

IMPROVING ENERGY EFFICIENCY IN FOOD

SHOCK FREEZING/COOLING APPLICATIONS

High humidity causes a number of problems in all industries including food industry as well. At the design stage of HVAC systems, freezing chambers for food, food production lines are crucially important to the measures of humidity level control and removal of excess water vapour from the air. Neglecting the influence of high humidity may lead to poor quality and shelf life of the product, longer idle time of production lines, increased energy consumption, violation of technologically demanded production / storage conditions of the product etc.

Freezing, cooling and shock freezing processes can be found in many food industry facilities. The main problem is the formation of the ice or snow coat on the evaporator surface. This leads to frequent defrosting cycles of the evaporators (usually 1-2 times per day). Certainly, defrosting is associated with additional energy input in order to defrost the ice/snow cover, and this causes the long idle time of production process. Moreover, the ice cover on the evaporator surface causes lower thermal conductivity and requires more cooling power input and consequently results in to many times higher power consumption by compressors that must operate at high - load conditions. This may be the root of the early compressor fault, higher maintenance/ repair costs.

One of the practical examples of successful desiccant dehumidifier installation was completed in the waffle cup ice cream quench chamber, where the temperature is low down to -40C. First of all, the maintenance costs of the chamber dropped by half, because the frequency of defrost cycles decreased twice during the same time period compared to the initial situation; Secondly, one of the two compressors serving the evaporator in the chamber is almost all the time in standby mode, because implementation of the desiccant dehumidifier decreased load on the chiller. Last but not the least benefit was that the issue of wafer cups being stick to the conveyor belt disappeared at all.

In another case, desiccant dehumidifier was successfully installed in bakery products shock freezing chamber. After installation, defrosting is performed every 2 weeks, compared with a daily defrosting before then. The total economic effect is reduction of operational costs by 25%.

Therefore, the use of desiccant (adsorption) dehumidifiers is technically and economically beneficial in the shock freezing/cooling applications. Introduction of desiccant dehumidifier allows to save energy, extends the non-stop operation of production lines by several times, improves product quality etc.

KEY WORDS: dehumidification, freezing, defrosting, desiccant

