沾錫能力測試機

SOLDERABILITY TESTING

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用途

1. 電路板沾錫能力測定。
2. SMT零件.DIP零件，銲接曲線參考數據模擬。
3. 助焊劑及錫膏品質管制，不良鑑定。

符合規範的沾錫能力測試方法

1.舊有的測試方法的影響

2.符合規範的沾錫能力條件

一.規範所認可的沾錫能力測試機

二.規範認可的測試數據

- 依IPC-X-804B 4.4.1的規定，沾錫平衡所用的試驗儀器，至少應具備有下列各部份的組合，才能算是完整的儀器。

1. 具有控溫精密的錫槽。
2. 能將錫槽上下移動的機構及精密控制系統。
3. 精密天平或微力量測試裝置。
4. 測試結果紀錄器。
5. 相關硬體及分析軟體。

- 這種測試方法在全世界公認是最佳吃錫性測試法，早在數十年前即在歐洲被提出直至今日已有多項法規明文規定於允收準則及操作規範中。

Signal Conditioner 信號產生器

Chart Recorder 曲線記錄器

Clips 夾具

Specimen 樣品

Solder bath 錫槽

Heater 加熱器

Control 電腦控制

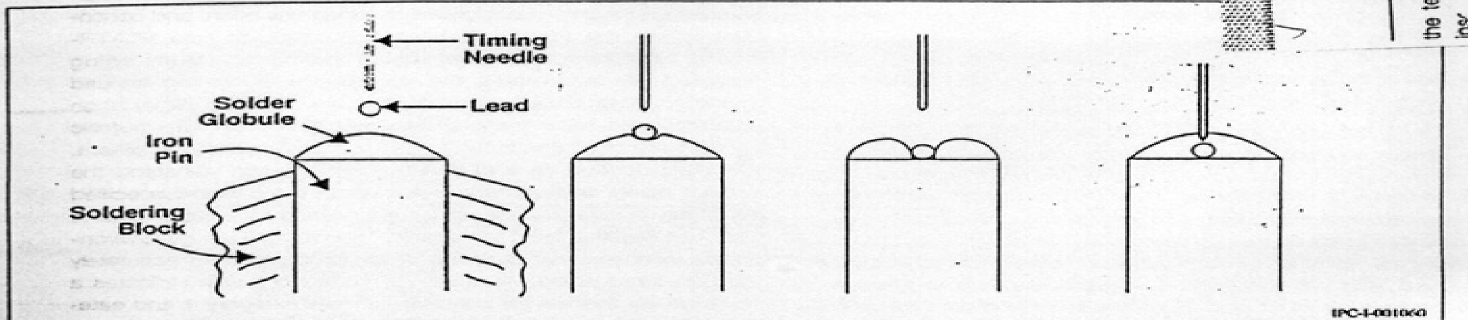


Figure 11 Globule test method

immersion into the globule shall be 10 ±1 mm/sec.

The time elapsing between the moment that the lead bisects the solder and when the solder flows around and contacts the timing needle is the soldering time. (See Figure 11.)

5.0 PREPARATION FOR DELIVERY

This section is not applicable to this standard.

6.0 NOTES

6.1 Test Equipment Sources The equipment sources described below, represent those currently known to the industry. Users of this document are urged to submit additional source names as they become available, so that this list can be kept as current as possible.

6.1.1 Tests A, B, C, D Hybric Machine Products, P.O. Box 826, Canon City, CO 81215, (719) 275-1531

Multicore Solders, Cantiague Rock Road, Westbury, NY 11590, (516) 334-7997

Robotic Process Systems, 4420 Shopping Lane, Simi Valley, CA 93063, (805) 583-5805

Williams Machine, 2092 W. Main St., Norristown, PA 19403, (215) 539-1123

6.1.2 Tests E & F Convey AB, Harpsundsv 113, 12440 Baudhalen, Sweden

G.E.C, Hirst Research Centre, U.K.

Hollis Automation, 15 Charron Ave., Nashua, NH 03063, (603) 889-1121

Kester Solder, 515 E. Touhy, Des Plaines, IL 60018, (708) 297-1600

Metronelec, 67 Boulevard National 92500 Rueil Malmaison, France (USA Distributor—Paradigm Electronics, 4 Crown Ridge Rd., Westborough, MA 01581, (508) 870-0091.)

