

Taiflex軟板材料簡介

基板事業處 產品開發

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TAIFLEX SCIENTIFIC CO., LTD.
台虹科技股份有限公司

大 綱

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 - 2)生產流程
 - 3)產品特性

Taiflex軟板材料種類

單(雙)面銅箔FCCL



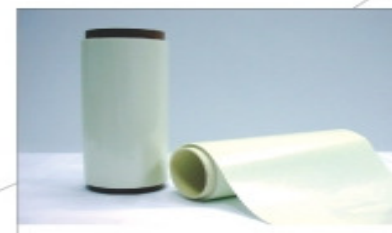
覆蓋膜Cover-layer



複合板 Composite Film



純膠 Bonding sheet



3L單面板

Cu
Adhesive
PI

PI
Adhesive
release paper

PI
Adhesive
PI
Adhesive
PI

release paper
Adhesive
release film

3L雙面板

Cu
Adhesive
PI
Adhesive
Cu

2L單面板

Cu
PI

2L雙面板

Cu
PI
Cu

補強板 Stiffener



PI
Adhesive
PI
Adhesive
PI
Adhesive
release film

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TAIFLEX

Taiflex軟板材料產品總覽

		FCCL		CVL	純膠	複合板	補強板
		2L	3L				
PI	無鹵素	2LP 2BP 2FP 2MP	TH	FH FG* FB# FHB# FHW◎	BH BT*	MH	RH

*為High-Tg產品

◎ FHW 為白色CL

FB #為Black AD之黑色CL；FHB#為Black PI之黑色CL

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FCCL產品特性

測試要求

IPC-4204

IPC-TM-650

UL 94 V & VTM

環保規範

RoHS

國際無鹵規範

IPC-4101B

JPCA-ES-01

IEC 61249-2-21

Sb & Bi-free

物化特性

耐電致離子遷移特性

優良

電氣特性

優良

操作性

優良

柔軟度&組裝反發力

低

FCCL-2L

FCCL - 2L產品編碼原則

2LP S E 10 10

Taiflex 2L Types

Single side

2LP

Double side

預計停產
2BP

2FP

2MP

Copper Foil Side

S : Single-side

R : Double-side

Copper Foil Types

E : ED Cu

R : RA Cu

PI Film Thickness

10

1mil

05

1/2mil

Copper Foil Thickness

05

1/2 oz

03

1/3 oz

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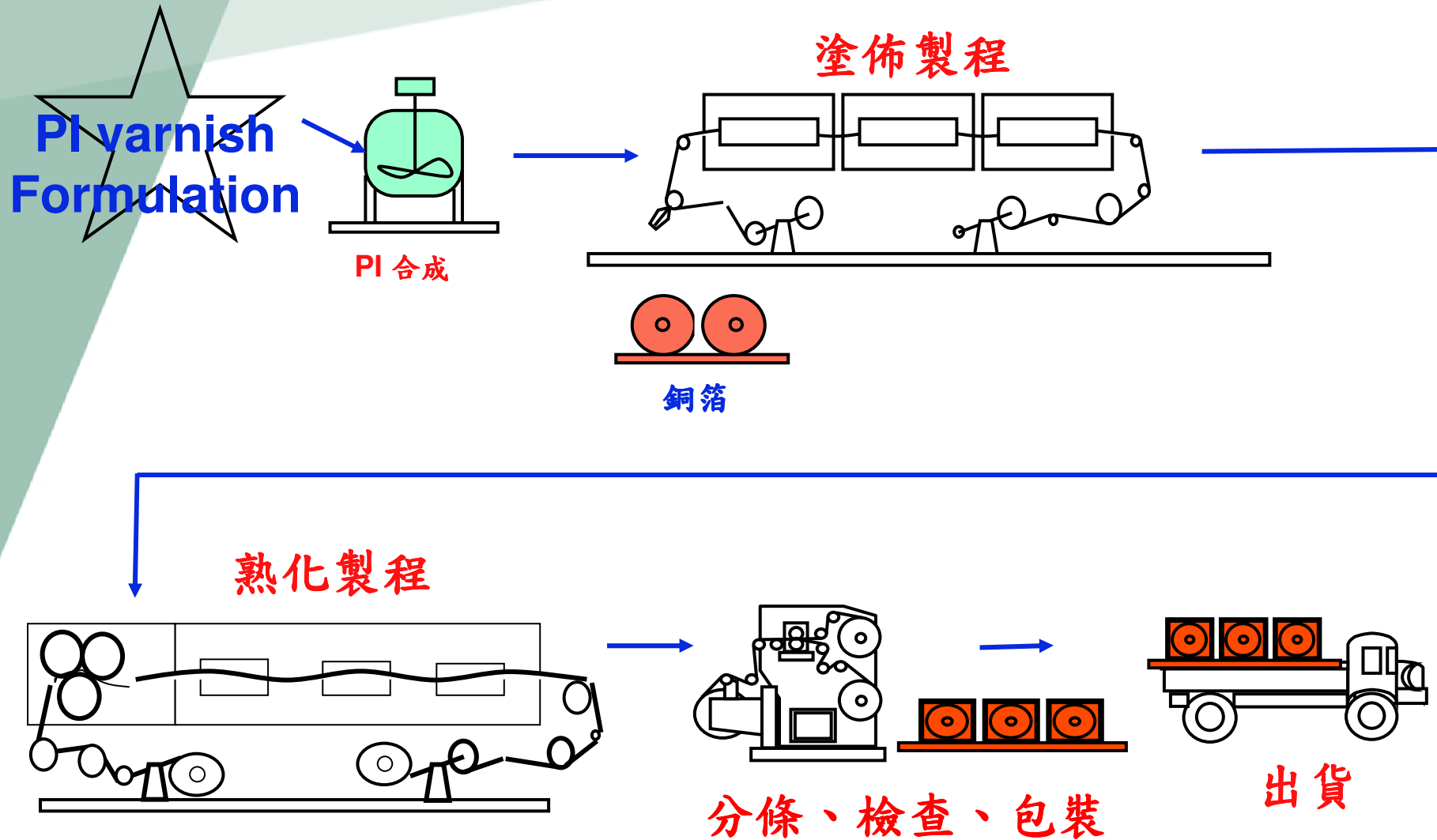
TAIFLEX

FCCL

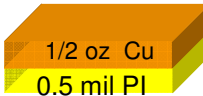
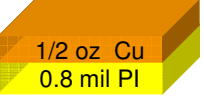
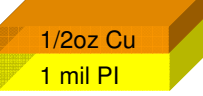
2L Single-side

2LP series

2L S/S 2LP 生產流程



2L S/S 2LP 產品特性

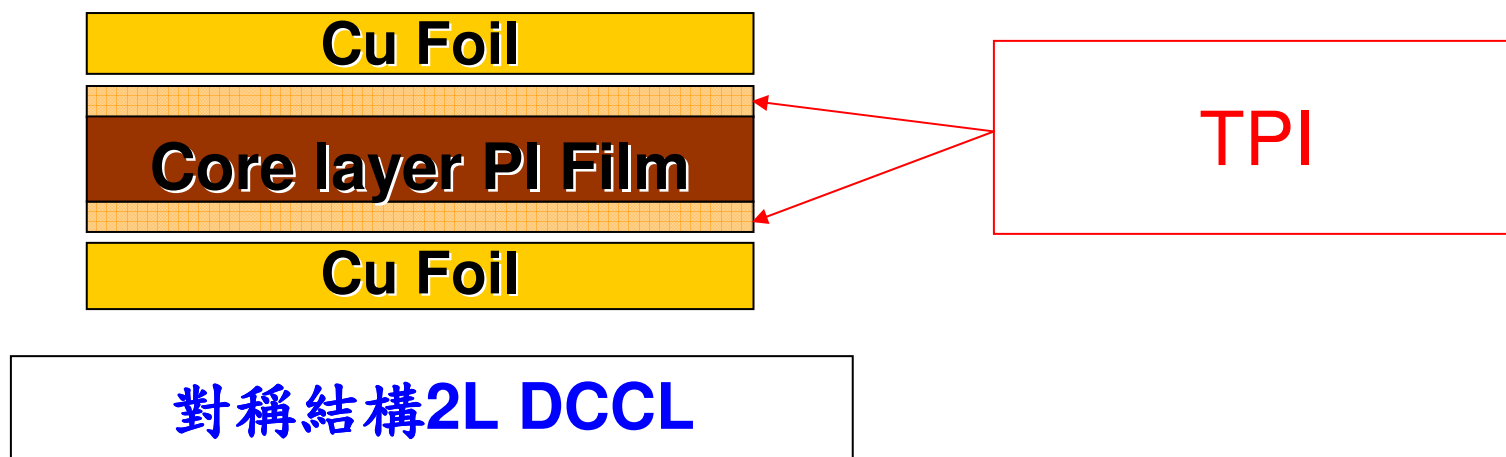
產品特性				單位	2LPSE0505	2LPSE0805	2LPSE01005	Testing Method
								
