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About CML Chemistry

Our reason

• It’s CML’s vision to strive for excellence and provide our customer the best customer experience and we never stop searching for ways to improve the service we provide to our customers.
• We’re not just quality control but also work closely with our material suppliers and now migrate into part of the technology development right from the start.
• After many years of a close collaboration with our Immersion Tin supplier, INNOTECH, we step out next step and entered into a joint venture by forming CML Chemistry.

Good things come together

• CML’s direct relationship to customers with first hand understanding of market expectation and needs.
• INNOTECH’s technology knowhow in Immersion Sn Surface Finishing.
Our Network and History

- **CML Europe**
  - Founded in Germany 2001
- We are located in
  - 16 cities & 12 countries
- Employees Globally 600+
- Talk to Us
  - Multilingual
- Production Capacity 1,000,000 m² per month
- Production sites Worldwide
  - Our factory **Starteam** located in Sichuan Province

CML – More than a manufacturer
**INNOSTAN®** CT-15 is an Immersion Plating Technology to produce a dense deposit of 0.8 to 1.2 μm of pure Tin on Copper surface on exchange reaction mechanism.

It is an ideal alternative to Lead free Hot Air Solder Leveling (HASL) process. Because of the growing demands of fine-pitch boards, the need of an even, homogeneous, easy-to-apply and cost competitive surface finishing with excellent solderability is increasing.

**INNOSTAN®** CT-15 meet the above requirements, and it can be applied to both Horizontal and Vertical mode operation.
Product Introduction

**INNOSTAN**® CT-15 Product Family contains:

- **INNOSTAN**® CT-16 Pre-dip solution for Vertical bath
- **INNOSTAN**® CT-15M Immersion Tin solution for main bath
- **INNOSTAN**® CT-15B Immersion Tin replenish solution
- **INNOSTAN**® CT-15C Immersion Tin brightener solution

Other necessary chemicals included:
- AC-202 Acid cleaner additive
- ME-801 Micro-etch additive
- CC-150 Copper conditioner solution
- NA-10 Neutralized agent
- TA-90 Tin anti-tarnish agent

Partnership with **Innotech**
Process Flow (Horizontal Mode)

- **Pre-treatment** - Remove thin oxide layer and contaminants on the Copper surface by horizontal pre-treatment line, and the Copper surface becomes shiny and clean with conveyor speed 1.0-1.5 m /min;

- **Acid Degreasing** - Removes the slight oxide film and oil on the Copper surface, making it wettable and ready for subsequent processes. The temperature is 35-45°C and duration is 20-60 seconds;

- **Micro-etching** - Further remove oxide layer on the Copper surface and reveals a fresh structure. The temperature is 20-28°C and duration is 20-40 seconds;

- **Activation** - Wetting the Copper surface and removing the remaining chemical residue as well as preserve temperature of the subsequent bath. Temperature is 20-30°C and duration is 10-20 seconds;

Continued
Process Flow (Horizontal Mode)

**Pre-Dip** - Produce a thin, dense pure Tin layer on copper surface as prepare for subsequent processes. The Tin surface becomes bright. The temperature is 20-30 °C and duration is 15-40 seconds;

**Main Bath** - Continue to enhance the reaction to make Tin thickness meet the requirements. Tin surface becomes matte, only has a slight brightness and the Tin surface should have good whiteness, and there must be no tailing, stain, pitting, black spots or chromatic aberration. The temperature is 65-70 °C and duration is 20-28 minutes;

**Neutralization** - Deep removal of chemical residues and prepare to meet ionic contamination requirements. The temperature is 55-65 °C and duration is 0.5-1.5 minutes;

**Tin surface Anti-tarnish + Post Treatment** - Protected Tin surface is not easy to turn yellowish at high temperature IR. The Tin protection, working temperature is 20-35 °C and duration is 10-30 seconds.
## Process Flow (Horizontal Mode)