Multicore Solders, Cantiague Rock Road, Westbury, NY 11590, (516) 334-7997

6.1.3 Test G Multicore Solders, Cantiague Rock Road, Westbury, NY 11590, (516) 334-7997

6.1.4 Steam Aging Equipment Express Test Corporation, 977 Benecia Avenue, Sunnyvale, CA 94086, (805) 583-5805

MountainGate Engineering, 540 Division Street, Campbell, CA 95008, (408) 866-5100

Robotic Process Systems, 4420 Shopping Lane, Simi Valley, CA 93063, (805) 583-5805

Zentek Scientific Systems, 3520 Yale Way, Fremont, CA 94538, (415) 651-1581

Additional drawings are available from IPC.

6.1.5 Grid Reticles Bender Associates, 5030 South Mill Avenue, Suite C2, Tempe, AZ 85252, (602) 820-0900

6.2 Use Of Non-Activated Flux Non-activated, pure rosin fluxes are specified for solderability testing for two main reasons. These are to provide maximum sensitivity during the test and to provide a consistent base flux for testing. Activated rosin materials have different performance characteristics both within a manufacturer and between manufacturers. Therefore, they do not provide as stable a base material for testing purposes as do the non-activated rosin materials.

In order to maintain control of the solids content of the flux due to solvent evaporation, a container with a high aspect ratio is preferred.

6.3 Globule Tester Check And Calibration The temperature of the solder is controlled by means of a thermocouple (with a volume not greater than 0.2 mm^3) inserted in the globule during the following test procedure:

A freshly tinned copper wire of nominal diameter 0.2 mm [0.0080 in] and 50 ±2 mm [1.97 ±0.08 in] long is inserted into

沾錫能力測試機又稱爲沾錫平衡機(Wetting Balance)，其基本原理是一個上昇的錫槽與待測零件，在接觸的刹那所產生的動作流程，而每個動作流程都有力量產生變化，直到力量達到平衡而停止，這個流程我們稱爲沾錫平衡(Wetting Balance)。

沾錫平衡之原理

所謂Wetting Balance"沾錫平衡"，是指舉起的錫池與樣品相遇的剎那間，所產生的兩個不同的動作，每個動作都有力量表現出來，最後當作用力達到平衡而停止後，即完成全部過程，稱爲沾錫平衡。

- 首先出現的是錫池本身的浮力（Bouyancy），所進行的試樣必須而克服此浮力才能進入池內5mm的深度，此種抗拒外物的浮力，也就是阿基米德定律中所說的“已排開同體積的液體重量”，故知浸入的體積愈大，則受到的浮力也愈大。
- 又當清潔的銅面浸入融錫液面之際，若其銲錫性良好時，則錫面也會向上攀升，在交界處形成凹月型接觸，稱爲凹月型或新月型的良好銲性，此時之潤濕力，即稱爲沾錫力量。

沾錫時間

沾錫力量

力量軸

時間軸

A B C D E F G H J

TIME

SOLDER

沾錫曲線的細部解說

A.錫槽舉起接近試片下緣。

B.錫面開始接觸試片下緣(爲方便作圖起見，本圖仍將試片視爲主動體而做上下移動)