基本特性	Peel strength (180°)		As received	kgf/cm	≥ 0.7	≥ 0.7	≥ 0.7	IPC-TM-650 2.4.9
	Dimensional stability	Method B	MD	%	±0.10	±0.10	±0.10	IPC-TM-650 2.2.4
			TD					
		Method C	MD	%	±0.10	±0.10	±0.10	
			TD					
Solder			300℃/30s	Pass	Pass	Pass	IPC-TM-650 2.4.13	
機械特性	Tensile strength			MPa	>300	>300	>300	IPC-TM-650 2.4.19
	Elongation			%	23~27	25~28	23~26	IPC-TM-650 2.4.19
	Modulus			GPa	>6.0	>6.0	>6.0	IPC-TM-650 2.4.19
電氣特性	Dielectric Constant (Dk)		1MHz	—	3.6~3.8	3.6~3.8	3.6~3.8	IPC-TM-650 2.5.5.3
	Dissipation Factor (Df)		1MHz	—	0.01~0.03	0.01~0.03	0.01~0.03	IPC-TM-650 2.5.5.3
	Volume resistivity (Rv)		1000V	Ω cm	≥ 1.0E+14			IPC-TM-650 2.5.17
	Surface resistance (Rs)		1000V	Ω	≥ 1.0E+13			
其他特性	PI	Tg	DMA 1 MHz	℃	310~320			DMA
		CTE	TMA 25~200℃	PPM/℃	20~25			IPC-TM-650 2.4.24.5
	Flammability				V-0			UL 94

FCCL

2L Double-side

2BP / 2FP series

2L D/S– 2BP & 2FP結構



2BP v.s 2FP 比較

FCCL Properties of FRS Grade

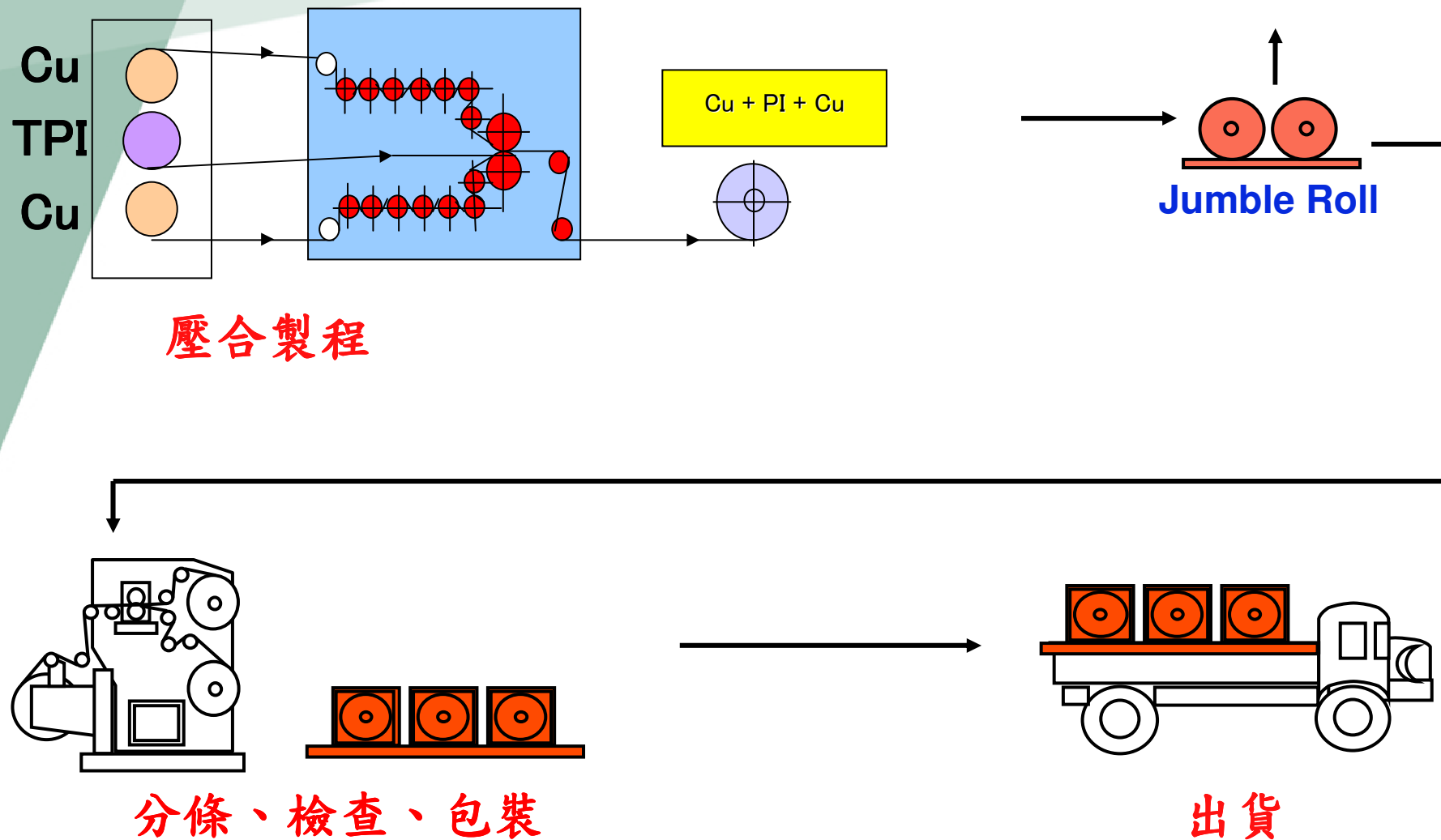
			2FP	2BP	
			FRS-Grade #SW	FC-Grade	
				#SW	normal
Dimensional stability(%) Kaneka method	After etching	MD	-0.02	-0.02	-0.04
		TD	-0.02	-0.02	0.04
	After 150°C30min	MD	-0.01	-0.01	-0.01
		TD	-0.01	-0.01	0.01
Solder resistance Kaneka method	23°C,55%RH × 24h		>350°C	300°C	300°C
	85°C,85%RH × 72h		300°C	260°C	260°C
Peel strength (N/cm) 90° peel	as received	Side A	17	17	13
		Side B	17	17	13

Laminating condition : 380°C, 0.8t/250mm, ED

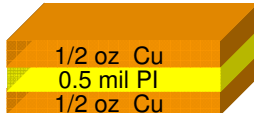
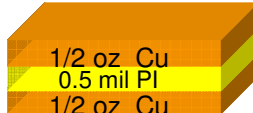
在solder resistance表現上，TPI FRS-type表現優異

◎上述測試結果僅供參考，相關規範請以產品規格書為依歸

2L D/S 2BP & 2FP 生產流程



2L D/S 2BP v.s 2FP 產品特性

產品特性				單位	2BPDE0505	2FPDE0505	Testing Method
							
基本特性	Peel strength (180°)		As received	kgf/cm	≥ 0.7	≥ 0.7	IPC-TM-650 2.4.9
	Dimensional stability	Method B	MD	%	±0.10	±0.10	IPC-TM-650 2.2.4
			TD				
		Method C	MD	%	±0.10	±0.10	
			TD				
Solder			300℃/30s	Pass	Pass	IPC-TM-650 2.4.13	
機械特性	Tensile strength			MPa	>160	>160	IPC-TM-650 2.4.19
	Elongation			%	42~46	50~55	IPC-TM-650 2.4.19
	Modulus			GPa	>4.0	>3.2	IPC-TM-650 2.4.19
電氣特性	Dielectric Constant (Dk)		1MHz	—	3.5~3.8	3.5~3.8	IPC-TM-650 2.5.5.3
	Dissipation Factor (Df)		1MHz	—	0.02~0.04	0.02~0.04	IPC-TM-650 2.5.5.3
	Volume resistivity (Rv)		1000V	Ω cm	≥ 1.0E+14		IPC-TM-650 2.5.17
	Surface resistance (Rs)		1000V	Ω	≥ 1.0E+13		
其他特性	PI	Tg	DMA 1 MHz	℃	330~340	340~350	DMA
		CTE	TMA 25~200℃	PPM/℃	16~19	15~18	IPC-TM-650 2.4.24.5
	Flammability				VTM-0	VTM-0	UL 94

