

# PLASKOLITE

## DRYING ROOMS

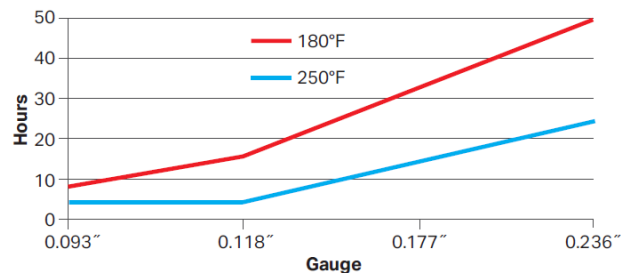
Most plastic resins, such as polycarbonate (PC), are hygroscopic materials. They adsorb moisture from humid ambient air and give moisture back to dry air. Although polycarbonate resin is dried prior to fabrication, once the resin has been converted into sheet or reel, it begins to readily reabsorb moisture. Water absorption, depending on air humidity levels, peaks after a 24 hour period and may reach a concentration up to 0.30%.

If moisture is not removed from the sheet or reel prior to high temperature processes such as thermoforming, the water between the PC molecular chains expands as it converts to water vapor and manifests as small bubbles in the sheet after thermoforming.

Traditionally, TUFFAK® polycarbonate sheet is placed in a dehumidifying, air circulating oven for pre-drying. Oven temperatures should be maintained near 250°F and be monitored for consistency. Recommended pre-drying times are based on gauge thickness.

Drying times/hours

Gauge	250°F	180°F
0.093"	4	8
0.118"	4	14
0.177"	12	30
0.236"	24	50



An innovative way to remove moisture from PC in sheet and reel form is to desiccate the material in a dry room. The concept of a dry room is moisture will migrate from a high concentration environment (the sheet or reel) to a low concentration environment (the dry room). The removal of humidity from the room air is achieved through desiccation.

Time, temperature, humidity level and air flow are the critical to the final drying results. Only through careful monitoring and testing of the process can repeatable and acceptable conditions be established.

### DRY ROOM CONSIDERATIONS

- Storing PC in a low humidity room will prevent the moisture content from increasing within a sheet or reel form, however in order to understand the actual drying capabilities, if any, conditions must be carefully documented through testing of material as it spends time within the room.
- Four components of drying polycarbonate **resin** are time, temperature, humidity and airflow. Recommended conditions for drying polycarbonate resin are:
  - Time - resin dried for 4 hours
  - Temperature - resin is dried at 250°F-280°F
  - Dew point - resin is -20°F to -40°F
  - Airflow - airflow is maintained through the resin at 1 cfm per lb/hour.

- Realizing that it's entirely impractical to create a dry room with the above conditions, practical conditions should include:
  - Time - **Sheets and reels** may need weeks or months to fully remove hygroscopic moisture.
  - Temperature - 100°F, higher temperatures facilitates migration of water out of the polycarbonate, however, maintain a temperature level that's tolerable to your employees.
  - Dew point - +15°F to +20°F (as low as economically practical)
  - Airflow - determined through testing.
- Dry rooms need to be insulated and sealed with an appropriate vapor barrier.
- Access to the room needs to be controlled with either an airlock or air curtain or both.
- When the room is not in active use, an airtight door must be present to control the inflow of humid air.
- Dehumidification and heating equipment needs to be properly sized for the proposed space.
- Understanding the masking film performance after spending extensive time within the dry room needs to be documented.
- Adopt a practice of validating moisture removal from the material by rapidly heating a small sample (12" x 12") of material to 340-360°F and visually examine the sample for moisture bubbles.

## RESOURCES

For construction, advice and information of dry room's requirements:

- Process Air Systems - (402) 598-5468
- 9112 Charles St, Omaha NE 68114

For information on dehumidification equipment:

- Munters-Cargocaire - 1-800-843-5360
- [dhinfo@munters.com](mailto:dhinfo@munters.com)
- <http://www.munters.us/en/us/Division-start-pages/Munters-Air-Treatment/>

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