	0040-02609		Serial No.	119423-038		Customer				
Name	CATHODE LINER		GP No.	PMT-18-12-5600		Date In (yyymmdd)	20190102		Module	Super E
						Date Out (yyymmdd)	20190103			
<b>Pictures &amp; illustrations:</b>										
Check Point Anodizing Thk. (mil) Spec 1 2 3 4 5 6 7 8 9 10 11 12 Min. Max. Avg.										
										
	Surface Roughness (Ra > 50 μ-inch)						Visual Inspection			
Surface Particle < 5 cnt/cmt' @ > 0.3 μm						Scratches				
Insp. Result		ACCEPT				Dents				
Inspected by		Li Ting				Chips/Peel off				
Reviewed by		ADAM				Stains				
						Anodized coating damage				
						X No Abnormalities Found				
										
*A0040-02609-s119423-038-d20190102-JOA1900003-01*										





ALDON TECHNOLOGIES SERVICES PTE LTD

# Typical Parts Lists (Brand New or Refurbishment)

- TEL Tools Chamber Parts
- LAM Tools Chamber Parts
- AMAT Tools Chamber Parts
- AMEC Tools Chamber Parts
- LCD TEL Etcher Chamber Wall Parts
- Ability to tailor made and anodize according to customer's requirements



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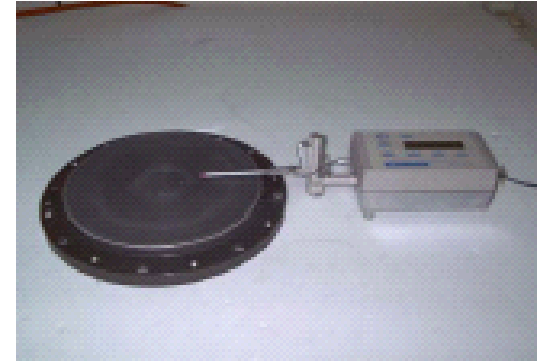
# ATS Quality Management



**Coating Thickness Meter**



**Breakdown Voltage**



**Roughness Check**



**Clean-room Assembly**



**Vacuum Packing**



*Aldon Proprietary Information*



ALDON TECHNOLOGIES SERVICES PTE LTD

# ISO 9001 Certificate

ZERTIFIKAT ♦ CERTIFICATE ♦ 認證證書 ♦ CERTIFICADO ♦ CERTIFICAT

  
TÜV SÜD Singapore

## CERTIFICATE

The Certification Body  
of TÜV SÜD PSB Pte Ltd  
certifies that

**ALDON TECHNOLOGIES SERVICES PTE LTD**  
20 Loyang Lane  
Singapore 508919

has established and applies  
a Quality Management System for

**Provision of Chemical and Surface Treatment Services  
for Process Equipment used in Electronics Industry**  
(See Appendix to Certificate for Details)

Proof has been furnished that the requirements  
according to

**ISO 9001 : 2015**

are fulfilled. The certificate is valid from **2019-10-02** to **2022-11-07**  
Certificate Registration No. **2007-2-1614**  
Date of Print : **2019-10-07**

  
TÜV SÜD

  
Siew Kwan Hong, Tiffany  
Certification Manager  
Business Assurance Division  
Management Systems

  
SAC  
Accredited  
Certification  
Body  
2019-11

Page 1 of 2

Please refer to [www.tuv.sud.sg/cert](http://www.tuv.sud.sg/cert) for current certificate status in the 'Directory of Management System Certified Companies'.

TÜV SÜD PSB Pte Ltd - 1 SciencePark Drive - Singapore 110201

TUV®








## Some Parts List – Anodization Parts (Sulphuric Anodization)

ALDON TECHNOLOGIES SERVICES PTE LTD

### AMAT DPS

Item	Picture	Module	OEM P/N	Description	Tools	Material
1		ETCH	0040-02544	DPS UPPER CHAMBER	DPS	Metal, Aluminum
2		ETCH	0021-01421	Chamber,upper, DPS	DPS-Metal	Metal, Aluminum
3		ETCH	0040-52662	DPS UPPER CHAMBER	DPS	Metal, Aluminum



