

Humidification for Potato Stores

Water loss or dehydration can be a problem in long term potato storage. Apart from the loss to the farmer in marketable weight of the product (a 1% weight loss on 1000t of potatoes is worth over £1000), water loss affects firmness and skin condition. To stop excessive water loss, the relative humidity of the store must be kept as high as possible.

On average water will evaporate at a rate of 0.17% of tuber weight per 10% of RH* per week for potatoes in mid storage period. (Note that weight loss maybe four times this rate in the first weeks of storage). In cases where the tuber is damaged weight loss may be as high as 0.6% per week per 10% RH* depression before the wound heals.

If potatoes suffer weight losses greater than 10% they become spongy and virtually unsaleable. A target figure for acceptable weight loss is below 4%

Refrigeration and Dehydration

Potatoes in refrigerated stores can suffer abnormally high weight loss because the refrigeration equipment has a drying effect on the air.

Within the store there is an equilibrium between the water content of the crop and the moisture vapour in the air. When the air in the store is passed over the cooling coil of the refrigerator its temperature drops below dew point. Dew point is the temperature where the maximum possible amount of water vapour is being held by the air, i.e. its humidity is 100% RH. At temperatures lower than dew point the air gives up the excess water and condensation occurs.

The loss of water vapour during refrigeration means that the air in the store is now drier and it

will tend to absorb moisture from the crop.

In most modern refrigerated potato stores this effect is minimised by limiting the air temperature drop across the cooling coil. Nevertheless in all but the best systems the release of condensate caused by the cooling coil will lead to some dehydration of the potatoes.

- * *Humidities taken for 5°C. Note that the effect of humidity depression is much greater at higher temperatures. Therefore weight loss is likely to be more of a problem for producers of processing potatoes which have to be stored at a higher temperature.*

Humidification

To correct the loss of moisture in the air some form of humidification may be required. It can be done in a number of ways but all involve evaporation of water.

Spray Humidifiers

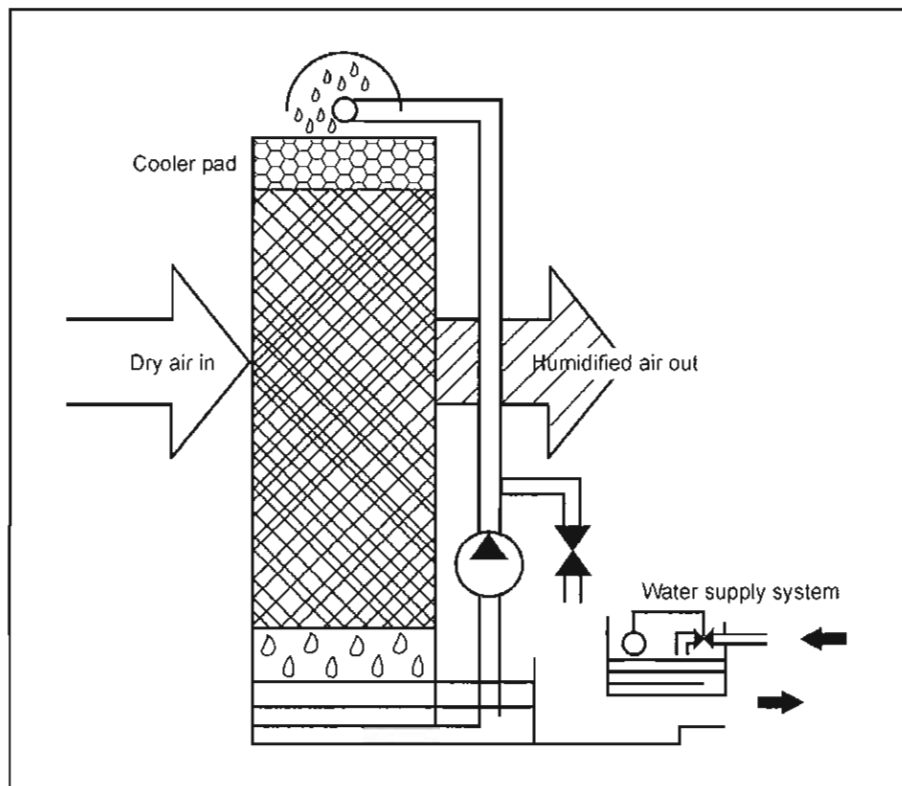
The simplest way to increase humidity is to spray water into an air-stream. Contact between the droplets of water and the air leads to the evaporation of water and hence humidification. The efficiency of this technique depends on the droplet size of the water spray. The most effective sprays produce a 'fog' of tiny droplets.

There can be problems in controlling this type of humidifier because of difficulties in measuring high humidity levels. The consequences of inaccurate control are either under humidification or, at the other extreme, carry-over of moisture droplets into the store. The latter can be a serious problem because water deposited on the crop and the building structure can cause disease, rotting or structural damage.

Pad Humidifiers

This equipment consists of a pad of material which is saturated with water and through which air is blown. Although control is still difficult, there is no problem with droplet carry-over at high humidification rates. In practice this means that the humidifier can be operated continuously without any risk of water carry-over damage. Pad humidifiers can either be built into an air handling system or bought as stand alone units. Energy costs are low as the only power required is that to operate the fan and water pump. Installation is simple involving an electrical connection and a water supply.

Stand alone humidifiers can be positioned anywhere in the store but preferably at high level.



Pad Humidifier