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## IMPROVING THE ENERGY EFFICIENCY OF THE DRYING PROCESS IN A 2-CHAMBER DRYER

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Increasing the energy efficiency of drying plant materials in the created 2-zone chamber dryer is achieved through the installation of manufactured thick-film heating electric elements and the use of partial recirculation of the coolant - 60% of the heated coolant after drying is returned to the dryer, and 40% is emitted into the atmosphere. The main objective of the study is to determine the drying kinetics and specific heat consumption during the operation of a 2-zone chamber dryer.

The thick-film heating element is based on a developed system of composite nanostructured pastes with different properties. The heaters are made using innovative technology and consist of a metal base with a dielectric coating of 1-8 mm thick. A conductive pattern is printed on a metal base using a resistive paste, which is a circuit resistance contour of an electrical circuit that is reliably isolated from both the base and the environment (Fig. 1.a). The installation of 21 heaters in a 2-chamber dryer is shown in Fig. 1.b [1].

During the process of drying pumpkin plates at a heat carrier temperature of 60°C, in a 2-chamber dryer with installed thick-film heating elements, the drying parameters, such as changes in mass and temperature of the material, energy consumption for the process, were measured. The drying process lasted 8 hours with a specific consumption of 4740 kJ/kg of evaporated moisture, but the highest energy consumption was observed in the last 2 hours (Fig. 1.c).

The efficiency of a 2-chamber dryer is calculated to be  $\eta = 62.3 \%$ , and when operating in the 1st chamber of the dryer, the efficiency decreases to  $\eta = 45.5 \%$  (specific heat consumption increases to 6530 kJ/kg of evaporated moisture).



SECTION 12.  
PRODUCTION ALIMENTAIRE ET TECHNOLOGIE

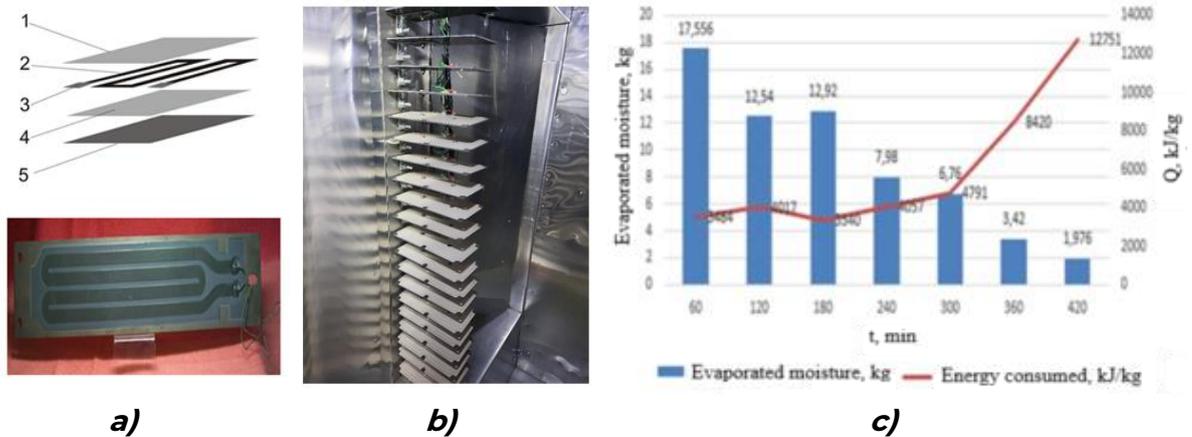


Fig. 1. Stages of work on the manufacture of a thick-film heating element U-220 V, P-1000 W (a), installation in a 2-chamber dryer (b) and the amount of evaporated moisture and energy consumed during the drying of pumpkin plates (c):

1,4 - protective dielectric layer, 2 - resistive layer, 3 - contact paste,  
5 - metal or ceramic base

**Conclusions.** Thick-film heating elements increase the energy efficiency of a 2-chamber dryer by 30%, as indicated by the experimentally determined specific heat consumption for the drying process, which is 4740 kJ/kg of moisture output and the calculated dryer efficiency  $\eta = 45.5 \%$ .

REFERENCES:

- [1] Snezhkin Yu.F., Paziuk V.M., Petrova Zh.O., Telnikov Y., Vyshnevskiy V. Malaschyk N. (2023) Energy-efficient chamber dryer with thick alloy heating elements. Energy Technology & Resource Saving. N°2., 85 – 95.