## Some Parts List – Anodization Parts (Sulphuric Anodization)

ALDON TECHNOLOGIES SERVICES PTE LTD

### AMAT DPS-II

Item	Picture	Module	OEM P/N	Description	Tools	Material
1		ETCH	0021-19030 0021-26274	SCREEN, PHM	DPS II	Metal, Aluminum
2		ETCH	0021-13430 0021-26273	CATHODE LINER	DPS II	Metal, Aluminum
3		ETCH	0040-46003 0040-81158	LOWER CHAMBER LINER, PHM	DPS II	Metal, Aluminum
4		ETCH	0040-43977 0040-81155	LOWER CHAMBER LINER	DPS II	Metal, Aluminum
5		ETCH	0040-41703 0040-81165	SLIT VALVE DOOR	DPS II	Metal, Aluminum
6		ETCH	0040-63668 0040-41703	SLIT VALVE DOOR	DPS II	Metal, Aluminum
7		ETCH	0040-81156	UPPER CHAMBER LINER	DPS II	Metal, Aluminum
8		ETCH	0020-13660	HOOP SHADOW RING, PHM	DPS II	Metal, Aluminum



# Some Parts List – Anodization Parts (Oxalic Anodization)

ALDON TECHNOLOGIES SERVICES PTE LTD

## AMAT e-MAX (200)

Item	Picture	Module	OEM P/N	Description	Tools	Material
1		ETCH	0040-50414	DOOR, SLIT VALVE, WAFFLE-LESS, 200MM E-M	200eMAX	Metal, Aluminum
2		ETCH	0021-14960	DOOR, SLIT VALVE, WAFFLE-LESS, 200MM E-M	200eMAX	Metal, Aluminum
3		ETCH	0040-34866	LINER, CATHODE, MAG RING, WAFFEL-LESS, D	200eMAX	Metal, Aluminum
4		ETCH	0040-34865	LINER, DGDP, CHAMBER, WAFFLE-LESS, 200MM	200eMAX	Metal, Aluminum





# Some Parts List – Anodization Parts (Oxalic Anodization)

ALDON TECHNOLOGIES SERVICES PTE LTD

## AMAT MxP & SUPER-e

Item	Picture	Module	OEM P/N	Description	Tools	Material
1		ETCH	0010-30057	ASSEMBLY, CATHODE LINER, MXP+	MxP+, Super E	Metal, Aluminum
2		ETCH	0021-10223	LINER, CHAMBER, CLAMP LID	MxP+, Super E	Metal, Aluminum
3		ETCH	0021-09104	LINER, CATHODE, ALIGNED, OXIDE ETCH	MxP+, Super E	Metal, Aluminum
4		ETCH	0040-33998	LINER, SLIT LINER DOOR	MxP+, Super E	Metal, Aluminum
5		ETCH	0020-19003	INSERT, SLIT VALVE SHO	MxP+, Super E	Metal, Aluminum
6		ETCH	0020-34694 0020-34695	LINER, CHAMBER CATHODE LINER,	MxP+, Super E	Metal, Aluminum



# Some Parts List – Anodization Parts (Sulphuric Anodization)

ALDON TECHNOLOGIES SERVICES PTE LTD

## LAM 2300




Item	Picture	Module	OEM P/N	Description	Tools	Material
1		ETCH	796-098655-002	GDP, TOP COVER	Lam2300	Metal, Aluminum
2		ETCH	796-098654-002	GDP, RING	Lam2300	Metal, Aluminum
3		ETCH	715-801916-008	Chamber Liner	Lam2300	Metal, Aluminum
4		ETCH	715-801916-008	GDP	Lam2300	Metal, Aluminum
5		ETCH	715-801021-838	Chamber Liner	Lam2300	Metal, Aluminum



## Some Parts List – Anodization Parts (Sulphuric Anodization)

ALDON TECHNOLOGIES SERVICES PTE LTD

### TEL DRM

Item	Picture	Module	OEM P/N	Description	Tools	Material
1		ETCH	1D10-101475-11	Baffle Plate	TEL DRM	Metal, Aluminum
2		ETCH	1D10-101551-11	Baffle Plate / IBM	TEL DRM	Metal, Aluminum
3		ETCH	1D10-303124-21	Shield Depo	TEL DRM	Metal, Aluminum


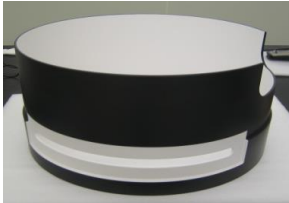





# Some Parts List – Anodized with $Y_2O_3$ Parts

ALDON TECHNOLOGIES SERVICES PTE LTD

## AMAT & LAM (300mm)

ITEM	OEM Part #	DESCRIPTION	MATERIAL	Photos
1	0021-17015	CATHODE SLEEVE	Al, partial coated $Y_2O_3$	
2	0040-99548	CHAMBER LINER LEFT	Al, partial coated $Y_2O_3$	
3	0040-99549	CHAMBER LINER RIGHT	Al, partial coated $Y_2O_3$	
4	0021-27883	SLIT DOOR ASSY	Al, partial coated $Y_2O_3$	