<table>
<thead>
<tr>
<th>Process Description</th>
<th>Temperature, °C</th>
<th>Dwell Time, min</th>
<th>Controlling Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid Cleaner</td>
<td>35-45</td>
<td>0.2-1.0</td>
<td>Acid Normality</td>
</tr>
<tr>
<td>City Water Rinse 2X, DI Water Rinse 1X</td>
<td>20-35</td>
<td>1-2</td>
<td>Flow rate</td>
</tr>
<tr>
<td>Micro-etch</td>
<td>20-28</td>
<td>0.2-0.6</td>
<td>Sulfuric Acid, Hydrogen Peroxide</td>
</tr>
<tr>
<td>City Water Rinse 2X, DI Water Rinse 1X</td>
<td>20-35</td>
<td>1-2</td>
<td>Flow rate</td>
</tr>
<tr>
<td>Copper conditioner</td>
<td>20-30</td>
<td>0.2-0.5</td>
<td>Acid Normality</td>
</tr>
<tr>
<td>Pre-dip</td>
<td>20-30</td>
<td>0.2-0.5</td>
<td>Acid Normality, SG, [Sn], [Cu]</td>
</tr>
<tr>
<td>Immersion Tin</td>
<td>65-70</td>
<td>20-28</td>
<td>Acid Normality, SG, [Sn], [Cu]</td>
</tr>
<tr>
<td>City water Rinse 2X</td>
<td>20-35</td>
<td>0.5-1.0</td>
<td>Flow rate</td>
</tr>
<tr>
<td>Neutralized Agent</td>
<td>55-65</td>
<td>0.5-1.5</td>
<td>pH</td>
</tr>
<tr>
<td>DI water rinse 3X</td>
<td>20-35</td>
<td>1-2</td>
<td>Flow rate</td>
</tr>
<tr>
<td>Tin Anti-tarnish</td>
<td>20-35</td>
<td>0.2-0.5</td>
<td>pH</td>
</tr>
<tr>
<td>DI water rinse 3X</td>
<td>20-35</td>
<td>1-2</td>
<td>Flow rate</td>
</tr>
<tr>
<td>Air Dry</td>
<td>80-100</td>
<td>1-2</td>
<td>N/A</td>
</tr>
</tbody>
</table>
**INNOSTAN®** CT-15 has the following benefits and properties:

- The working solution is always clear, without any turbid or precipitated particles, resulting in easy maintenance and filtration for the working bath.
- Free of Tin whiskers especially for fine line/pitch panels (Line/pitch sized below 2 mil/4 mil).
- More even and fine particles of the coating deposit resulting in more dense and reliable protection of the base Copper in order to pass over 6 times reflow.
- No uneven color tones for big pads (sized over 4×4 cm) as well as small size BGA.
- The chemistry has a low risk attacking to Soldermask.
- No attack to base Copper beneath the flexible coverlay materials and free of Tin cavities.
- No concern mouse-bite defects on hole-wall in the presence of Soldermask residuals.
Free of Sludge and turbidities

INNOSTAN® CT-15 has an excellent Sn²⁺ stabilizer to make the formulation very stable. The working bath would work well without sludge and turbidities for 12 months.
✓ Free Concern of Tin Whiskers

Tin whiskers problem is one of major concerns of pure Tin coatings.

**INNOSTAN®** CT-15 Immersion Tin technology is free of Tin whiskers and reliable up to one year storage before assembly (Controlled storage environment).

Tin whisker test is normally performed with the method and specification according to JESD201.

The main conditions and criteria are listed below:

- **Temperature:** 60 ± 5°C
- **Humidity:** 85 ± 2%
- **Time:** 500 or 1000 hours
- **Method:** By SEM (Scanning Electron Microscope)
- **Specification:** Individual whisker length less than 20 µm

**INNOSTAN®** - No Obvious Tin Whisker Growth
Free Concern of Tin Whiskers

The reason for the formation and growth of Tin whiskers is mainly due to uneven crystal lattice with high internal stress. The internal stress will be continuously released during the storage, it grows at the defected lattice since the diffusion speed of Cu and Sn is unbalance.

Whiskers are normally columnar shaped with a length of 5-100 microns. The growth of whiskers is most vigorous in 2 to 4 weeks after Immersion Tin process until all internal stress is being escaped.

No whiskers will be existed after the high temperature assembly as considered as an equivalent heat treatment process, which all internal stress are released.

INNOSTAN® CT-15 implements an “unique organic additive” (Leveling Brightener) to generate even, fine and compact Tin grain structure. It not only control the internal stress to a very low level, but also press down Cu/Sn diffusion speed during the storage.
✓ Fine Deposition

INNOSTAN® CT-15 deposits are formed with even and fine tin particles, resulting in more dense and reliable protection of the base Copper to ensure the panels have good solderability up to 1 year storage (Controlled storage environment).
✓ Fine Deposition

As analyzed by AUGER, the purity of INNOSTAN® CT-15 Tin deposits is 99.74% and 100% after 2 and 5nm sputtering respectively. This makes INNOSTAN® CT-15 to be environmental friendly and particularly compatible with all types of Lead-free solders, without risk for poisoning the assembly solder.