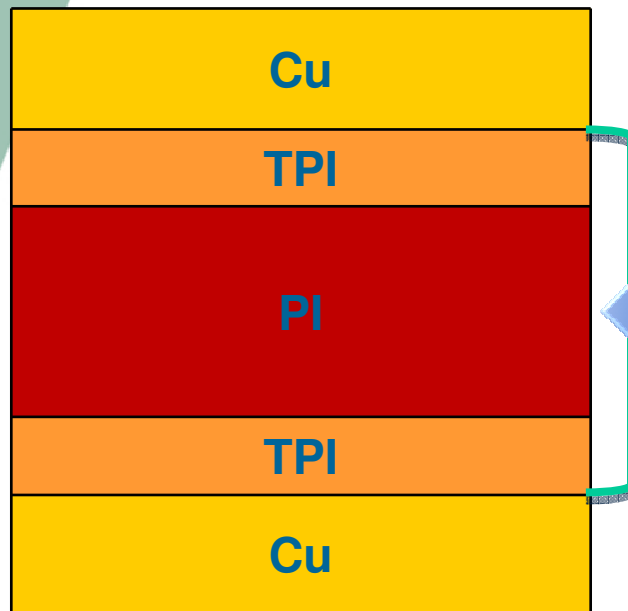
FCCL

2L Double-side

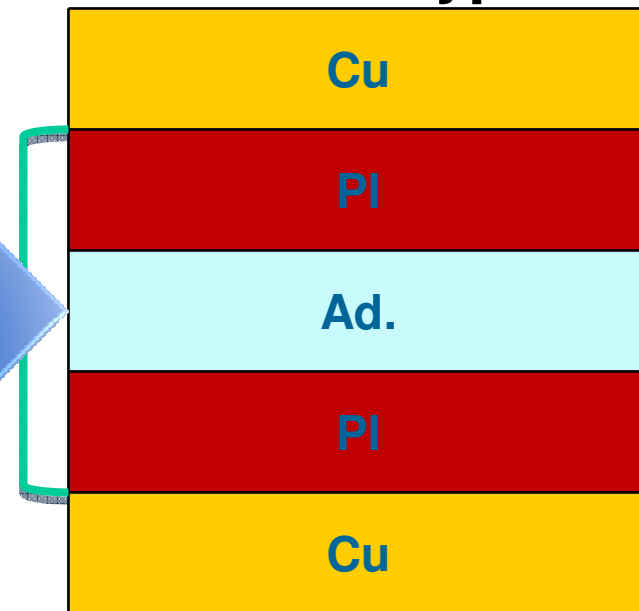
2MP series

2MP D/S產品結構說明

市售2L D/S PI 1.5mil



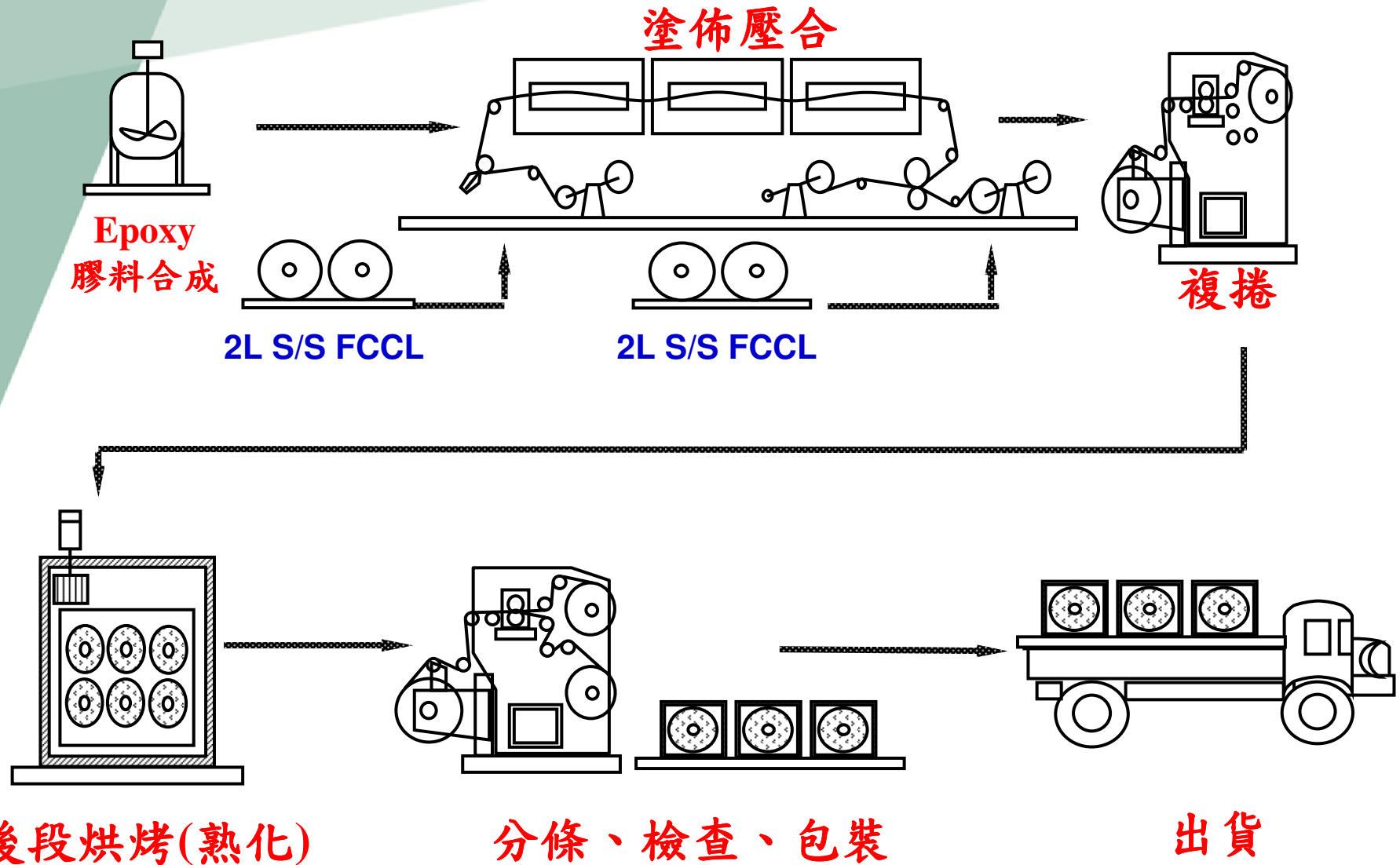
Taiflex D/S 1.5mil
2MP-type



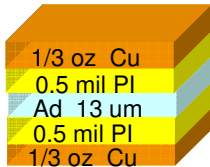
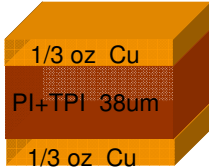
差異

阻抗要求產品

2MP D/S生產流程



2L D/S 2MP v.s 他社 2L產品特性比較

產品特性				單位	2MPDE1503	他社 2L	Testing Method
							
基本特性	Peel strength (180°)		A-side	kgf/cm	1.30	1.60	IPC-TM-650 2.4.9
			B-side		1.30	1.00	
	Dimensional stability	Method B	MD	%	0.031	0.059	IPC-TM-650 2.2.4
			TD		0.012	0.025	
		Method C	MD	%	0.037	0.036	
			TD		0.024	0.004	
	Solder			300℃/30s	Pass	Pass	IPC-TM-650 2.4.13
	電氣特性	Dielectric Constant (Dk)		3GHz		3.36	3.25
5GHz					3.38	3.28	
Dissipation Factor (Df)		3GHz	—	0.0147	0.0084		
		5GHz		0.0144	0.0095		
柔軟度					1.48	1.70	Taiflex
Flammability					V-0	V-0	UL 94

