



HORI HR6025

FULLY AQUEOUS DRY FILM

INTRODUCTION

HR6025 was developed as fully aqueous type photosensitive dry film for high-density printed circuit boards. Application for inner & outer layer direct acidic etching. With characteristics of excellent tenting, high adhesion and resolution, high image contrast, etc. It could improve through-out performance and yield.

BENEFITS

- Excellent tenting.
- Wet lamination improves adhesion.
- Excellent adhesion for improved yields.
- High image contrast for ease of inspection.
- Small flake size for ease of filtration on stripping.
- Ideal balance of lamination, adhesion, resolution, speed of developing and stripping, sensitivity, tenting and conformance property could improve quality, efficiency and cost for customers.

OPERATING DATA

Model No.	Thickness of Photosensitive layer [μm]	Film width [mm]	Film length [ft]
HR6025	23 $\pm$ 2	200~640mm	722

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Item		HR6025
Application		Etching Tenting
Exposure	Recommended ST (x/41)	22±3
Developing	Recommended Development Na2CO3 concentration (%)	1.0±0.2
	Temperature (°C)	30±2
	Minimum Developing Time (sec)	22±3
Adhesion	ST=15/41	35
	ST=17/41	30
	ST=19/41	25
	ST=21/41	20
	ST=23/41	15
Resolution	ST=15/41	15
	ST=17/41	20
	ST=19/41	25
	ST=21/41	30
	ST=23/41	35
Conformance (μm)		10±5
Stripping	Recommended NaOH concentration (wt%)	3.5±0.5
	Temperature (°C)	50±3
	Time (sec)	24±3
	Size (mm)	<7

PROCESS SEQUENCE

Process		Condition	Remarks
Substrate pre-treatment	Mechanical surface treatment	Cleaning + Acid dip + Micro etching Cleaning concentration: 8~12% Cleaning temperature: 38~42 °C Acid dip concentration: 2~4% Micron etching: 0.4~0.8 mm Pre-treatment speed: 1.0~2.0m/min	1) Completely remove trash, oil, oxidized copper on the surface of the substrate to get a fresh and properly rough copper surface. 2) Completely remove the water attached to substrate surface and hole to avoid oxidized copper, especially the water and vapor
	Water rinsing	Spray time: 10-30 sec Spray pressure: 0.15-0.25 MPa	

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	Hot air blow	Temperature: 80~95 °C Time: 20~40 sec	inside holes could lead to tenting breakage. 3) Piling up pre-treated substrates may cause scratch, oxidization, contamination on surface and water mist inside holes. 4) The speed of polish is applicable within the range of 1.5-2.5m/min 5) The combined use of buffing polish & volcanic ash or buffing polish & (super) coarsening micro-etching is desirable.
	Lamination	Roll temperature: 110±10°C Roll speed: 1.0~3.0 m/min Roll pressure: 0.3~0.5MPa	1) Substrate temperature before lamination is applicable within the range of 40~60°C. 2) The setting of pre-heating, pre-laminating and lamination roll need adjustment based on actual site conditions to avoid wrinkle, bubble and other abnormal phenomenon.
	Holding ¹	Temperature: 18±2°C Humidity: 50±10 %RH Time: 15 min~24 H	1) Under a yellow lamp or special white-light without UV.
	Exposure	19-23 steps by a 41-step tablet	The exposure light source could be high (extra-high) voltage mercury lamp, metal halide lamp, iodine-gallium light, LED light source and laser. Photosensitive wavelength range: 350-410nm.
	Holding ²	Temperature: 18±2°C Humidity: 50±10 %RH Time: 15min ~ 12hours	The recommend total time of holding ¹ and holding ² should be within 24 hours.
Development	Developer spray	Developer (Na ₂ CO ₃): 30±2°C, 1.0±0.2wt% Time: 1.5 times~2.0 times of the minimum developing time Spray pressure: 0.08~0.15 MPa	1) Renew developer in reference to the following guide: Amount of film treatment: 0.3 m ² /L 2) To prevent resist chips from contaminating the substrate, exposure frame and developing machine, one of countermeasures is not to expose around the substrate.

