PET with a drying temperature of 325° F (163° C), needs an airflow of 1.0 to 1.2 CFM per pound of plastic processed per hour. ABS, on the other hand, requires a drying temperature of 180° F (82° C) and an airflow of 0.6 to 1.0 CFM per pound of plastic processed per hour.

In general, an airflow of around 1.0 CFM per pound of plastic processed per hour is recommended by most plastic and dryer manufacturers.

It is possible to over dry a plastic. Over drying can adversely affect physical properties.

### Recommended Drying Conditions

<table>
<thead>
<tr>
<th>Resin</th>
<th>Temp.</th>
<th>CFM</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET</td>
<td>325°F (163°C)</td>
<td>1.0 - 1.2</td>
<td>4-6</td>
</tr>
<tr>
<td>ABS</td>
<td>180°F (82°C)</td>
<td>0.6 - 1.0</td>
<td>3-4</td>
</tr>
<tr>
<td>PC</td>
<td>250°F (121°C)</td>
<td>1.0</td>
<td>3-4</td>
</tr>
</tbody>
</table>

VII. Basic Dryer Designs

A. Oven dryer

1. Used for drying small quantities of a single or different plastic (batch operation). For example, different colors of the same plastic.
   a. Make sure the oven is not overloaded, otherwise the plastic will not properly dry.
   b. Can be operated under vacuum conditions.
Air which has been heated, or heated and dried, is blown into the oven chamber and over the pellets, picking up moisture from the pellets. The air containing moisture is discharged from the oven chamber as new air takes its place.

B. Hopper dryer

1. Off-line dryer
   a. Used when the drying system is centralized or for pre-drying resin.

2. In-line dryer
   a. Part of the processing machinery.

3. Portable dryer
   a. Mounted on a stand with casters and can be moved from machine to machine.
In the hot air hopper dryer, heated air or heated and dried air is blown into the lower part of the hopper and is forced through the air diffuser cone. The air flows over the pellets, picking up moisture. The moisture laden air exits out the top of the hopper either out of the system in an open loop system, or back through the system to be re-dried and re-circulated in a closed loop system.

4. In order for the hopper dryer design to work effectively, the air must flow uniformly through the pellets in the hopper. Uniform air flow is controlled by:
   a. The air diffuser cone.
   b. A full pellet level in the hopper.

5. Hopper design should promote plug flow. Plug flow is established by:
   a. A flow diverging cone - the angle is typically 60 degrees.
   b. The height to diameter ratio of the hopper - usually slender and tall.

6. Tunnel flow - “rat holes”
   a. Channels that form in the pellets in the hopper allowing recently added plastic, which has not had a chance to properly dry, to quickly go through the hopper and enter the feed throat of the process machine.

7. Insulating the hopper
   a. The hopper must be insulated when drying temperatures are above 225° F (107° C).
**NOTE:** It is a good idea to insulate the hopper and air supply hose regardless of the drying temperature.

Uninsulated Hopper Dryers

Heat is lost through the side walls of an uninsulated hopper. This means that the plastic at the sides of the hopper will be at a lower temperature than the plastic in the center of the hopper, and so it will not dry evenly. But more importantly, an insulated hopper and hoses protect operators from possible burns.

8. Drying temperatures
   a. Above 200° F (93° C), high temperature rating silicone hoses for the air supply and resin discharge should be used.
   b. Above 300° F (149° C), high temperature rating silicone hoses should be used for the air return as well.

9. Sizing the dryer and hopper
   a. Select a dryer with the air flow and temperature capacity for the plastics you expect to process.
   b. Hopper capacity size - the production rate multiplied by the drying time for the plastic being processed.

C. Closed loop
   1. The air is re-dried and re-used over and over.

D. Open loop
   1. The air is vented out of the system after it is used once.