C.試樣下沉至預定深度。

D.從C點到D點這一瞬間中，浮力及表面張力(有用的是垂直分力),開始接拔融錫向試片表面攀升。

E.沾錫力開始發揮，漸使上升的攀升解度接近90度。

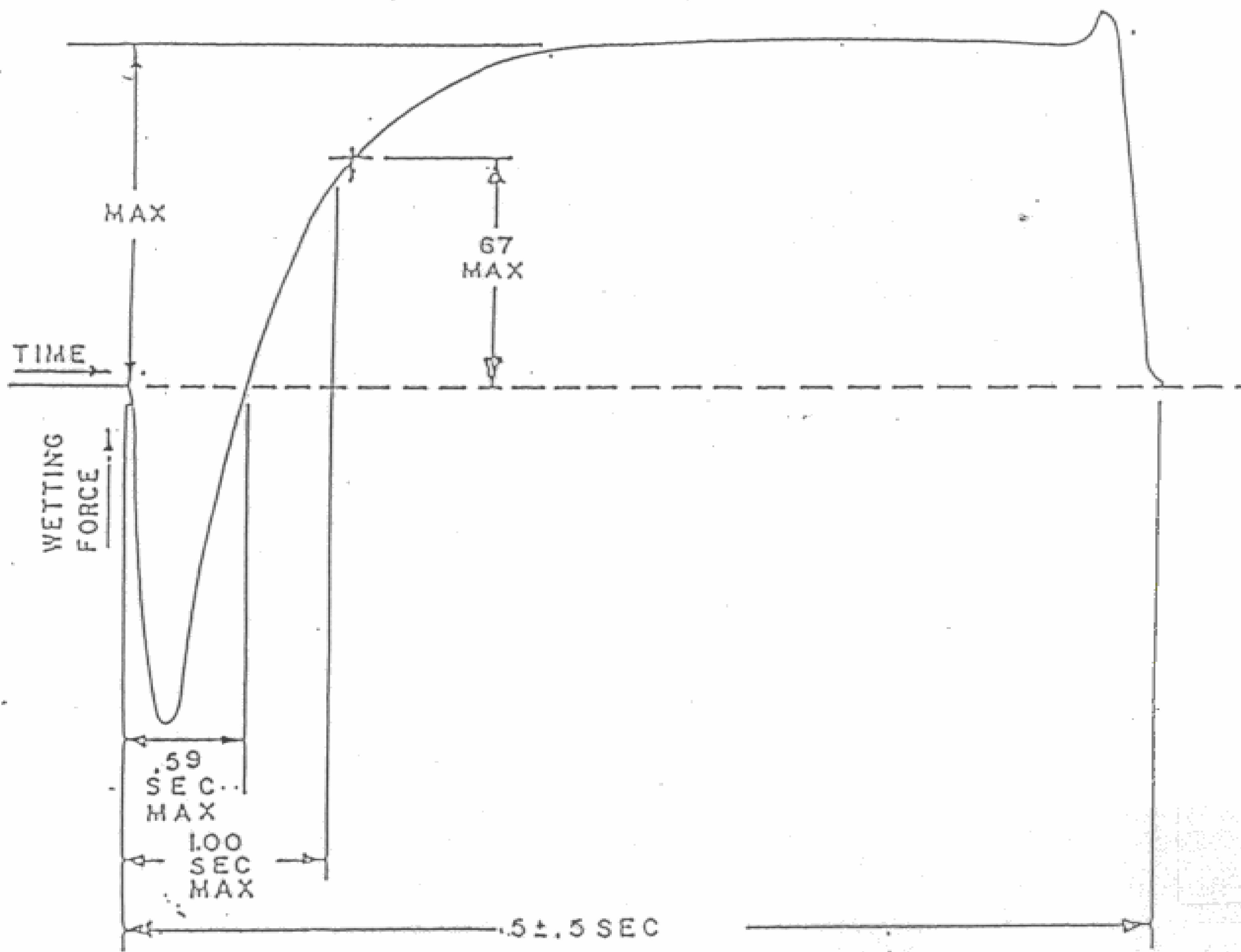
F.錫面已被拉平，此時之沾錫力(Wetting force)與浮力相等，而由B到F的時間則稱Zero Crossing Time，沾錫時間愈短，則焊錫性愈好。

