

## Out-Gassing Prevention: Plastic Sheet Pre-Treatment

Out-gassing, what is it? You've mounted a great graphic image to a polycarbonate or acrylic sheet with PermaTrans, IP2100. Or maybe you've covered one of these plastic sheets with MACmark translucent vinyl for a backlit display or light box. It looks great when you send it out or install it for your customer. Two weeks later you get a frantic call from your customer, that great graphic is now full of tiny bubbles or 'crystals', it looks horrible and it needs to be redone. What happened?

MACTac R&D has conducted extensive testing on these typical signage substrates and concluded that they will absorb and hold moisture from the atmosphere until such time as the temperature gets warm enough to drive the moisture out. This is especially significant when humidity is at it's highest, particularly in the summer months. When this surface is covered with a pressure sensitive adhesive, whether it's a mounting film such as IP2100 or a vinyl film for signage, the moisture becomes trapped or encapsulated. Subsequent exposure to heat, such as from the sun or in a light box, above the lamination temperature can cause this trapped moisture to expand into the adhesive layer where it will appear as tiny bubbles or snowflakes (a.k.a. fractals).

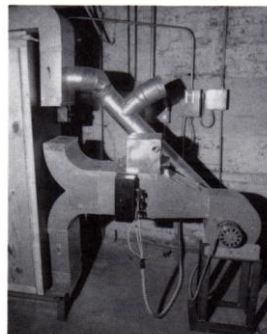
Testing shows that pre-heating the plastic sheet will significantly reduce or eliminate out-gassing. It also reduces the variation in performance between different kinds of plastics.

### Follow this procedure when pre-heating:

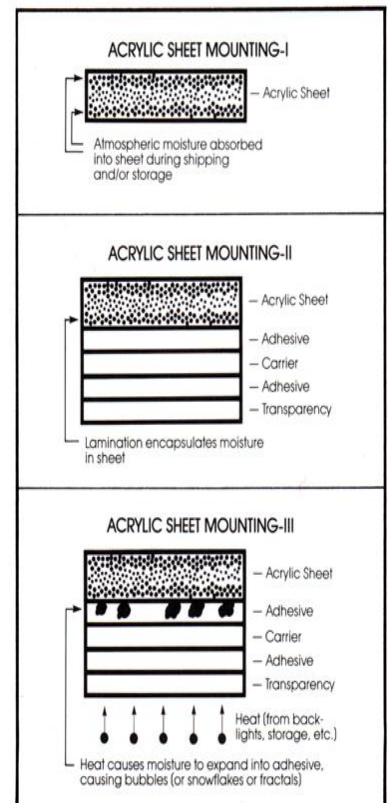
- 1) Remove the protective covering from the plastic sheet and wipe with isopropyl alcohol.
- 2) Place sheet into heating chamber at a temperature approximately 20°F higher than the final laminate will be exposed to (i.e. if the laminate will see 140°F in transport or end use, heat the plastic sheet to 160°F). Take care not to scratch the unprotected surface.
- 3) Bake the plastic sheet at a constant temperature for at least 16 hours (overnight is best).
- 4) Carefully remove the sheet and laminate IP2100 or your translucent film *within 15 - 20 minutes*. This step is critical to ensure that moisture will not be reabsorbed into the sheet. The shorter the elapsed time the better the laminate.
- 5) Allow the finished graphic to reside at room temperature for 16 hours before exposing it to higher temperatures.
- 6) If the final laminate is being used in a light box, adequate ventilation must be used to keep the temperature as low as possible.
- 7) Evaluate several varieties of plastic sheeting to find the one that works best, and then specify supplier based on type and lot number.



*Curing oven at Vista Color Lab, Cleveland, Ohio, is big enough to handle the largest sheets of plastic being used.*



*Heating element and blower should include a high-temperature cut-off thermostat as a protective device.*



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**Heating Chamber Recommendations:**

- 1) The heating chamber should be large enough to accommodate the largest size sheet used in your operation.
- 2) Construct it to reduce or eliminate the possibility of scratching the plastic sheet during handling.
- 3) Some sort of support should be provided in the chamber to prevent the sheet from bowing, especially at temperatures of 160° or higher.
- 4) In addition, the chamber should be equipped with a high temperature cut-off thermostat to prevent accidental overheating.

These guidelines should not be taken as an absolute guarantee that out-gassing will be stopped 100% of the time on 100% of the plastic sheets available. Variations from supplier to supplier and from lot to lot are not under MACTac control and these variations could cause bubbling under conditions not yet studied. However, following this procedure should significantly improve your final results in a majority of cases.

**IMPORTANT NOTICE:** The information given and the recommendations made herein are based on our research and are believed to be accurate, but no guarantee of their accuracy or completeness is made. In every case, user shall determine before using any product in full scale production, or in any way, whether such product is suitable for user's intended use for their particular purpose under their own operating conditions. User assumes all risk and liability whatsoever in connection with their use of any product. The products discussed herein are sold without any warranty as to merchantability or fitness for a particular purpose, or any other warranty, express or implied. No representative of ours has any authority to waive or change the foregoing provisions, and no statement or recommendation not contained herein shall have any force of effect unless in an agreement signed by the officers of seller and manufacturer. Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute a permission, inducement or recommendation to practice any invention covered by any patent without authority from the owner of the patent. The following is made in lieu of all warranties, express or implied: Seller's and manufacturer's only obligation shall be to replace or credit such quantity of the product proved to be defective at its discretion.

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