FCCL-3L

FCCL - 3L 產品編碼原則

T H K S 10 10 20

T: Taiflex 3L FCCL

Adhesive Types

H : Halogen Free AD

PI Types

K : Dupont **K**apton

Copper Foil Side

S : Single-side

D : Double-side

PI Film Thickness

10	1mil
05	1/2mil

Copper Foil Thickness

05	1/2 oz
03	1/3 oz

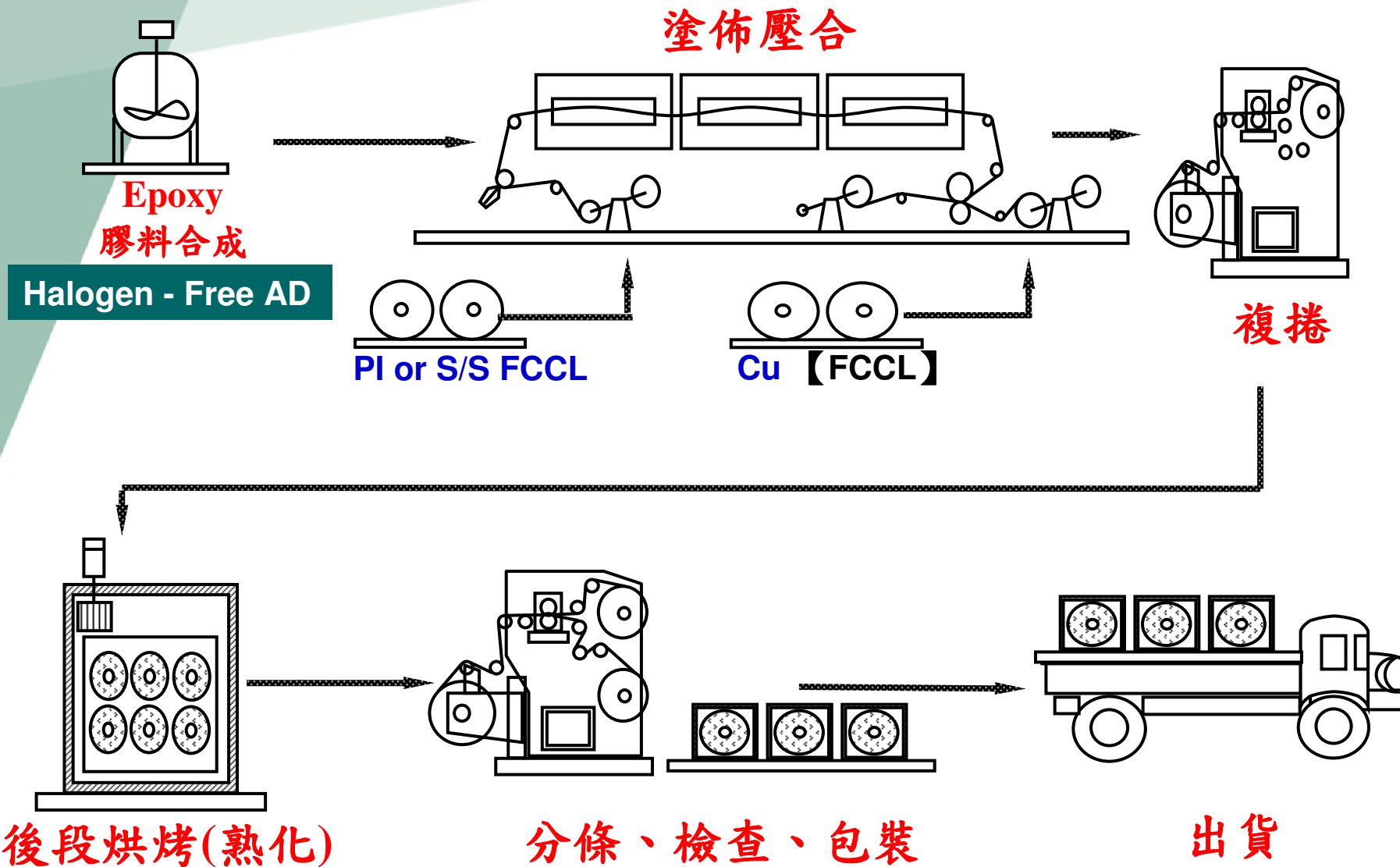
Adhesive Thickness

20	20 um
13	13 um

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 **TAIFLEX**

3L FCCL S/S & D/S 生產流程



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FCCL

**3L Single & Double -side
TH series**

3L S/S & D/S TH產品特性

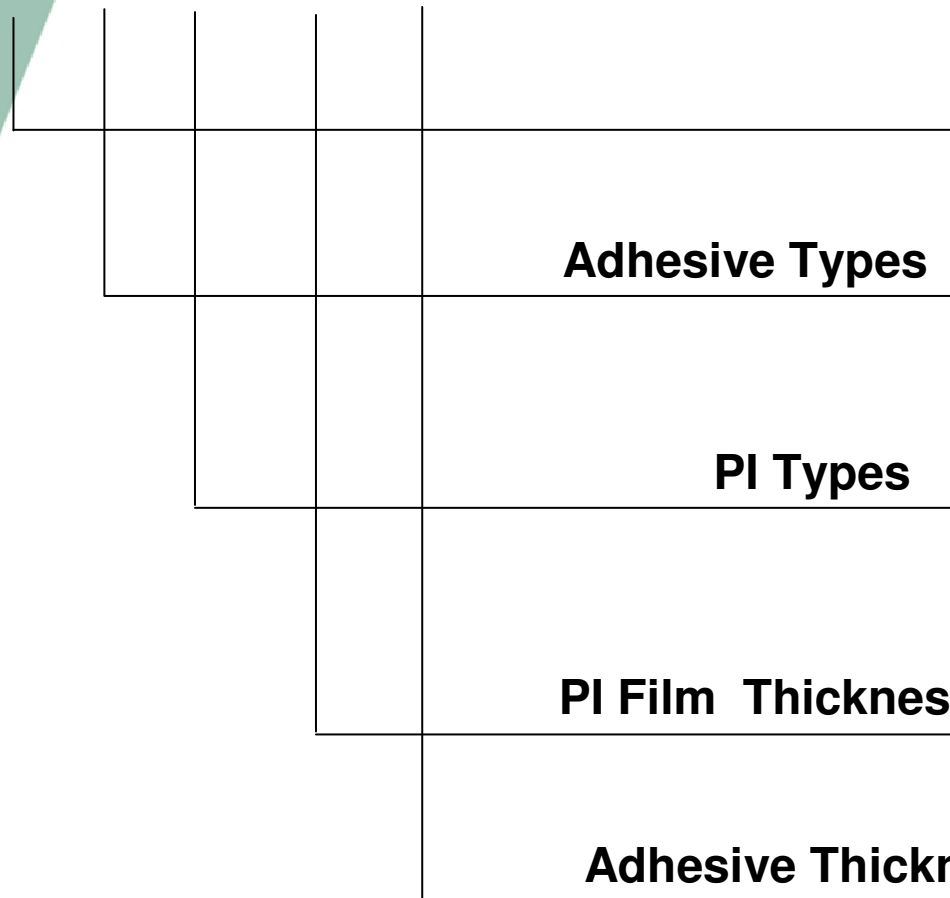
產品特性				單位	THKS050513	THKD050513	Testing Method
基本特性	Peel strength (90°)		As received	kgf/cm	≥ 0.8	≥ 0.8	IPC-TM-650 2.4.9
	Dimensional stability	Method B	MD	%	±0.15	±0.15	IPC-TM-650 2.2.4
			TD				
		Method C	MD	%	±0.20	±0.20	
			TD				
Solder			300℃/30s	Pass	Pass	IPC-TM-650 2.4.13	
機械特性	Tensile strength			MPa	>160	>120	IPC-TM-650 2.4.19
	Elongation			%	58~62	45~50	IPC-TM-650 2.4.19
	Modulus			GPa	>1.1	>1.5	IPC-TM-650 2.4.19
電氣特性	Dielectric Constant (Dk)		1MHz	—	3.6~3.8	3.6~3.8	IPC-TM-650 2.5.5.3
	Dissipation Factor (Df)		1MHz	—	0.04~0.06	0.04~0.06	
	Volume resistivity (Rv)		1000V	Ω cm	≥ 1.0E+14		IPC-TM-650 2.5.17
	Surface resistance (Rs)		1000V	Ω	≥ 1.0E+13		
其他特性	Ad	Tg	DMA 1 MHz	℃	70~80		DMA
		CTE	TMA 25~200℃	PPM/℃	200~250		IPC-TM-650 2.4.24.5
	Flammability				V-0		UL 94



