



# Australian Grain Industry – Code of Practice Technical Guideline Document

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## No. 9 GRAIN DRYING

**Compiled on behalf of the Australian Grain Industry by:  
Grain Trade Australia**

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## Australian Grain Industry – Code of Practice

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### Technical Guideline Document

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## 1. Application

Refers to the drying of stored grain to reduce its moisture content.

## 2. Discussion on Grain Drying

### 2.1 What is Grain Drying

Grain drying reduces the moisture content of the grain to a level that is appropriate for the intended purpose of the grain.

### 2.2 Why Dry Grain

Grain may be dried for a number of reasons:

- To reduce the moisture content to enable the grain to be safely stored for a period of time.
- To reduce the moisture content to a level that meets the relevant standards, enabling that grain to be marketed.
- Prior to harvesting, grain is subject to downgrading due to a number of reasons, mainly inclement weather. By harvesting grain at a high moisture content (that may be higher than permitted in standards), the risk of weather damage and subsequent reduction in quality is reduced. Grain may then be placed in storage and undergo some form of drying to enable it to be safely stored or sold.

### 2.3 Principles of Drying Grain

There are different methods available. Their use depends on a range of factors including but not limited to:

- Availability of the infrastructure;
- Commodity;
- Initial moisture content of grain to be dried;
- Final moisture content of the grain following drying;
- End-use of the grain; and
- Economics of grain drying.

No matter the method of drying used, there are a number of key principles to consider:

- Temperatures must be at levels appropriate for the type of dryer and commodity.
- Drying must be conducted in accordance with the manufacturer's instructions.
- Test the temperature in the dryer both before and during the drying operation.
- Do not over-dry the grain as grain damage may occur.
- Do not expose the grain to heat for too long as grain damage may occur.
- Grain with a very high moisture content may need to be dried slowly and/or in stages.
- It is preferable that each grain kernel receives the same treatment, allowing the grain to dry uniformly. If not, varying moisture content may arise and additional treatment may be required if holding this grain in storage for an extended period of time.

- Depending on the dryer type, it is preferable to keep the grain moving in the dryer and to mix it with the hot air. This ensures grains have an even temperature and that those next to the heat source do not reach an excessive temperature that may lead to grain damage.
- While variations by commodity exist, in general, when using artificial dryers the grain temperature should not exceed a set maximum, meaning that air temperatures should be appropriately controlled.
- After grain has passed through an artificial dryer it should be cooled either as part of the drying operation or by other means prior to delivery.

## 2.4 Methods for Drying Grain

There are two main methods for grain drying.

### 2.4.1 Grain Driers via Heat

This is often referred to as “artificial grain drying”, a process by which hot dry air is passed through or over grain to remove excess moisture.

A minimum time for the drying process is required. However, there are various economic and other constraints and it is recognised that reduced grain throughput and cost may not permit low temperatures and a lengthy grain drying process.

An artificial grain dryer works on the principle that the wet grain is cooled as moisture from the grain evaporates into the air around it. As the grain dries, the cooling effect decreases.

There are two basic types:

- Non-recirculating dryer (i.e., batch dryer)
- Cross flow continuous dryer

### 2.4.2 Aeration Drying

While aeration is frequently used to cool the grain, it may also be used to dry the grain. This process must be strictly controlled and monitored to ensure it is done correctly.

Refer to:

<http://storedgrain.com.au/aeration-drying-getting-right/>

[www.storedgrain.com.au](http://www.storedgrain.com.au) GRDC Aerating Stored Grain A Grains Industry Guide June 2013

<http://storedgrain.com.au/aeration-cooling-for-pest-control-grdc-fact-sheet-september-2010/>

<http://storedgrain.com.au/category/information-hub/grain-aeration/>

<https://www.daff.qld.gov.au/plants/field-crops-and-pastures/broadacre-field-crops/grain-storage/aeration>

## 2.5 Who Dries Grain

### 2.5.1 Growers and Storage Providers

Generally growers dry grain in order to reduce the moisture level to that stated in GTA Trading Standards, enabling that grain to be marketed. Storage Providers may receive grain high in moisture and subsequently dry it to an appropriate level.

### 2.5.2 Commercial Service Providers

There are a number of commercial providers offering grain drying services to the grain industry. These are generally mobile services, drying grain based on the customer requirements.

## 2.6 Grain Industry Standards

In general, end-users of grain prefer as low a temperature as possible be used to dry grain in order to preserve grain quality. Some may even specify temperature limits. Others may specify that grain drying is not permitted.

