

Decorative Dolomite Brick Based on Raw Materials from the Poltava Region

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Keywords: building material; caustic dolomite, bischofite, filler, pigment, coloured dolomite brick.

Abstract. Non-traditional colour solutions used by designers in the design of building exteriors and interiors are driving a rapid increase in demand for locally produced decorative building materials. The modern pigments market offers a wide range of products, but not all of them satisfy consumer requirements, particularly regarding colour range. Inorganic pigments are characterised by high resistance to light and weather conditions, but organic pigments provide the greatest variety and brightness. Due to the significant rise in energy costs, which in turn has increased the price of Portland cement, more attention in Ukraine is being given to the research and application of magnesia-based binders. One of the advantages of these binders is that they require significantly less energy for production compared to lime and Portland cement.

1 Introduction

A feature of magnesia and barium binders is that they are mixed not with water, but with aqueous solutions of salts [1, 2, 3]. Magnesia cements do not require wet hardening conditions, provide high fire resistance, low thermal conductivity, increased wear resistance and strength of the formed artificial stone [4, 5, 6].

Building materials based on magnesium binders, called magnolites, are characterised by a number of valuable properties that are essential for creating environmentally friendly materials [7]:

- high compressive strength in the early curing stage, with flexural strength that is 3–5 times higher than that of traditional concrete;
- fire safety – with sufficient structural thickness, magnolite structures can withstand a category 5 fire without material destruction or the release of carcinogenic substances;
- low dielectric permittivity and electrical conductivity – magnolites are used to protect against electromagnetic radiation, their surfaces do not accumulate static charge, which eliminates the risk of sparks;
- resistance to weather conditions, as well as to oils, petroleum products, and salts;
- fungicidal and bactericidal properties, which prevent the growth of fungi and bacteria, while its bitter-salty taste deters insects and rodents;
- aesthetic versatility – capable of imitating various natural materials due to its compatibility with different pigments.

Other significant advantages of magnesia binders include: higher flexural strength compared to other binders; a dense microstructure of hardened magnesia stone; high adhesion strength with aggregates in the production of magnesia concrete and mortars, as well as considerable corrosion resistance [8].

Unlike traditional types of binders, magnesia binders are mixed not with water, but with solutions of magnesium chloride and sulphate salts [9, 10, 11]. The use of bischofite ($\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$) solution as a mixing component instead of crystalline magnesium chloride can significantly reduce the production cost of the binder [12].