CVL

CVL - 產品編碼原則

F H K 05 25



F: Taiflex CVL

H : Halogen Free AD

G : High TG Halogen Free AD

B : Halogen Free AD **B** Black AD

K : Dupont **K**aptone

T : Taimide **TL**

B : Taimide **BK**

W : PI Coating **W**hite paint

PI Film Thickness

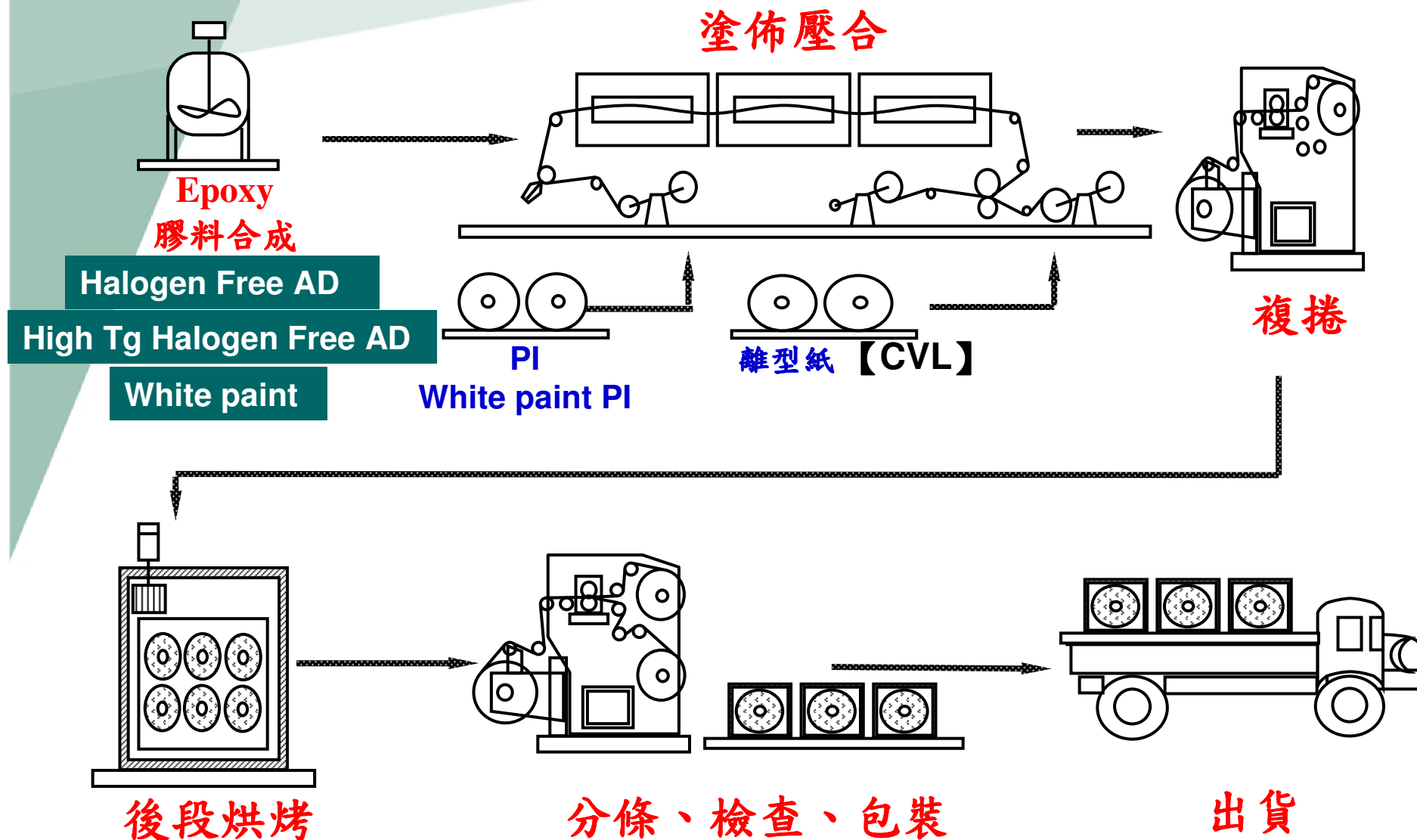
10	1mil
05	1/2mil

Adhesive Thickness

25	25 um
15	15 um



CVL 生產流程



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CVL產品特性

測試要求

IPC-4203

IPC-TM-650

UL 94 V

環保規範

RoHS

國際無鹵規範

IPC-4101B

JPCA-ES-01

IEC 61249-2-21

Sb & Bi-free

物化特性

耐電致離子遷移特性

優良

電氣特性

優良

操作性

優良

柔軟度&組裝反發力

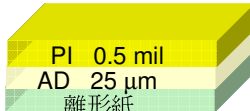
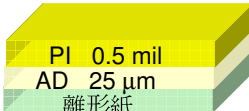
低

CVL

FHK series- Dupont PI

FHT series- Taimide PI

CVL FH 產品特性

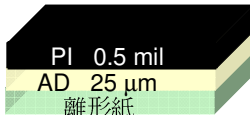
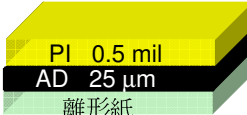
產品特性				單位	FHK0525	FHT0525	Testing Method
							
基本特性	Peel strength (90°)		As received	kgf/cm	≥ 0.7	≥ 0.7	IPC-TM-650 2.4.9
	Dimensional stability	Method B	MD	%	±0.15	±0.15	IPC-TM-650 2.2.4
			TD				
	Solder			300℃/30s	Pass	Pass	IPC-TM-650 2.4.13
	Resin flow			mm	<0.125	<0.125	IPC-TM-650 2.3.17.1
機械特性	Tensile strength			MPa	>100	>100	IPC-TM-650 2.4.19
	Elongation			%	53~58	47~50	IPC-TM-650 2.4.19
	Modulus			GPa	>1.6	>2.0	IPC-TM-650 2.4.19
電氣特性	Dielectric Constant (Dk)		1MHz	—	3.6~3.8	3.6~3.8	IPC-TM-650 2.5.5.3
	Dissipation Factor (Df)		1MHz	—	0.03~0.05	0.03~0.05	
	Volume resistivity (Rv)		1000V	Ω cm	≥ 1.0E+14	≥ 1.0E+14	IPC-TM-650 2.5.17
	Surface resistance (Rs)		500V	Ω	≥ 1.0E+13	≥ 1.0E+13	
其他特性	AD	Tg	DMA 1 MHz	℃	65~75		DMA
		CTE	TMA 25~200℃	PPM/℃	200~250		IPC-TM-650 2.4.24.5
	Flammability			—	V-0	V-0	UL 94

黑色CVL

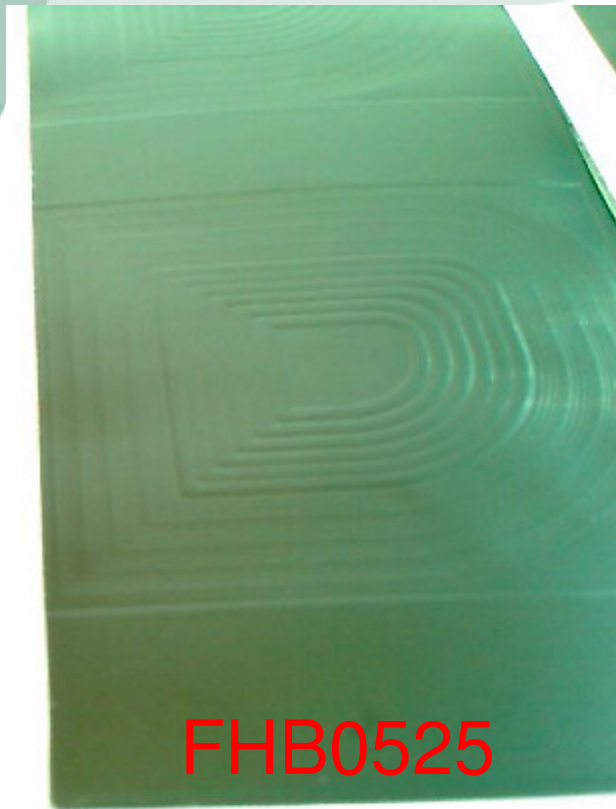
FHB series- Taimide Black PI

FBK series- Taiflex Black Ad

黑色CVL 產品特性

產品特性				單位	FHB0525 	FBK0525 	Testing Method
基本特性	Peel strength (90°)		As received	kgf/cm	≥ 0.7	≥ 0.7	IPC-TM-650 2.4.9
	Dimensional stability	Method B	MD	%	±0.15	±0.15	IPC-TM-650 2.2.4
			TD				
	Solder				300℃/30s	Pass	Pass
Resin flow				mm	<0.125	<0.125	IPC-TM-650 2.3.17.1
機械特性	Tensile strength			MPa	>120	>110	IPC-TM-650 2.4.19
	Elongation			%	40~50	50~60	IPC-TM-650 2.4.19
	Modulus			GPa	>2.0	>1.6	IPC-TM-650 2.4.19
電氣特性	Dielectric Constant (Dk)		1MHz	—	4.0~4.2	4.0~4.2	IPC-TM-650 2.5.5.3
	Dissipation Factor (Df)		1MHz	—	0.04~0.06	0.04~0.06	
	Volume resistivity (Rv)		1000V	Ω cm	≥ 1.0E+13	≥ 1.0E+14	IPC-TM-650 2.5.17
	Surface resistance (Rs)		1000V	Ω	≥ 1.0E+11	≥ 1.0E+13	
其他特性	AD	Tg	DMA 1 MHz	℃	65~75		DMA
		CTE	TMA 25~200℃	PPM/℃	200~250		IPC-TM-650 2.4.24.5
	Flammability			—	V-0	V-0	UL 94
	Gloss		60°	GU	20~25	>100	ISO 2813 JIS Z8741
	Haze			%	92.86	>100	ISO 14782 JIS K 7136
	TT			%	0.37	0	

