

THERMAL INSULATION'S DEVELOPMENT OF THE FURNACE VAULT AS A WAY TO IMPROVE ENERGY EFFICIENCY OF GLASSWARE PRODUCTION

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Like any branch of the national economy, glass industry is associated with the use of natural resources and negative impact on the environment. The increase in demand for glass products entails the expansion of glass production, and, consequently, an increase in energy, water and resource consumption.

The existing technology of glass production is associated with pollution of atmospheric air, soils, surface and groundwater.

Abroad, market competition and the high cost of fuel and energy resources have served as a powerful stimulus in the development of glassmaking furnaces [1]. In recent years, their technical and operational characteristics have reached a very high level.

However, in this area there is a lag of domestic production from the level of developed industrial countries.

The glassmaking furnaces occupy a special place in the technological process of glass production. It work largely determines not only the quantity and quality of products, but also the economics of production as a whole. Among the four characteristic structural elements: the vault, the suspended walls of the flame space, the walls of the pool, the bottom of the pool - the vast majority of heat loss into the surrounding space falls on the vault [2].

Therefore, the vault of the glassmaking furnace must be insulated. A glass dinas is used for laying. Its advantage in comparison with the alternative electro-fused refractories is due to the high resistance to plastic deformation, relatively low thermal conductivity, as well as the complete solubility of refractory products in the glass melt. High-quality glass dinas is characterized by a chemical composition in which the mass fraction of SiO_2 is not less than 96%, and the Fe_2O_3 content does not exceed 0.5%.

The introduction of a highly efficient structure of thermal insulation of the vault will increase the thermal resistance of the masonry by 4 times. The heat loss through the vault will be reduced by 4-4.5 times, and the external surface temperature by 3-3.5 times [3].

Analysis of the economic efficiency of the implementation of this measure showed that increasing the thickness of the insulation layer by 0.1-0.5 m saves the cost of natural gas for the production of glass containers during the first six weeks by 460-752 thousand UAH. The payback period investments of the thermal insulation purchase is 3.5 weeks.

Thus, the development of an energy-efficient structure of thermal insulation of the glassmaking vault furnace using a glass dinas will help to increase energy efficiency and prevent heat loss to the environment.

References:

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