

Saving Energy in High Temperature Drying In Bin Dryaeration and Combination Drying

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Dryeration: This is a process for drying corn in a high temperature dryer in which the corn is removed from the high temperature dryer while it is still hot (110-130°F) and 1.5 to 3.0 percentage points above the target final moisture content. The hot corn is allowed to temper or steep, and then it is cooled in a temporary holding bin. Steeping times are typically 6 to 12 hours and the grain is cooled using ambient air at an airflow between 0.5 and 1 cfm/bu. This process can remove up to 2 or 3 points of moisture. During the cooling period the amount of condensation in the steeping bin may be significant. However, when corn is moved to a storage bin it will be mixed and aerated, promoting the gradual equilibration of kernel moistures. One of the primary drawbacks of dryeration is the increased handling associated with the process. Research from Purdue indicates that using dryeration can increase dryer capacity to 150% of its normal capacity (dry and cool) and reduce drying costs by more than 10%.

In-bin Dryeration (In-storage cooling): This technique is similar to dryeration. However, instead of using a dryeration bin, the corn is placed directly in the bin. The fans are started as soon as a few feet of hot corn has been delivered to the bin and they are operated continuously thereafter. The bin must have a drying floor to facilitate good air movement and adequate roof vents to ensure the humid air can easily escape. One or more fans (roof exhausters) or other devices can be placed in the roof to assist with the removal of the humid air. Condensation can be a problem with in-bin cooling. Moisture can condense on the roof or bin walls. Low outside air temperatures make condensation more likely. In order to reduce problems with condensation, moisture removal should be no more than 1 to 2 percentage points.

Combination Drying – This is a two stage drying procedure in which corn is dried in a high temperature dryer and placed in a drying bin at 19 to 23% moisture with kernel temperatures between 110 and 130°F. After the corn is placed in the bin, the fan is operated continuously. This cools the grain and removes moisture from the kernels until the surface of the grain is adequately dried to safe storage moisture. Producers should be aware that during in-bin drying the bottom layers of corn may be dried to moistures significantly lower than the target moisture. This can be prevented by using bins that have stirrers which mix the dry corn at the bottom with the corn at the top of the bin resulting in a more uniform moisture distribution. Combination drying is a good choice for producers that have in bin drying equipment and have installed portable dryers. Like the dryeration process, combination drying requires a higher level of management. According to Purdue research, combination drying can increase dryer efficiency by as much as 70% and reduce the cost of drying by more than 10%.

Additional information on this subject is available at www.grainquality.org. Click on "Extension Publications" then select "Grain Drying, Conditioning, and Aeration". Look for "Optimizing Grain Dryer Operation GQFS #15" (scroll down to the section on "Combination Dryers" and look at the sub titles on "Dryeration" and "In-bin Cooling"). See also the older publication "Dryeration and Bin Cooling Systems for Grain - AE 107." In addition, information on Dryeration and In-bin Dryeration (In-storage cooling) can be found in the University of Minnesota publication WW-07356 entitled "Dryeration and In-Storage Cooling for Corn Drying"
<http://www.extension.umn.edu/distribution/cfopsystems/DC7356.html>