Black CVL產品比較



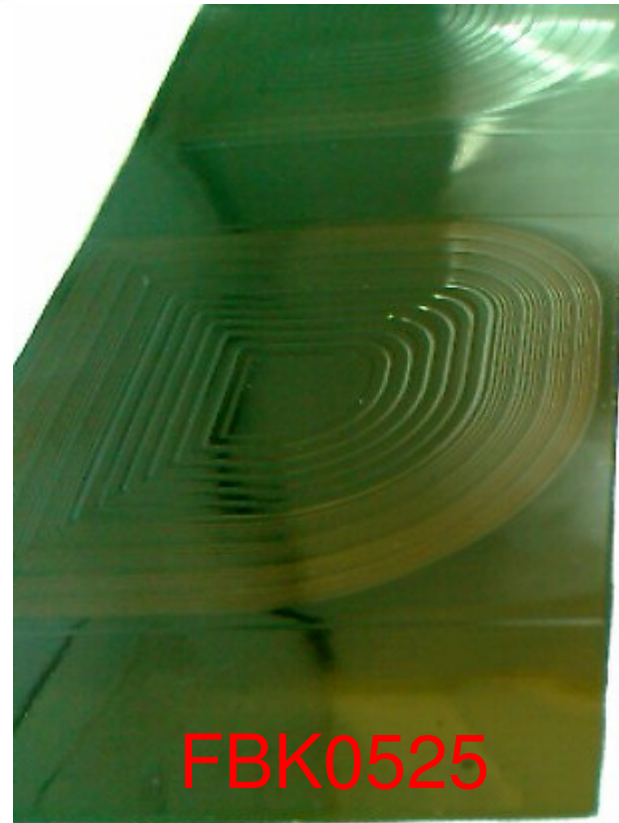
FHB0525

◎霧面

◎Black PI

◎成本較高

◎遮蔽性佳



FBK0525

◎亮面

◎Black AD

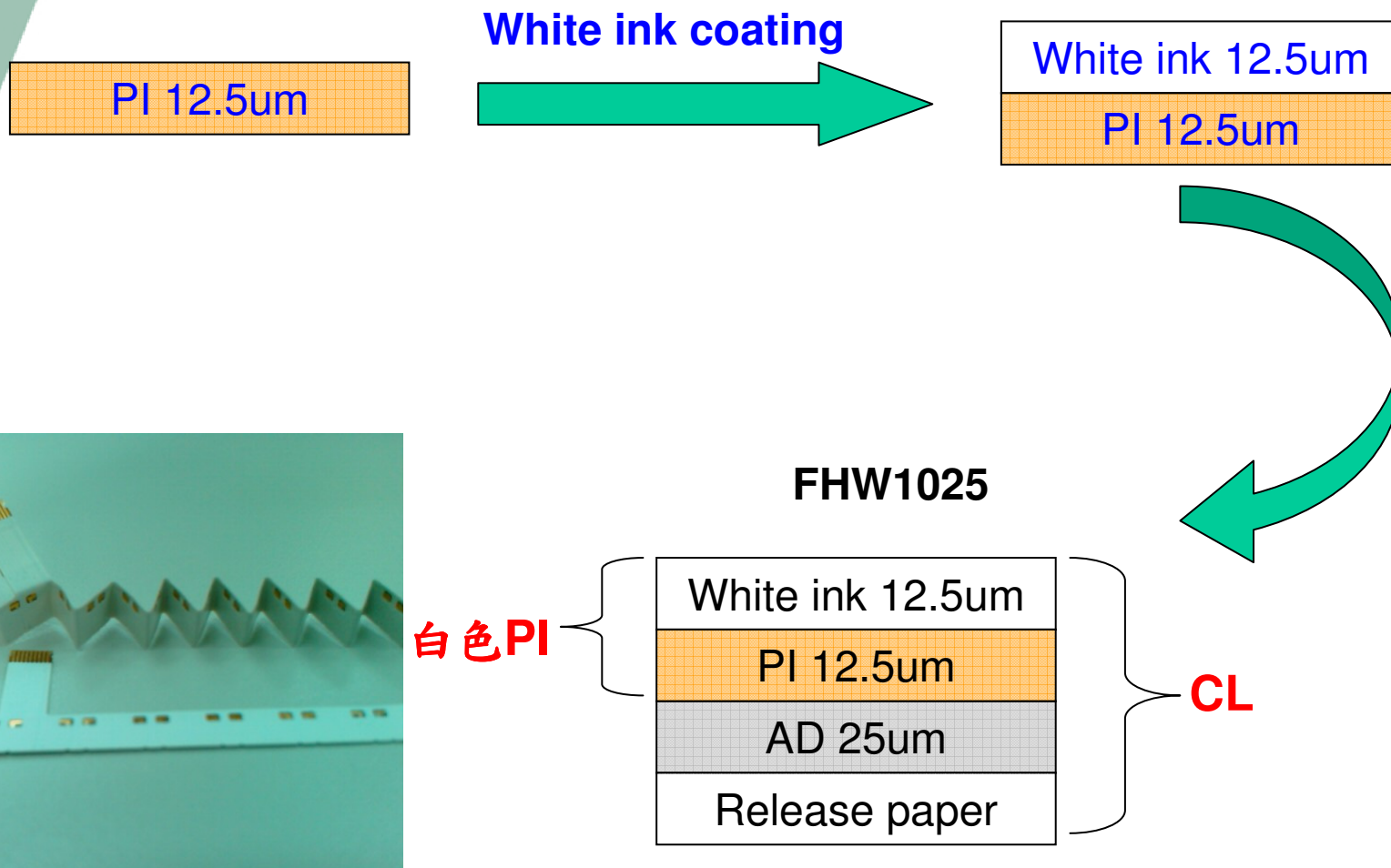
◎成本較低

◎遮蔽性較差

白色CVL

FHW series - PI Coating White paint

White CL產品結構說明



產品比較

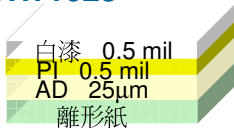
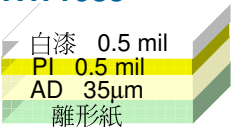
一般CL+白色ink

- 需進行網印白色油墨此工序，且有厚度不一，表面缺陷多，良率不佳等問題；另外，網印白色油墨後，需經兩次低溫烘烤，增加工序，耗費工時。
- 易黃變，白度容易變化
- 不耐撓折，油墨面容易產生裂痕
- 表面亮度易受環境影響，反射率差
- 耐燃效果不佳，不易達成UL 94 V-0要求
- 長期耐候性能差

白色CL

- 可減少網印此工序，節省人力及工時。
- 耐黃變特性優良
- 仍保有極佳的柔韌性
- 表面亮度及反射率佳
- 通過UL 94 V-0
- 長期耐候性能優良

白色CVL 產品特性

產品特性				單位	FHW1025 	FHW1035 	Testing Method
基本特性	Peel strength (90°)		As received	kgf/cm	≥ 0.7	≥ 0.7	IPC-TM-650 2.4.9
	Dimensional stability	Method B	MD	%	±0.15	±0.15	IPC-TM-650 2.2.4
			TD				
	Solder				300℃/30s	Pass	Pass
Resin flow				mm	<0.125	<0.125	IPC-TM-650 2.3.17.1
機械特性	Tensile strength			MPa	>90	>90	IPC-TM-650 2.4.19
	Elongation			%	38~43	38~43	IPC-TM-650 2.4.19
	Modulus			GPa	>2.0	>2.0	IPC-TM-650 2.4.19
電氣特性	Dielectric Constant (Dk)		1MHz	—	3.6~3.8	3.6~3.8	IPC-TM-650 2.5.5.3
	Dissipation Factor (Df)		1MHz	—	0.03~0.05	0.03~0.05	
	Volume resistivity (Rv)		1000V	Ω cm	≥ 1.0E+14	≥ 1.0E+14	IPC-TM-650 2.5.17
	Surface resistance (Rs)		500V	Ω	≥ 1.0E+13	≥ 1.0E+13	
其他特性	AD	Tg	DMA 1 MHz	℃	65~75		DMA
		CTE	TMA 25~200℃	PPM/℃	200~250		IPC-TM-650 2.4.24.5
	Flammability			—	V-0		UL 94
	Gloss		60°	GU	≥65		ISO 2813 JIS Z8741
	Color		L	—	≥95		—
			a*	—	0.0 ~ 0.6		
			b*	—	-0.2 ~ 0.7		