<table>
<thead>
<tr>
<th>Elements</th>
<th>2nm</th>
<th>5nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Sn</td>
<td>99.74%</td>
<td>100.00%</td>
</tr>
<tr>
<td>O</td>
<td>0.26%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
✓ Fine Deposition

XPS (X-ray Photoelectron Spectrum) method also showed the surface was consisted of 100% pure Tin.

![Graph showing elements analysis by XPS after 10nm sputtering]
✓ Minimum attack on Soldermask

The attack to the Soldermask is due to Thiourea in immersion Tin formulations, the higher the concentration of Thiourea, the more serious attack to S/M.

Normal commercial available Immersion Tin chemicals contain about 100g/L Thiourea which could cause unacceptable S/M peeling as apply 3M tape test.

INNOSTAN® CT-15 implements a special reduction agent to replace part of thiourea in order to maintain acceptable plating thickness of pure Tin layer. Since the concentration of Thiourea has been reduced to 80-95g/L, INNOSTAN® CT-15 could pass 3M tape test.

Please contact our technical team for proved S/M list, consideration of S/M selection and entire process control.
**Competitive Edge**

- ✔ Minimum attack to Soldermask

<table>
<thead>
<tr>
<th>Pre-treatment</th>
<th>Chemical</th>
<th>Pumice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photo</td>
<td><img src="image1.png" alt="Photo" /></td>
<td><img src="image2.png" alt="Photo" /></td>
</tr>
<tr>
<td>Requirement</td>
<td>No S/M peel off, whitening width ≤ 2mil</td>
<td>No S/M peel off, whitening width ≤ 2mil</td>
</tr>
<tr>
<td>Actual</td>
<td>No S/M peel off, whitening width ≤ 2mil</td>
<td>No S/M peel off, whitening width ≤ 2mil</td>
</tr>
<tr>
<td>Comment</td>
<td>Accept</td>
<td>Accept</td>
</tr>
</tbody>
</table>

**Photo Requirement**

- No S/M peel off, whitening width ≤ 2mil

**Actual**

- No S/M peel off, whitening width ≤ 2mil

**Comment**

- Accept

**Comment**

- Accept
The conventional immersion Tin chemistries show Tin nick problem, which is believed to be caused by the corrosion of the based Copper under the adhesives of *coverlay. As showed in below pictures, Tin nicks are cavity shaped and should reduce the base Copper thickness and hence resulting in less reliability and flexible endurance after numerous bending.

**INNOSTAN®** CT-15 implemented the unique formulation and process to eliminate Tin nick, and enhance the flexible endurance of FPC.

* Coverlay is one of the major differences between FPC and Rigid PCB, and it is the mechanical protector for the fragile conductors on flexible circuits. Film based coverlay and flexible solder mask have been the standard materials for traditional flexible circuits.
Free of Mouse-bite (Cavities on Rigid Boards)

Recall normal Immersion Tin formulations, Copper corrosion will found in small PTH when the hole size smaller than 0.4mm. Soldermask residues on PTH wall is the root cause for corrosion reaction.

\[
\text{Reaction: } 2H^+ + Cu^0 \rightarrow Cu^{2+} + H^2
\]

This defect so-called Mouse-bite which has the same mechanism as corrosion on FPC.

The main reaction desired for exchange of Sn\(^{2+}\) with Copper is:

\[
Sn^{2+} + 2Cu^0 \rightarrow 2Cu^+ + Sn^0
\]

**INNOSTAN**\(^\text{®}\) CT-15 has specific corrosion inhibitors to control the above reaction, China and Global Patent is under application, in order to overcome Mouse-bite.
Free of Mouse-bite (Cavities on Rigid Boards)

Mouse-bite defect is also happened on Soldermask undercut area as showed in the below figure. Tin concentration could not be refreshed and continuously drop to out of lower limited range, then the exchange reaction is terminated and change to corrosion reaction.