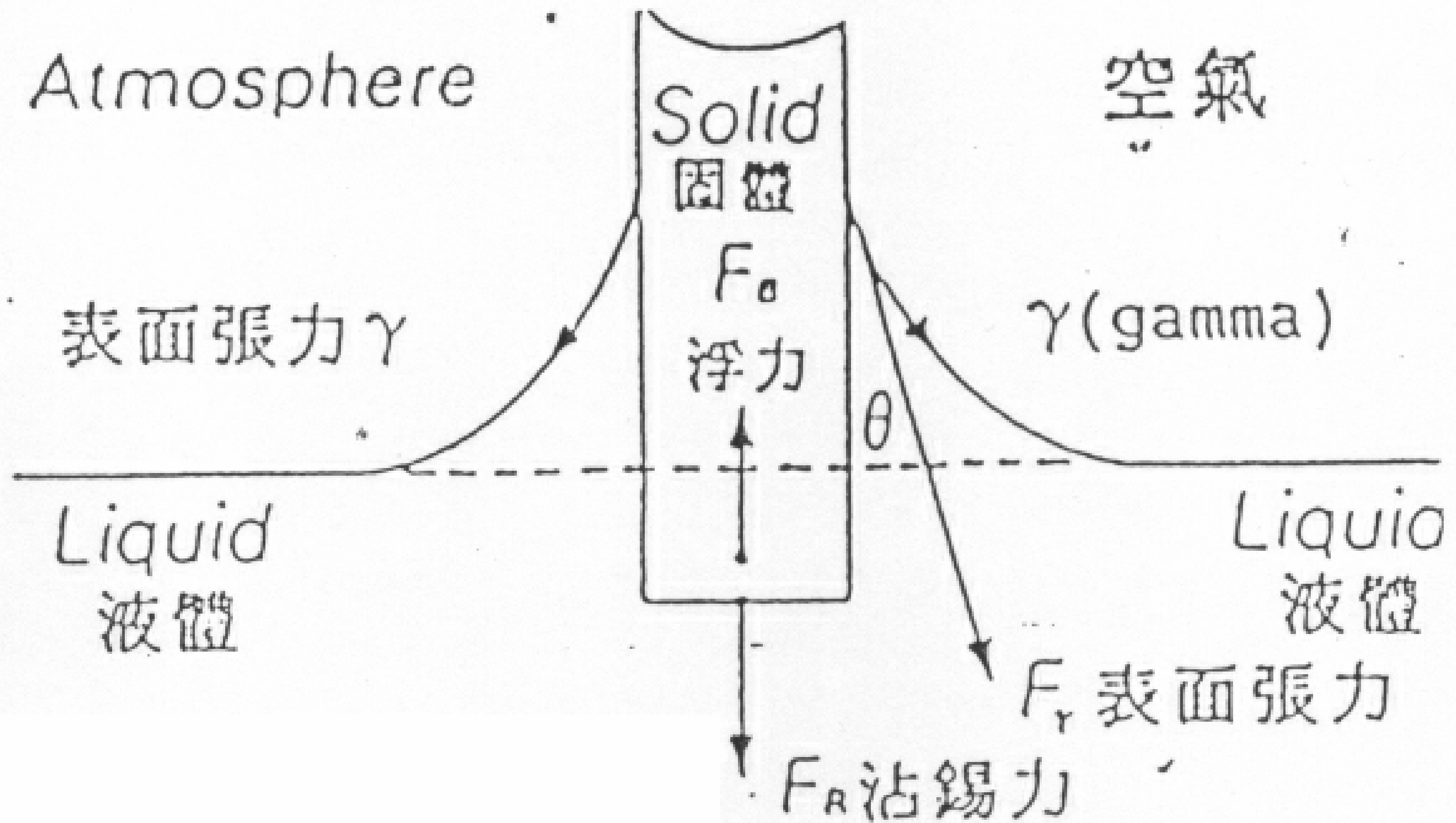
G.沾錫力量到達其最大數值。

H.沾錫試驗完畢的時刻，由此刻起錫槽開始下降而將離開試片。

I.因錫面與試樣之間的上下進出是一種相對的運動，故錫槽之下降，其實就等於是將試片自錫池中拔起，使得液錫的上升力量稍有增加。

J.因試片上多了一些沾上的錫，故重量比試驗前稍重了一些，因此在儀器感受力量的彈簧裝置上，會多出現一小點重(力)量，而表現在紀錄上。


MAX
67
MAX
TIME
WETTING
FORCE
.59
SEC
MAX
1.00
SEC
MAX
.5±.5 SEC

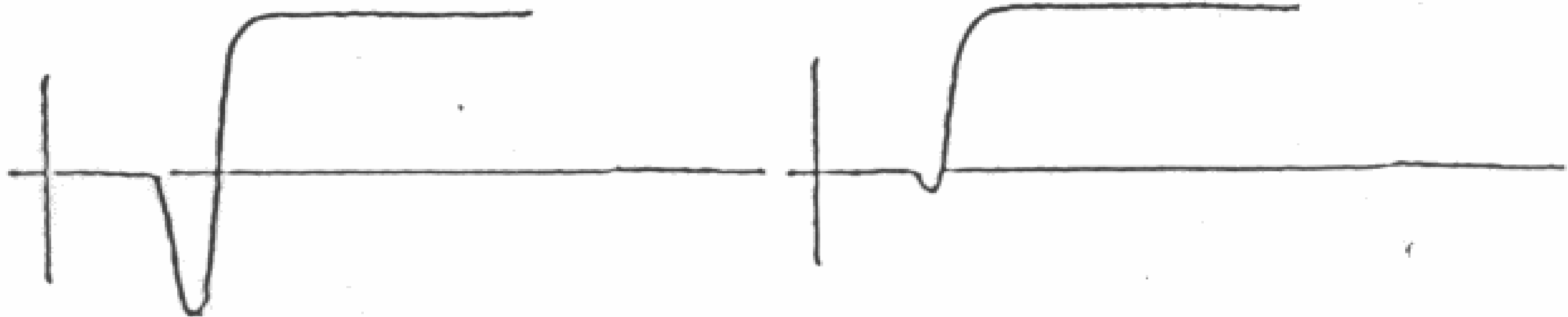