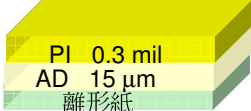
薄型CVL

FGE series- Thin film

PI : 7.5um

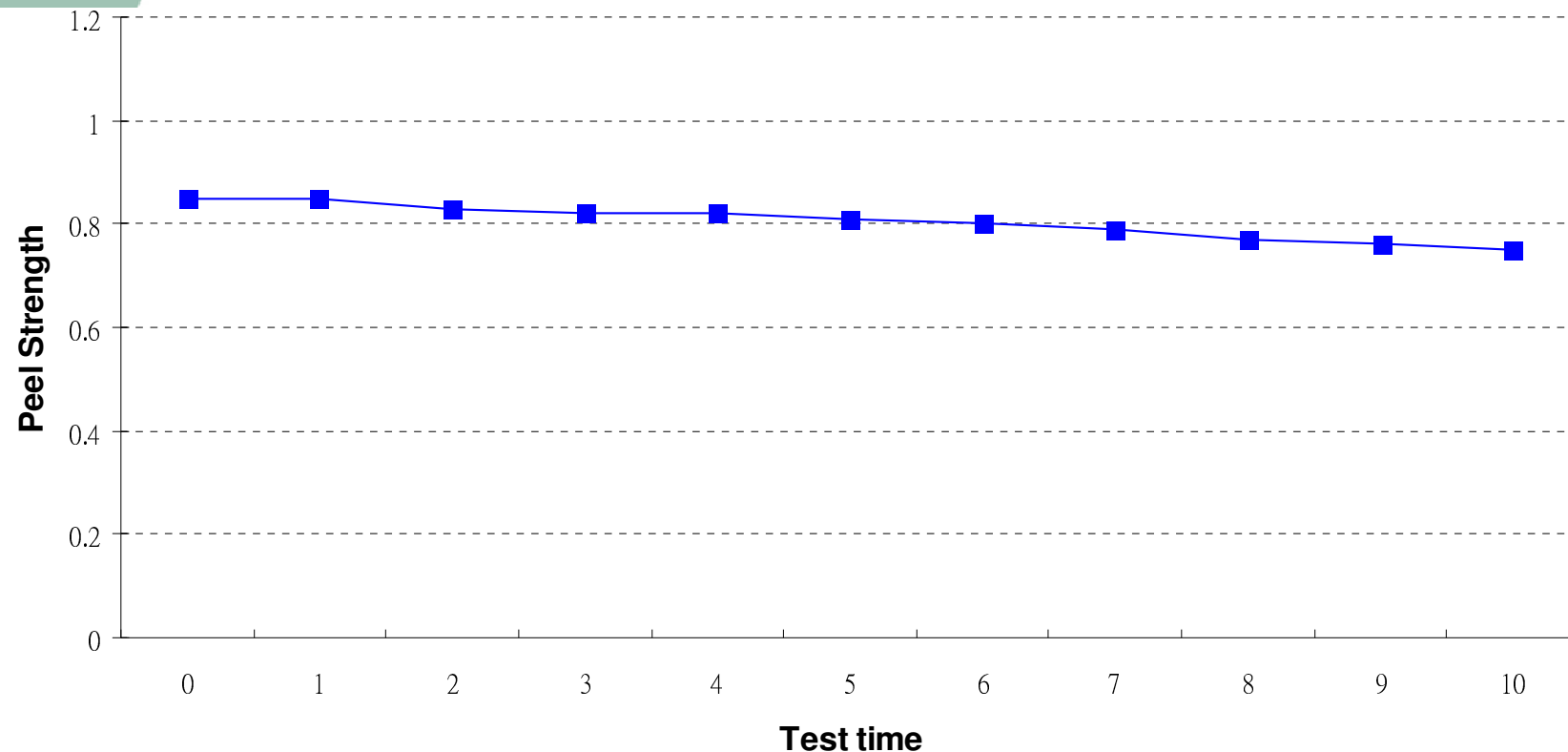
AD : High-Tg adhesive

薄型CVL Thin film產品特性

產品特性				單位	FGE0310	FGE0315	Testing Method
							
基本特性	Peel strength (90°)		As received	kgf/cm	≥ 0.5	≥ 0.5	IPC-TM-650 2.4.9
	Dimensional stability	Method B	MD	%	±0.15	±0.15	IPC-TM-650 2.2.4
			TD				
	Solder			300℃/30s	Pass	Pass	IPC-TM-650 2.4.13
	Resin flow			mm	<0.12	<0.12	IPC-TM-650 2.3.17.1
機械特性	Tensile strength			MPa	>120	>130	IPC-TM-650 2.4.19
	Elongation			%	38~43	38~43	IPC-TM-650 2.4.19
	Modulus			GPa	>2.5	>2.5	IPC-TM-650 2.4.19
電氣特性	Dielectric Constant (Dk)		1MHz	—	3.6~3.8	3.6~3.8	IPC-TM-650 2.5.5.3
	Dissipation Factor (Df)		1MHz	—	0.03~0.05	0.03~0.05	
	Volume resistivity (Rv)		1000V	Ω cm	≥ 1.0E+14	≥ 1.0E+14	IPC-TM-650 2.5.17
	Surface resistance (Rs)		1000V	Ω	≥ 1.0E+13	≥ 1.0E+13	
其他特性	AD	Tg	DMA 1 MHz	℃	100~120		DMA
		CTE	TMA 25~200℃	PPM/℃	180~200		IPC-TM-650 2.4.24.5
	Flammability				—	VTM-0	VTM-0

Repeatedly lamination test (10times)

FGE0315



※Lamination condition : 190°C@85kg/cm² / 10-60sec
Post-cure : 160°C/2hrs

TAIFLEX CONFIDENTIAL



TAIFLEX

純膠

純膠 - 產品編碼原則

B H 25

B: Taiflex 純膠

Adhesive Types

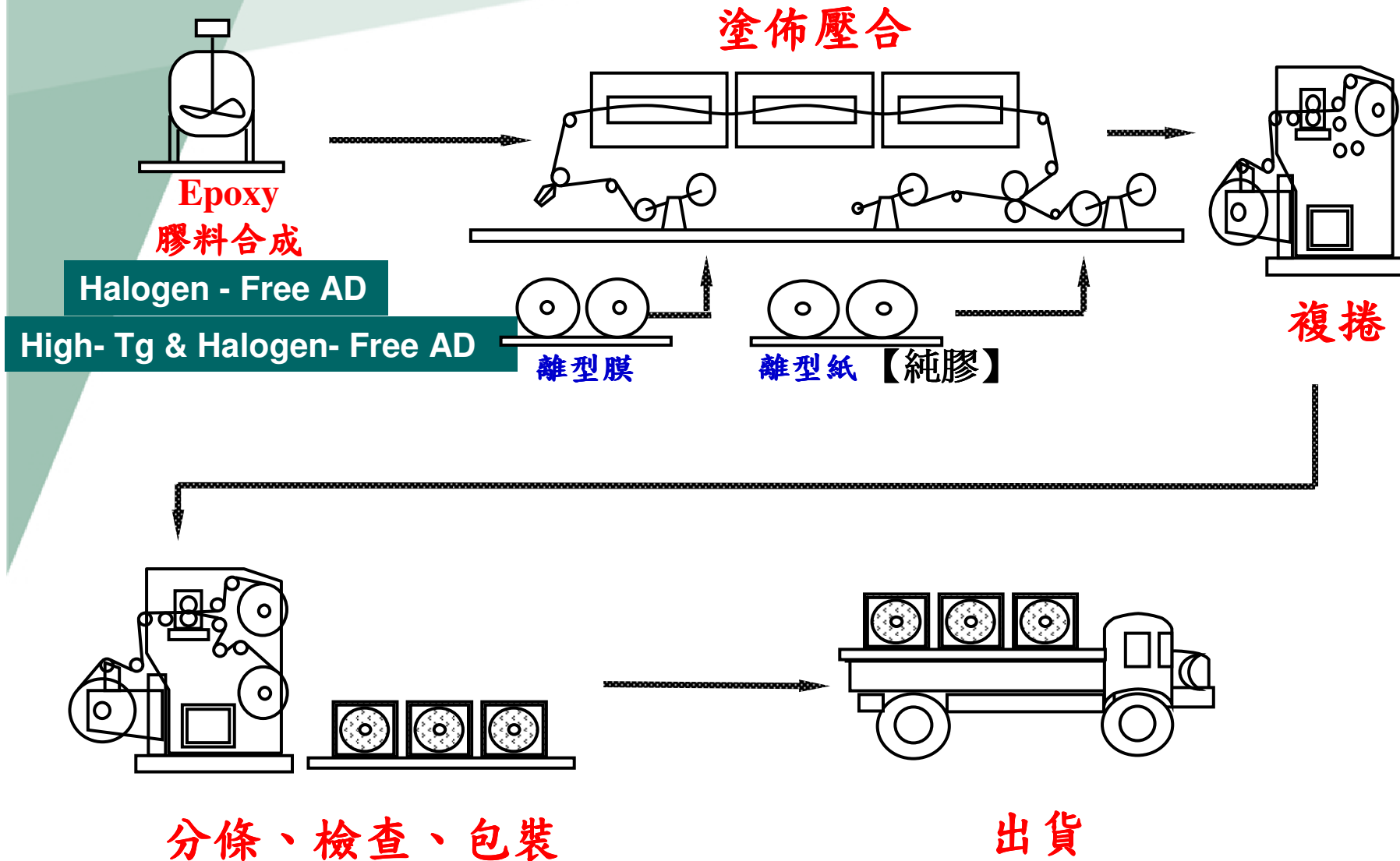
H : Halogen - Free AD

T : High - **TG** Halogen - Free AD

Adhesive Thickness

25	25 um
15	15 um

純膠 生產流程



TAIFLEX CONFIDENTIAL



純膠

BH series- Halogen-Free AD

BT series- High-Tg & Halogen-Free AD

純膠產品特性

產品特性				單位	BH25 	BT25 	Testing Method
基本特性	Peel strength (180°)		As received	kgf/cm	≥ 1.0	≥ 1.0	IPC-TM-650 2.4.9
	Solder			300℃/30s	Pass	Pass	IPC-TM-650 2.4.13
	Resin flow			mm	≤ 0.25	≤ 0.25	IPC-TM-650 2.3.17.1
機械特性	Tensile strength			MPa	>35	>35	IPC-TM-650 2.4.19
	Elongation			%	38~43	35~40	IPC-TM-650 2.4.19
	Modulus			GPa	>1.5	>1.5	IPC-TM-650 2.4.19
電氣特性	Dielectric Constant (Dk)		1MHz	—	3.9~4.1	4.0~4.2	IPC-TM-650 2.5.5.3
	Dissipation Factor (Df)		1MHz	—	0.05~0.07	0.05~0.07	
其他特性	AD	Tg	DMA 1 MHz	℃	60~80	100~120	DMA
		CTE	TMA 25~200℃	PPM/℃	200~250	180~200	IPC-TM-650 2.4.24.5
	Flammability			—	IR	IR	UL 94