Mouse-bite is a high-risk defect for conducting small PTH holes since it may cause circuits open problem.
Reliability Test Data - Solderability

Solderability After Baking

Test Conditions:
Machine: DAGE-BT 2400PC Solder Ball Shear Test Machine
Company: DAGE-MPL Private Ltd
Solder ball diameter: 0.5mm
Flux: Sparkle Flux WF-6050
Ball shear test condition: Land speed 100um/s; Test height 50.0 Um; Test speed 250 um/s; Threshold 500g; Overtravel 300 um; Pitch 0; Range 2000 g

Test Criteria | INNOSTAN® CT-15 | HASL
--- | --- | ---
Baking @ 155°C | Unit: g | Unit: g
0 hour | 1461.1 ±54.7 | 1489.4 ±97.8
2 hours | 1437.2 ±137.2 | 1450.6 ±90.6
4 hours | 1430.4 ±55.5 | 1437.9 ±62.7
6 hours | 1403.9 ±143.1 | 1424.6 ±148.1
8 hours | 1372.9 ±77.8 | 1386.1 ±329.8

Conclusions:
- Before and after heat treatment at 155°C, the solderability of INNOSTAN® CT-15 deposits is close to that of HSAL;
- The influence of heat treatment on solderability is weak with less than 8% decrease of the shear strength.
- The ball shear strength for all test samples is higher than 1300 g (industrial standard is 800 g), indicating the solderability of immersion tin deposits is still good after the heat treatment.
Reliability Test Data - Solderability

Solderability After Reflow

Test Conditions:

<table>
<thead>
<tr>
<th></th>
<th>INNOSTAN® CT-15</th>
<th>HASL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Criteria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit: g</td>
<td>Unit: g</td>
<td></td>
</tr>
<tr>
<td>No reflow</td>
<td>1461.1 ±54.7</td>
<td>1489.4 ±97.8</td>
</tr>
<tr>
<td>1X reflow</td>
<td>1417.2 ±58.3</td>
<td>1462.6 ±90.6</td>
</tr>
<tr>
<td>2X reflow</td>
<td>1411.1 ±253.2</td>
<td>1423.4 ±165.2</td>
</tr>
<tr>
<td>3X reflow</td>
<td>1407.7 ±235.5</td>
<td>1409.1 ±32.0</td>
</tr>
<tr>
<td>4X reflow</td>
<td>1386.7 ±280.3</td>
<td>1392.1 ±421.8</td>
</tr>
<tr>
<td>5X reflow</td>
<td>1345.1 ±329.8</td>
<td>1372.5 ±233.0</td>
</tr>
</tbody>
</table>

Conclusions:

- The solderability of INNOSTAN® CT-15 deposits is very similar and close to that of HSAL; It can pass at least 3 times reflow soldering with good solderability.
- The ball shear strength for all test samples is higher than 1300 g (Industrial standard is 800 g).
Solderability After Humidity Test

Test Conditions:
Machine: DAGE-BT 2400PC Solder Ball Shear Test Machine
Company: DAGE-MPL Private Ltd
Solder ball diameter: 0.5mm
Flux: Sparkle Flux WF-6050
Ball shear test condition: Land speed 100um/s; Test height 50.0 Um; Test speed 250 um/s; Threahold 500g; Overtravel 300 um; Pitch 0; Range 2000 g

Humidity Test Conditions: Relative humidity 90%; Temperature: 40 °C; Time: 96 hours

<table>
<thead>
<tr>
<th>Final Finishing</th>
<th>Unit: g Before</th>
<th>Unit: g After</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INNOSTAN CT-15</strong></td>
<td>1461.1 ±54.7</td>
<td>1426.5 ±115.9</td>
</tr>
<tr>
<td>Immersion Sn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HASL</td>
<td>1489.4 ±97.8</td>
<td>1438.7 ±147.3</td>
</tr>
<tr>
<td>ENIG</td>
<td>1522.8 ±188.2</td>
<td>1501.5 ±136.6</td>
</tr>
</tbody>
</table>

Conclusions:
• The influence of humidity test on solderability INNOSTAN® CT-15 Immersion Sn is not significant;
• The solderability of INNOSTAN® CT-15 Immersion Sn deposits is very similar and close to that of HSAL before after humidity aging, and slightly lower than that of ENIG deposits.
• The ball shear strength for all test samples are higher than 1300 g (industrial standard is 800 g) after 96 hours humidity aging.
Excellent Soldering After Reflow Test with Stencil Printing

After 4X Reflow  After 4X Reflow  After 6X Reflow
Reliability Test Data - Solderability

Wetting Balance

As Received

Baking 4 hr@155ºC
Reliability Test Data - Solderability

Wetting Balance

1X Reflow after Baking

2X Reflow after Baking
Wetting Balance

Reliability Test Data - Solderability

3X Reflow after Baking

4X Reflow after Baking
• All conditions showed excellent wetting performance.