Many commodity standards have a maximum temperature for grain to be received. This generally infers that grain artificially dried is not to be delivered direct from the dryer to the storage or end-user. Grain must not be delivered until it is cooled, either artificially or naturally.

In some GTA Trading Standards such as 'wheat', there is a limit for "excessive grain drying". This refers to "grain that is greater than 10% visually sprouted or exhibits other evidence of weather damage but no corresponding decrease in Falling Number". In this instance, a nil tolerance applies to grain undergoing such an inappropriate treatment.

Where industry is concerned with the potential impacts of incorrect drying techniques, it is recommended that the supplier of the grain provide a Commodity Vendor Declaration attesting to the nature of the drying activity conducted on the grain.

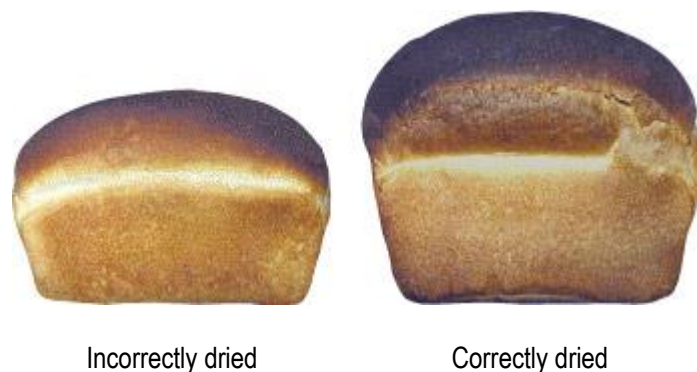
## 2.7 Impacts of Drying Grain

When grain is dried there is a risk it will be damaged if not done correctly.

Depending on the nature of the incorrect drying operation, a number of impacts may occur. These impacts may or may not be seen when inspecting and testing the grain according to Standards:

- The functionality of proteins within the grain will be altered, impacting on the performance of end-products produced from the grain. The extent of the performance loss depends on a range of factors, including temperature, duration of drying and commodity.

As an example, the following depicts the impact of inappropriate drying on the loaf volume and texture of bread wheat:



Source: Canadian Grain Commission

- In barley, inappropriate grain drying will lead to a loss of germination, potentially rendering that grain unsuitable for malting. While permitted, some sectors of the Australian malting barley industry may prefer that growers not artificially dry malting barley because of these quality concerns.

Refer to:

- [http://storedgrain.com.au/wp-content/uploads/2013/06/WA\\_grain\\_drying\\_malting\\_barley.pdf](http://storedgrain.com.au/wp-content/uploads/2013/06/WA_grain_drying_malting_barley.pdf)
- GrainCorp Harvest Bulletin 5 November 2010 "TAKE CARE IF DRYING MALTING BARLEY" [www.graincorp.com.au](http://www.graincorp.com.au)
- Farmnote AgWA 101/2000 Grain Drying of Malting Barley <http://storedgrain.com.au/grain-drying-of-malting-barley-ag-wa-farmnote/>
- The visual appearance of the grain may be altered. As depicted in the most recent Visual Recognition Standards Guide, the grain may be visibly burnt. The grain may be reddish brown in appearance, or in severe cases, be blackened.
- In maize, care must be taken during the drying process to avoid fracturing the grain.

Refer to:

<https://www.uaex.edu/publications/pdf/mp437/chapter10corn.pdf> Arkansas Corn Production Handbook, On-Farm Corn Drying

- The grain may emit an odour. A nil tolerance applies in most standards.

## 2.8 Further Information

General

- 2006 The WA Guide to High Moisture Harvest Management, Grain Storage and Handling [www.giwa.org.au](http://www.giwa.org.au)
- Grain Drying and Storage of Damp Grain <http://www.gov.mb.ca/agriculture/crops/production/drying-and-storage-of-damp-grain.html> - Crop Production. Manitoba Agriculture, Food and Rural Initiatives
- Grain Storage - Frequently Asked Questions. [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/faq7402?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/faq7402?opendocument) Alberta Agriculture, Food and Rural Development

Barley and Wheat

- Cereal Grain Drying and Storage. [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/crop1204](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/crop1204) Alberta Agriculture, Food and Rural Development

Canola and Soybeans

Storage of Canola. [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/crop1301?opendocument](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/crop1301?opendocument) Alberta Agriculture, Food and Rural Development