※BH快壓使用；BT傳壓使用

複合板

複合板 - 產品編碼原則

M H K 50 25

M: Taiflex 複合板

Adhesive Types

H: Halogen Free AD

PI Types

K: Dupont Kaptone

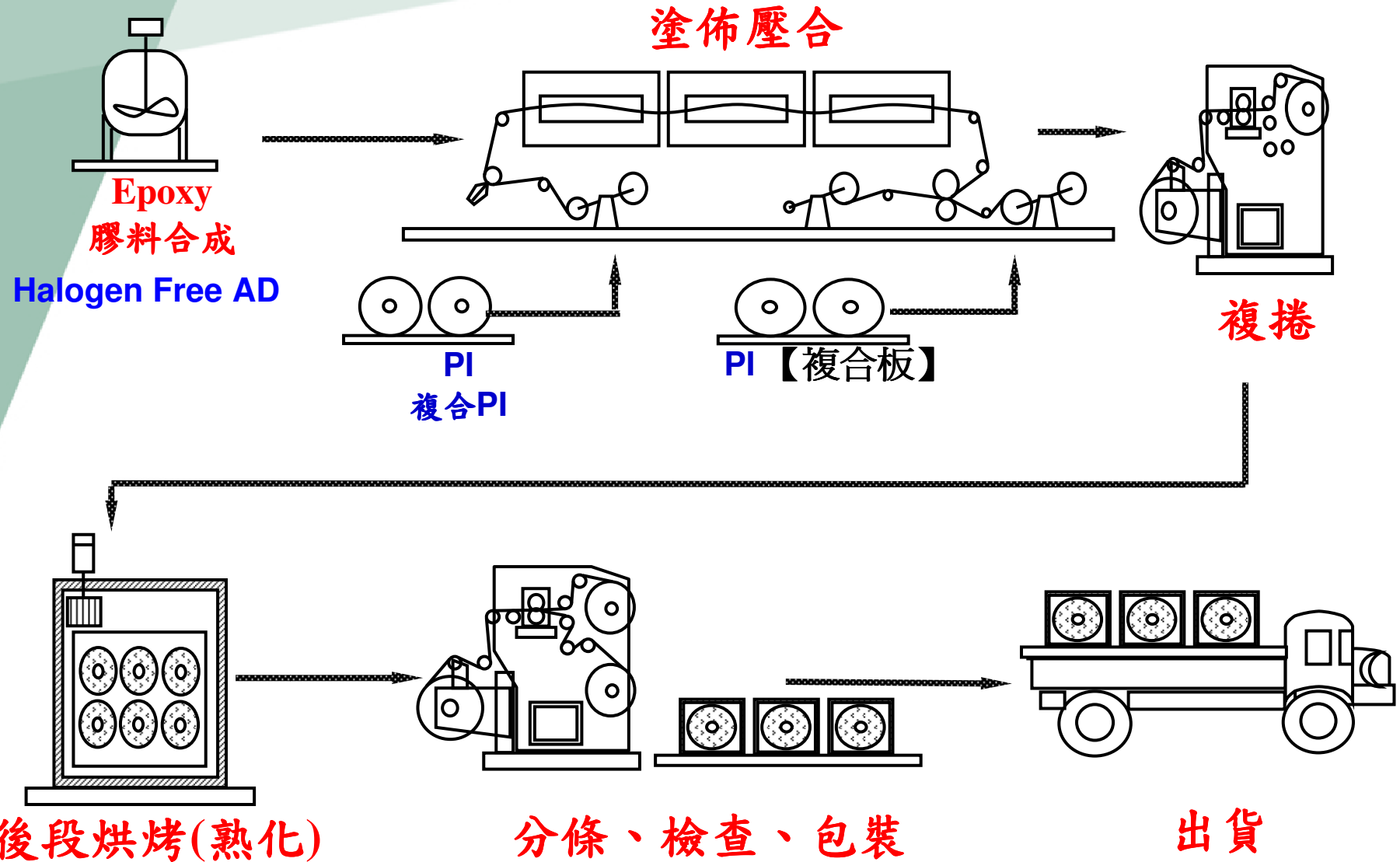
Total Thickness

50	5mil
30	3mil

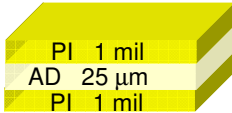
Single Layer Adhesive Thickness

25	25 um
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複合板 生產流程



複合板產品特性

產品特性			單位	RHK3025 	RHK8025 	Testing Method
基本特性	Peel strength (180°)	As received	kgf/cm	≥ 1.0	≥ 1.0	IPC-TM-650 2.4.9
	Solder		300°C/30s	Pass	Pass	IPC-TM-650 2.4.13
耐化特性	MEK 10 min		—	Pass	Pass	—
	10 % NaOH / 10min		—	Pass	Pass	—
	10 % HCl / 10min		—	Pass	Pass	—
	10 % IPA / 10min		—	Pass	Pass	—
電氣特性	Volume resistivity (Rv)	1000V	Ω cm	$\geq 1.0E+14$	$\geq 1.0E+14$	IPC-TM-650 2.5.17
	Surface resistance (Rs)	1000V	Ω	$\geq 1.0E+13$	$\geq 1.0E+13$	

補強板

補強板 - 產品編碼原則

R H K 50 25

R: Taiflex 補強板

Adhesive Types

H: Halogen Free AD

PI Types

K: Dupont Kaptone

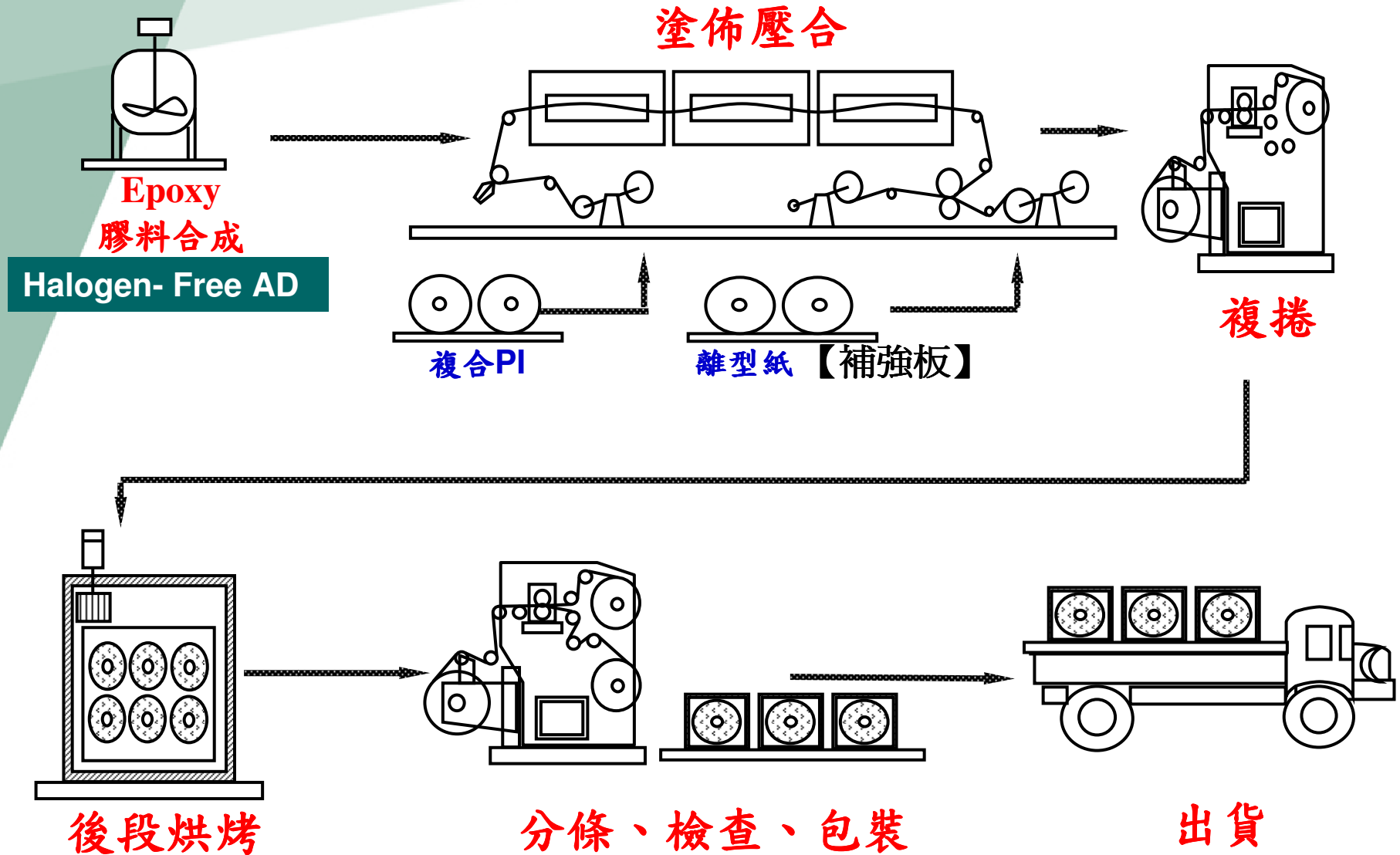
PI Film Thickness

50	5mil
30	3mil

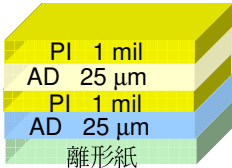
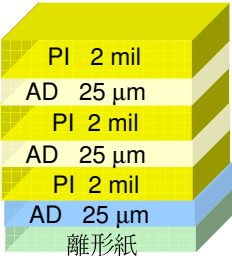
Adhesive Thickness

25	25 um
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補強板 生產流程



補強板產品特性

產品特性			單位	RHK3025	RHK8025	Testing Method
						
基本特性	Peel strength (180°)	As received	kgf/cm	≥ 1.0	≥ 1.0	IPC-TM-650 2.4.9
	Solder		300°C/30s	Pass	Pass	IPC-TM-650 2.4.13
	Resin flow		mm	≤ 0.15	≤ 0.15	IPC-TM-650 2.3.17.1
耐化特性	MEK 10 min		—	Pass	Pass	—
	10 % NaOH / 10min		—	Pass	Pass	—
	10 % HCl / 10min		—	Pass	Pass	—
	10 % IPA / 10min		—	Pass	Pass	—
電氣特性	Volume resistivity (Rv)	1000V	Ω cm	≥ 1.0E+14	≥ 1.0E+14	IPC-TM-650 2.5.17
	Surface resistance (Rs)	1000V	Ω	≥ 1.0E+13	≥ 1.0E+13	



Thanks for your attention



- TECHNOLOGY INNOVATION
- TEAM GROWTH
- QUALITY EXCELLENCE
- CUSTOMER SATISFACTION