

I. Introduction

A. General

DuPont's Hot Roll Laminator/Cleaner (HRL-24) is designed for use with RISTON® photopolymer film resist. The Laminator uses large-diameter, internally heated rolls and incorporates solid state temperature controls to achieve optimum lamination. The heated rolls are in intimate contact with the resist and transfer heat directly to it and the boards. The Cleaner reduces lamination defects caused by dirt or particles between the resist and the board. As the board enters the laminating rolls, static bars neutralize the dirt-attracting electrostatic charge which builds up as the polyolefin is separated from the resist; brushes and vacuum simultaneously remove dust, chips, and other particles from both sides of the board, making cleaning an in-line operation. Heat and pressure are controlled automatically. A built-in exhaust system removes resist fumes.

The cleaner is an integral part of the Laminator's feed table and lifts out easily for film thread-up. The cleaning brushes are adjustable for normal board thicknesses and are a "snap-in" type for easy cleaning and replacement. The Cleaner's base cabinet houses the vacuum blower and supports the Laminator at an optimum height for board feeding. The Laminator is powered from the base cabinet.

The Laminator includes Air Power Assist which provides up to three times the standard laminating pressure for improved resist conformation over irregular surfaces. This feature uses an adjustable board thickness sensor and an air pressure regulator to control laminating pressures.

The HRL-24 Laminator/Cleaner will laminate RISTON photopolymer films to one or both sides of PWB copper laminate, chemical milling metals, and additive circuitry substrate materials. Materials may be up to 610 mm (24 in.) wide and 6 mm (0.25 in.) thick. Maximum film width is 610 mm (24 in.).

B. Safety

1. Laminator Safety Features

- a. Control Panel Switches: The POWER, HEATERS, and DRIVE switches on the control panel are low voltage (24 V) rocker switches for operator safety. Side barriers on the switches help avoid accidental switch actuation. The POWER switch is spring-loaded to return to the center position after being turned on or off to prevent automatic restart after a power stoppage or an emergency stop.

- b. Emergency Stop Switch: Located on the top of the control side, this palm-type switch enables the operator to shut off the electrical power to all Laminator functions and to the static eliminator bars. It will not disconnect power to the blower or to the flange heaters on the exhaust hood. After releasing the emergency switch, you must press the POWER switch for the Laminator to operate.
- c. Roll Grounding Brushes: These provide a positive ground should the heater element electrically short circuit to the roll.
- d. Circuit Breaker Overload Protection: Both the main power supply and the laminating roll drive are protected by circuit breakers. Fuses protect all other circuits.
- e. Quick Disconnect Air Line: Located on the bottom of the rear cover (toward the Drive side), this fitting allows the operator to quickly disconnect the air supply to the Laminator.
- f. Internal Air Pressure Regulator: This prevents the operator from increasing the air pressure beyond safe limits.
- g. Protected Microswitch: The board sensor microswitch is located under the side cover so there is no exposed electrical wiring.
- h. "Twist-Lock" Receptacle: A NEMA-approved receptacle is supplied which matches the Laminator's line plug.

2. Cleaner Safety Features

- a. Large Capacity Exhaust System: The exhaust ducts built into the Cleaner's feed table remove potentially harmful resist fumes from the Laminator. The two-speed blower (60-Hz units only) provides low-noise fume exhaust when boards are not being laminated. The Cleaner's exhaust outlet must be connected to the plant's outside exhaust system; do not connect it to a return air or ventilation system!
- b. Exhaust Duct Heaters:
 - (1) The flanges on the exhaust hoods are heated to prevent resist fumes from condensing in them, thus preventing operator contact with potentially hazardous material.

- (2) The flange heaters on the exhaust hoods will only heat when the feed table is in place and the exhaust blower is operating. This prevents the hoods from overheating and protects the operator from exposed hot surfaces.
- c. **Static Eliminators:** Shock-free static eliminators remove the dirt- and dust-attracting charge caused by the polyolefin being stripped from the resist.
- d. **Fused, Unexposed Power:**
 - (1) Power for all system components is fused and distributed from a covered electrical box in the cabinet. There are no exposed wires or connections in the cabinet ensuring that mechanical work can be done safely.
 - (2) The blower switch controls power to the Laminator. For any Laminator functions to operate, the blower switch must be on.
- e. **Guards:** The fan belt and pulleys in the base cabinet are guarded to protect personnel during maintenance.
- f. **Blower Motor Circuit Breakers:** The two-speed blower motor (60-Hz units only) is separately fused for each of the two windings. Thus, the blower cannot run beyond its intended capacity at either speed.
- g. **Feed Table Interlock:** When the feed table is removed from the Laminator, an interlock switch prevents continuous laminating roll drive operation. The rolls can only be operated while pressing the momentary FORWARD/REVERSE jog switch on the right side cover. This prevents operator injury during roll cleaning or film wrap removal.

3. Safety Instructions

Important safety recommendations are interspersed throughout this manual.

A **WARNING** and instructions in boldface type emphasize potential personal safety hazards.

A **CAUTION!** refers to potential equipment damage.

A **NOTE** conveys special information or emphasizes a particular instruction.

C. Laminator/Cleaner Specifications

1. Dimensions

Width: 1070 mm (42 in.)

Length: 735 mm (29 in.)

Height: 1525 mm (60 in.)

Feed Table Height (approx.): 1070 mm (42 in.)

2. Weight (Approximate)

Laminator: 73 kg (160 lb.)

Base Cabinet: 163 kg (360 lb.)

Total: 236 kg (520 lb.)

3. Shipping Weight

Laminator: 84 kg (185 lb.)

Base Cabinet: 178 kg (392 lb.)

Total: 262 kg (577 lb.)

Heater Capacity (Two): 1000 watts each

Nominal Laminating Temperatures: 99°C to 104°C (210°F to 220°F) (Refer to RISTON film data sheets for specific recommended temperatures).

4. Maximum Panel Size

Width: 610 mm (24 in.)

Thickness: 6 mm (0.25 in.)

5. Laminating Roll Speed

Speed Range: 0 to 4 m/min. (0 to 13 fpm)

Typical Working Range: 1.2 to 1.8 m/min. (4 to 6 fpm)

6. Electrical

Services Required: 200/240 V, a.c., 50/60 Hz, single phase, 30 A

Connection: plug-in; twist-lock receptacle (supplied)

Power Rating: 18 A, 230 V, 4140 W

7. Compressed Air Supply

Compressed Air Supply: 345 kPa [3.5 kg/cm² (50 psig)] (Consumption less than 0.03 m³/min)

Operating Air Pressure Range: 5 to 40 psig

8. Exhaust Flow Rate

High Speed: 8.5 m³/min. (300 cfm) (50- & 60-Hz)

Low Speed: 3.7 m³/min. (130 cfm) (60-Hz only)

Exhaust Connection: 102 mm (4 in.) dia.; light-duty PVC plastic recommended

9. Film Supply

Maximum Film Width: 610 mm (24 in.)

Maximum Roll Dia.: 255 mm (10 in.) Adapters supplied for 76 mm and 152 mm (3 in. and 6 in.) I.D. cores