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			3) Please check and ensure the displayed figure of the developing temperature is as same as the measured value as the temperature has much influence on dry film property. 4) Under the premise of resolution, minimize the developing time in order to improve adhesion performance.
	Water rinse	Temperature: Room temperature ~30°C Time: 28~65sec Spray pressure: 0.10 MPa or more	1) Water rinsing at least 3 times and use municipal water in the final time.
	Hot air dry	Temperature: 30~50°C Time: 10~20 sec	
Stripping	Stripper spray	Stripper: 50±3°C, 3.5±0.5wt% NaOH aqueous Time: 1.0~1.5 times of Minimum Stripping time Spray pressure: 0.10 MPa or more	1) Renew stripper in reference to the following guide: Amount of film treatment 0.60m²/L. 2) It is hard to strip flakes away if the concentration of NaOH is beyond the recommended range, e.g.: >4.0% 3) If for tin plated board, lower temperature and spray pressure.
	Water rinse	Temperature: Room temperature Time: 45~100 sec Spray pressure: 0.10 MPa or more	

APPLICATION NOTES

1. Application: Use this film as resist for pattern formation on printed circuit board and as temporary protection for certain boards (e.g. metal plate, glass plate)
2. Storage conditions: keep dry film under temperature (10°C~20°C), with relative humidity of less than 60%. When take dry film from cold storage, keep dry film hold (lay down film rolls horizontally) under the condition of 18±2°C、50±10%RH at least 1 hour and use up within one week.

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3. Substrate preheating: Preheating at too high temperature for long time may cause oxidization. When the substrate surface temperature prior to lamination exceeds 60°C, the film thickness on through-hole edge may become too thin and it may cause tenting breakage.
4. Holding after lamination: Avoid putting unused dry film on lamination machine for long time. Hold unused dry film under black sheet and store as required.
5. Holding after lamination: Hold under black sheet or under a yellow lamp. Development should be done within 24 hours after lamination and 24 hours after exposure.
6. Piling up laminated substrates may cause the following defects:
 - 1) Resist may be polymerized by heat accumulation and it may cause some residue after development.
 - 2) The film of the photosensitive layer at a through-hole edge may be thinned and it may break the tent. When using for tenting, should be put laminated substrates in a rack.
 - 3) Sandwiched dusts and foreign particles etc. may thin the film of the photosensitive layer and it may cause open and short circuits.
7. Development:
 - 1) When temperature of developer is more than 32°C, it may make resist profile worse.
 - 2) If defoamer is necessary in developing, defoamer compatibility testing should be done first. Otherwise it may cause incomplete development and other defects.
8. Stripping: Strip within 72 hours after lamination. Defoamer could be used in proper way to avoid overflowing of too much foam.
9. Dry film components in developer and stripper can be coagulated by neutralization. The coagulated components can be separated from the aqueous solution by filter press method and centrifugal method. The separated aqueous solution has some COD and BOD values, so it must be waste disposal treated in a proper way.
10. The colour of this film (HR6025) is green/blue. Though the colour may gradually discolour with time, it should not influence the characteristics.

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STORAGE NOTES

1. Store in a dark, cool and dry place at the temperature of 10~20°C and relative humidity of 60% or lower. Quality guarantee period will be 6 months, photosensitive layer without flowing guarantee period will be 3 months.
2. Keep film rolls horizontally. When they are laid vertically, sheets of dry film may slip one by one and roll-shape may be like a bamboo sprout. It may cause the phenomenon of photosensitive layer flowing.
3. Take out film rolls from black sheet under a yellow lamp or the same kind of safety lamp. Cover film rolls by black sheet when you store them for a long time.

PRODUCT FAMILIES

The following products are referred to in this data sheet.

PRODUCT NAME	PRODUCT NUMBER
HORI RESOPOWER DRY FILM HR6025-17.71 x 220M	HR602517.71
HORI RESOPOWER DRY FILM HR6025-24 x 220M	HR602524

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