In use by an Irish research institute for drying tests

Flexible Chamber Dryer for Product Development

The Teagasc research institute provides support for food producers who do not operate a development department of their own. These companies may use laboratory machinery and facilities of the institute to develop new product ideas. Teagasc has recently started to provide a Harter modular expandable H01 chamber dryer for food drying tests.

Teagasc is a research institute of the Republic of Ireland. It provides integrated research, advisory and training services to the agriculture and food industry and rural communities. The organisation was established in 1988. The 11 member Authority is appointed by the Minister for Agriculture, Food and the Marine and has representatives from the farming organisations, the food industry, universities, the Department of Agriculture, Food and the Marine and Teagasc staff. Teagasc is a client-based organisation employing approximately 1,100 staff at 55 locations throughout Ireland with an annual operating budget in excess of EUR160 million.

The Dublin institute wanted to acquire a convection type dryer for their laboratory to add to their existing freeze dryer. Looking for a suitable system they came across drying system manufacturer Harter at last year's Anuga FoodTec in Cologne, Germany. Harter had developed the so-called heat pump based condensation drying almost 30 years ago. This drying method offers both gentle and efficient drying. The Southern Germany based company has also gained a foothold in the pharmaceutical and food sectors over the past 10 plus years. Drying with recirculated air at low temperatures was exactly what Teagasc desired. So they acquired a H01 chamber dryer.

Multifunctional Trolley

The chamber dryer is a series production system. It may be expanded by additional modules to meet any processing quantity

The H01 chamber dryer includes a multifunctional trolley for drying a large variety of products

Teagasc's H01 chamber dryer was recently used for mushroom drying tests

Germinated wheat drying tests are currently being conducted

requirement. Operators of such dryers enjoy extreme flexibility – they may dry a large portfolio of their products. This is made possible by the multifunctional trolley that comes with the dryer. It may hold trays for single-layer drying, such as for mushroom slices. Mushrooms were the first items subjected to drying tests in the Teagasc system by one operator. With little manual adjustments, the trolley may be prepared to hold pans for drying bulk items which may be filled up to 200 mm high. Teagasc is presently using such pans for test drying of germinated corn - oat, wheat and barley. The chamber dryer includes a humidification unit to obtain an exact humidity, at a given time, of the items being dried, if desired. An integrated weighing cell allows the operator to monitor the product's weight during drying. Parameters such as temperature, time, humidity and air flowrate may be set individually. The operator may record and manage all such data in programmes for the specific products. The operating temperature range of the chamber dryer may be varied between 40 °C and 75 °C. Set-point temperature and dryer shut-off at a defined residual humidity may also be controlled individually.

Dry Air Accurately Routed

For Harter's heat pump based condensation drying to take full effect, two features are essential. First, efficient air dehumidification in the core of each drying system – the dehumidification module. This module is the source of extremely dry air passed to the drying chambers. This dry and, thus, unsaturated air perfectly absorbs – by physical action – any humidity on or in the items to be dried. The humid air is subsequently cooled in the dehumidification module so that the humidity condenses. Then, the air is reheated and returned to the drying chamber in a closed air circuit. Heat pump assisted air dehumidification, however, is only one guarantor for success. The second essential feature is adequate air routeing. By its very nature, air follows the path of least resistance. In Harter's dryers, air routeing is designed such that the dry air is passed exactly to the place where it is supposed to absorb humidity. Air routeing is particularly important for drying bulk items.

Retention of Valuable Ingredients

Drying in a closed air system, with no supply and exhaust air, offers quite a few other benefits. Aromas are retained. The colour and appearance of the products are only lightly changed. Sulphurisation to retain colour is not required. Enzymes and other ingredients, too, are largely retained, as demonstrated by testing of apple rings. Projects realized so far have shown that the condensates obtained may contain volatile aromas and flavours. Heat pump based condensation drying is a flexible method which may also be used in other dryer variants - batch dryers such as chamber, barrel or tunnel dryers, or continuous dryers such as belt dryers. With little modification, each dryer may also be used for cooling, if desired or required for the specific process. Temperature equalization at 110 °C maximum is also possible. The heat pump technology integrated in all Harter dryers is efficient enough to be government subsidized as of late.

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