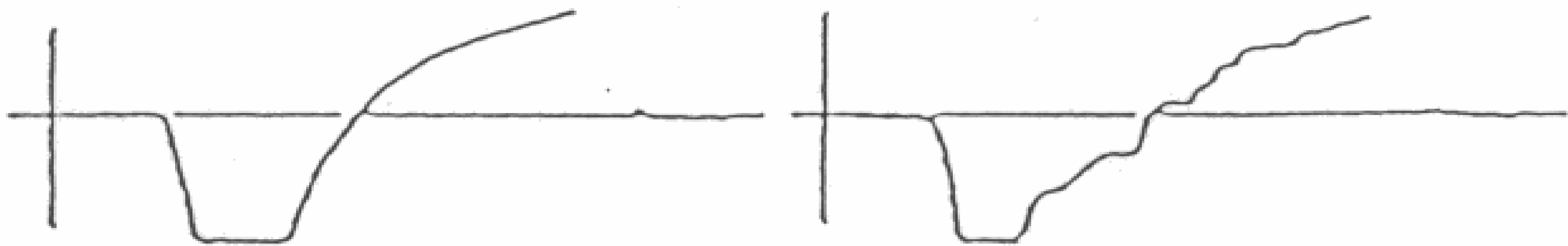
$$Fw = F\gamma \cdot \cos\theta - Fb$$

功能特點：

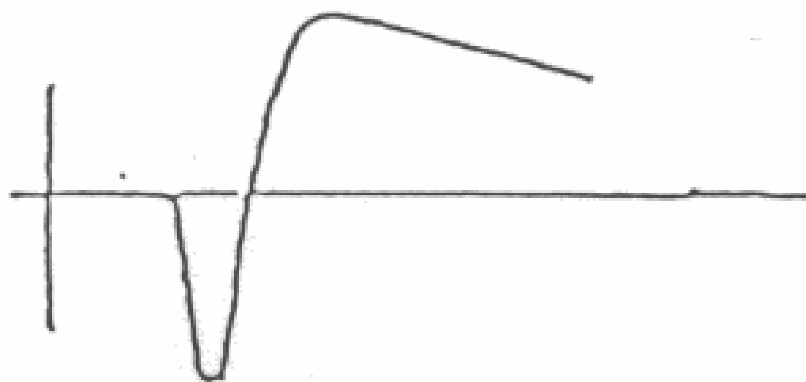
1. 電腦自動控制，精度高．操作簡單。
2. 自動存取測試數據及測試結果。
3. 彩色圖形即時顯示測試結果及數據。
4. 自動移動零件位置，方便多腳測試操作。
5. 可立即判斷PASS/FAIL並顯示不良原因。
6. 合於IPC.IEC.MIL指定規範，並蒙建議使用。(測試範圍含蓋A~G項)
7. 零件測試種類廣泛，包含SMD及傳統零件。
8. 軟體可作多次測試曲線重疊顯示比較。