• Even pass 4 times reflow after dry baking aging for 4 hours at 155ºC (it used for simulating for the growth of Sn/Cu IMC layer over 12 months), INNOSTAN® CT-15 remains outstanding Solderaility performance.

• Wetting balance results of INNOSTAN® CT-15 are better than other conventional Immersion Tin finishing.
Surface Insulation Resistance (SIR) aim is mainly exposed to the samples under specified temperature and humidity conditions, to measure the insulation resistance according to IPC-TM-650 2.6.3.3B method. The acceptance Criteria is:

Insulation resistance > 1000MΩ  
Dendritic growth \leq 25\% original spacing

<table>
<thead>
<tr>
<th>Specimen Position</th>
<th>Specimen 1#</th>
<th>Specimen 2#</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1#</td>
<td>2#</td>
</tr>
<tr>
<td></td>
<td>P1</td>
<td>P2</td>
</tr>
<tr>
<td>Before at room Temp</td>
<td>8.51E+10</td>
<td>6.63E+10</td>
</tr>
<tr>
<td>24h</td>
<td>2.89E+09</td>
<td>1.74E+09</td>
</tr>
<tr>
<td>96h</td>
<td>6.45E+09</td>
<td>6.00E+09</td>
</tr>
<tr>
<td>168h</td>
<td>8.27E+09</td>
<td>1.24E+10</td>
</tr>
<tr>
<td>After at room Temp</td>
<td>4.03E+10</td>
<td>3.85E+10</td>
</tr>
<tr>
<td>Result</td>
<td>Pass</td>
<td>Pass</td>
</tr>
</tbody>
</table>
Reliability Test Data - SIR

SIR Chart

- 1.00E+12Ω
- 1.00E+11Ω
- 1.00E+10Ω
- 1.00E+09Ω
- 1.00E+08Ω
- 1.00E+07Ω
- 1.00E+06Ω
- 1.00E+05Ω
- 1.00E+04Ω
- 1.00E+03Ω
- 1.00E+02Ω
- 1.00E+01Ω
- 1.00E+00Ω

Tested at various temperatures and times.
Ionic contamination is a critical consideration for Automobile PCB. High ionic contamination may cause electro-migration of the circuits to short or open defects.

- Typical limit is not more than 1.5 µg/cm² listed in IPC standard. So far, the end-users normally upgrade this limit not more than 0.8 µg/cm².

- **INNOSTAN® CT-15** contains a special component which named neutralized agent NA-10 to further reduce ion contamination to below 0.5 µg/cm². This chemical could deep clean compounds residue inside solder-mask capillaries and cracks.

- UV treatment before immersion Tin found to be a key point for Ionic contamination, especially for matt Soldermask. UV light could help to cure Soldermask more completely to reduce the capillaries and cracks. The optimum UV light intensity is about 2000 mj per cm² and it should be checked regularly.
Reliability Test Data - Ionic Contamination

1. 测试报告，报告编号：GZFL201500870
   日期：2015年4月1日
   发布：第2页 共3页

1.2 测试前准备条件：
   产品类型：PCB
   测试条件：

<table>
<thead>
<tr>
<th>项目</th>
<th>测试结果</th>
<th>项目描述</th>
<th>结论</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCB</td>
<td>0.315 ppm</td>
<td>无污染</td>
<td>Pass</td>
</tr>
</tbody>
</table>

## Contamination vs Time

The graph above illustrates the contamination level over time, showing a steady state of contamination without any significant increase or decrease.
Subject: Immersion TIN Material Approval

Manufacturer: INNOTECH
Brand: INNOSTAN
Model Number: CT-15

Qualification tests have been performed on sample boards produced under supervision of CML.

The immersion tin finishing was applied on a vertical line at Starem plant.

All samples were tested following ES60's internal quality regulations.

