Maximum Allowable Grain Temperatures During Drying

Feed . . . . . . . . 180°F
Milling . . . . . . . . 140°F
Seed* . . . . . . . . 110°F

*Some delicate seed like peanuts and canola are lower.

Drying Methods

In-Storage Layer Drying

Shallow layers of grain dried in a grain bin with natural or heated air. Normal temperature increase of heated air is 20°F. This method is recommended only for one-bin operations.

Batch Drying

Batch-in-Bin - A 2-foot to 4-foot grain layer dried in a bin. Fan and heater are turned on after 6 inches of grain is in the bin and grain is added as it is harvested to a depth not to exceed 4 feet. Drying air temperature is 140°F. This method should be used when more than one bin is available and the grain is to be dried in a bin.

Column Dryers - A portable or stationary dryer with columns 12- to 24-inches thick. Small batches are dried and cooled before being moved to storage. Drying air temperature is 180° to 220°F. This method can be considered for 7500 bushels or more per year.

Continuous Flow Drying

A portable or stationary dryer with grain flowing by gravity through columns 6- to 18-inches thick. Heated air dries grain passing the upper section while natural air is forced through the lower section to cool the grain. Drying air temperature is 180° to 240°F. This method can be considered for operations drying about 15000 bushels or more per year.

Air Volume Required For Moisture Removal
The amount of moisture removed by the drying air at various drying temperatures and humidities is given in Table N2.2

Table N2.2: Moisture Removal By Air At Various Drying Temperatures and Humidities

<table>
<thead>
<tr>
<th>Temperature Removed per of air, °F</th>
<th>Humidity of Air, Percent</th>
<th>Lbs. of Water 1,000 CFM in One Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>65</td>
<td>7</td>
</tr>
<tr>
<td>70</td>
<td>45</td>
<td>12</td>
</tr>
<tr>
<td>80</td>
<td>32</td>
<td>18</td>
</tr>
<tr>
<td>100</td>
<td>18</td>
<td>31</td>
</tr>
<tr>
<td>110</td>
<td>11</td>
<td>38</td>
</tr>
<tr>
<td>140</td>
<td>5.8</td>
<td>60</td>
</tr>
<tr>
<td>180</td>
<td>2.2</td>
<td>78</td>
</tr>
</tbody>
</table>

*Initial condition of air, 60°F and 65 percent humidity.

Air flowing at a rate of 1000 CFM heated from an average design temperature of 60°F and 65 percent humidity will remove 38 pounds of moisture per hour (Table N2.2). The air flow rate required to dry a given quantity of grain is given by the expression below where:

\[
\text{CFM} = \frac{Q \times 1000}{EXH}
\]

The efficiency of drying depends upon the efficiency of heat utilization which drops as the outside temperature drops. For average design conditions of 60°F and 65 percent relative humidity, the drying efficiency can be assumed to be 0.75 and would be typical for fall conditions in Georgia. If harvest is delayed into cold weather, the efficiency could go to 0.6. In summer the drying efficiency may be as high as 0.85.