沾錫平衡結果之判斷





沾錫平衡結果之判斷



(e) SLIGHT DEWETTING

(f) MAJOR DEWETTING

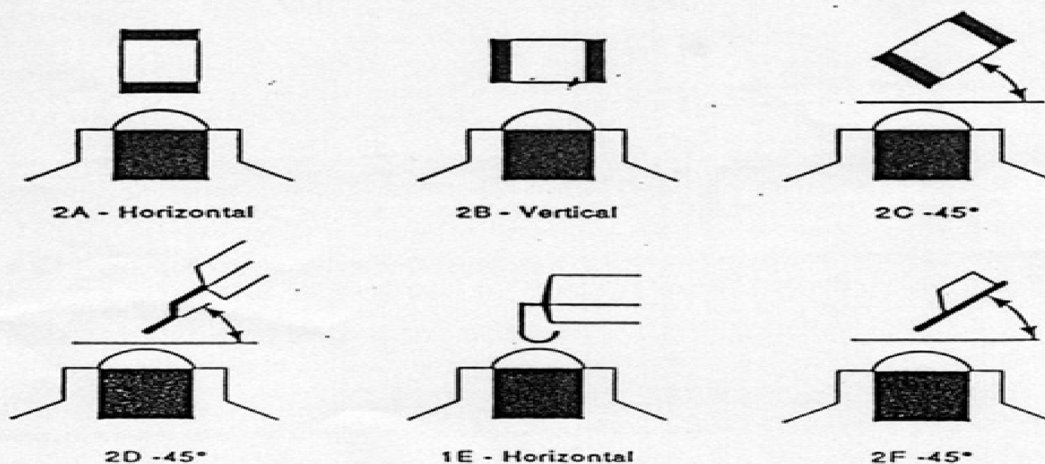
(g) POOR WETTING OR BUOYANT SAMPLE

(h) NON WETTING

Table 2 – Recommended solder globule wetting balance test conditions

Component	Dipping angle	Figure	Immersion depth	Pin size	Globule Weight	Remarks
C0402	Vertical	2B	0,10 mm	2 mm	25 mg	
C0603	Vertical	2B	0,10 mm	2 mm	25 mg	
C0805	Horizontal	2A	0,10 mm	4 mm	200 mg	
C1206	Horizontal	2A	0,10 mm	4 mm	200 mg	
C1812	Horizontal	2A	0,10 mm	4 mm	200 mg	Bath method preferred
R0402	Vertical	2B	0,10 mm	2 mm	25 mg	
R0603	Vertical	2B	0,10 mm	2 mm	25 mg	
R0805	Vertical	2B	0,10 mm	4 mm	200 mg	
R1206	Vertical	2B	0,10 mm	4 mm	200 mg	
SOT 23	45°	2D	0,10 mm	2 mm	25 mg	
SOT 89	45°	2F	0,20 mm	4 mm	200 mg	1 outer pin only
SOT 223	45°	2F	0,25 mm	4 mm	200 mg	1 outer pin only
SOIC 16	45°	2D	0,20 mm	4 mm	200 mg	Remove sufficient leads to avoid bridging between tested leads
SOIC 28	45°	2D	0,20 mm	4 mm	200 mg	
VSO 40	45°	2D	0,20 mm	4 mm	200 mg	
QFP 48	45°	2D	0,20 mm	4 mm	200 mg	
QFP 160	45°	2D	0,20 mm	4 mm	200 mg	
PLCC 44	Horizontal	2E	0,10 mm	4 mm	200 mg	
PLCC 84	Horizontal	2E	0,10 mm	4 mm	200 mg	
MINIMELF	Vertical	2B	0,25 mm	4 mm	200 mg	
SOD 80	Vertical	2B	0,20 mm	4 mm	200 mg	

NOTE - The recommended dwell time is 5 s, except for SOT 89 and SOT 223 components where 10 s is recommended.



Set the temperature of the solder to 235 °C ± 3 °C. Note that the globule blocks should never be heated without solder covering the iron pin. Heating the uncovered pin could cause the iron to become oxidized and difficult to wet.

The specimen is mounted in the appropriate holder, to give the desired dipping angle and the termination to be tested is centred above the solder globule. Recommended dipping angles and immersion depths for a typical range of components are given in table 2.

沾錫能力測試機的好處

- 1.提高品質,增加訂單,提高營業額
- 2.控管新零件的品質
- 3.增加與同業的競爭力
- 4.得到客戶的認同