Based on the sample qualification test, an onsite Audit of the Starem production facility was performed with positive results.

After reviewing and analyzing the Sample evaluation results, EGO concluded that INNOTECH Immersion Tin product INNOSTAN CT-15 is qualified for use on EGO printed circuit boards.

The above statement does not release the producing facility from its responsibility to plan and execute its own process qualification of INNOSTAN CT-15.

With Best Regards

Company: EGO Elektronikzentrale GmbH
Name: Dietz, Andreas
Title: Vice Director QM Supplier
Signature: [Signature]
Date: 06.06.2019

To Whom it may concern

Subject: Immersion Tin Material Approval

Manufacturer: INNOTECH
Brand: INNOSTAN
Model Number: CT-15

Qualification tests have been performed on sample boards produced under supervision of CML.

The immersion tin finishing was applied on a vertical line at Starem plant.

All samples were tested following Murrelektronik's internal quality regulations.

Based on the sample qualification test, an onsite Audit of the Starem production facility was performed with positive results.

After reviewing and analyzing the Sample evaluation results, Murrelektronik concluded that INNOTECH Immersion Tin product INNOSTAN CT-15 is qualified for use on Murrelektronik printed circuit boards, included those intended for Automotive applications.

The above statement does not release the producing facility from its responsibility to plan and execute its own process qualification of INNOSTAN CT-15.

With Best Regards

L.A. Stefan Pittsch
Supplier Quality Manager (SQM) | CM

Oppenweiler, the 30th of July 2019
Approval & Qualification

SGS evaluation report, SGRL201804030_03 dated 2018-06-28, can be provided upon request for review.
Approval & Qualification

Innotech Subcontracting Service

ISO 9001

The Certificate of Quality Management System

Certificate No.: 5001800332005

Tag Standard (ZhuHai) Technology Co., Ltd.

Registered address: No. 101, No. 2, Shengji Road, Hengqin, Zhuhai, Guangdong, China

Certification validity: From 2018-12-27 to 2021-12-26

Validity: 3 years

The effectiveness of the Certificate is subject to periodic revision. The holder of the Certificate shall be committed to maintaining its validity to completion of its period of validity. The certificate is not transferable.

ShaJing ZhuHai
To cope the market demand, in addition to chemistry, we also provide Horizontal line for Immersion Tin deposition. It designs and manufactured by our team. Our production system not only perfect match with INNOSTAN® CT-15 system, but also enhance overall efficiency as well as productivity.
Line Features with Advantages

- The integrated modules with UV machine and Jet-scrubbing unit;
- Sliding structure for tolerance of heat expansion and contraction without any shape changes over the years;
- Long main Tin bath result in high productivity with unique gears transmission boxes;
- On-line sensors with auto-dosing systems to control the chemicals continuously;
- The optimum quality and reliability for the finished panels;
- Simple straight exterior design without complicated auxiliary facilities such as Copper re-generation unit and Tin reduction system.
### Equipment - Horizontal Mode

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Panel Size</td>
<td>800mmx 630mm</td>
</tr>
<tr>
<td>Min. Panel Size</td>
<td>150mmx100mm</td>
</tr>
<tr>
<td>Min Board Thickness</td>
<td>0.4mm</td>
</tr>
<tr>
<td>Max. Board Thickness</td>
<td>3.2mm</td>
</tr>
<tr>
<td>Aspect Ratio</td>
<td>1:8</td>
</tr>
<tr>
<td>Min. Hole Size</td>
<td>0.3mm</td>
</tr>
</tbody>
</table>

- Total Solution (Chemistry + Equipment)
- Competitive Cost (20% - 40% lower than general market price)
- 3 years hardware guarantee (except consumable parts)
- Package deal offer
“One Stop Shop” Support

- Excellent Product Quality
- Tailor made Equipment Capability
- Full Supply chain service
- Focus and Unique
- Global Network
- Product Knowhow and hands on field experience

CML – More than a manufacturer
Appendix – Storage and packaging requirement

To ensure good Solderability after long time storage, packaging should be kept under the following conditions:

• Use clean white paper to separate the panels one by one;
• Keep the panels in sealed PP or PE bags without damage;
• Storage temperature shall not be higher than 25°C;
• Relative humidity shall be lower than 55%;
• Keep away from acids, alkaline and Sulphur compounds.
Let’s begin by understanding your requirements and expectations