

Energy-saving technologies with the use of water treated by the magnetic fields

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Summary. The current hypotheses of water structure and influence of the magnetic field on the change in its structure have been analyzed. The hypotheses of the feasibility of using high-frequency electromagnetic fields to enhance their impact on the water structure and the stability of this process have been formulated. Experimental studies using water treated in the high-frequency electromagnetic fields for the ecoconcrete production have been carried out.

Key words: magnetized water, field density, wave motion frequency, water processing time in the field.

INTRODUCTION

Since the mid XX th century, the Soviet Union began conducting scientific studies and practical application of magnetic water in different industries [1 – 6].

Y.G. Dorfman [7] examined the relationship between magnetic properties and structure of matter. However, along with significant achievements in scientific research and practical application in many sectors of the economy: thermal power, building materials, agriculture, medicine, etc. there have been cases of results instability. This was due to nonstrict

hypotheses on the water structure model and, consequently, on the effects of magnetic fields on it.

Meanwhile, Y.I.Frenkel [8] believed that the liquid in its structure is closer to the solid body, rather than gases. In liquids, as well as in solids, thermal vibrations of the particles occur around some equilibrium positions, and, unlike in solids, in liquids oscillating particles do not remain in one place for a long time, but abruptly move from one equilibrium position to another one. Based on the ratio obtained by Y.I. Frenkel it turns out that each molecule of water before moving from one equilibrium position to another one makes 1000 vibrations in the original position. Based on this Y.I. Frenkel concluded that the water particles are mostly "sedentary". Applying this conclusion for water, taking into account the theory of its cluster structure appeared later one can assume that to destroy clusters with significant savings of heat energy it is necessary to provide the vibration frequency of water molecules of more than 1 kHz. In this case the equilibrium will be destabilized, and the clusters will break down rapidly.

Thus, the time of monomolecular water creation by molecules other than the "bio-

field", i.e. charged, should be decreased dramatically and gain stability.

THE MAIN PART

After studying the application of the theory of magnetic water and significant achievements in scientific researches and practical ap-

plication in building materials production we have proposed technologies of concrete products manufacture using high-frequency electromagnetic devices for magnifying "I" (LLC "Votali"), as well as the device "II" ("Vulkan" and "Kalmat", company "Edelweiss").

Magnetic water was received on the stand with two devices that can operate independently from each other (Fig. 1) [9].

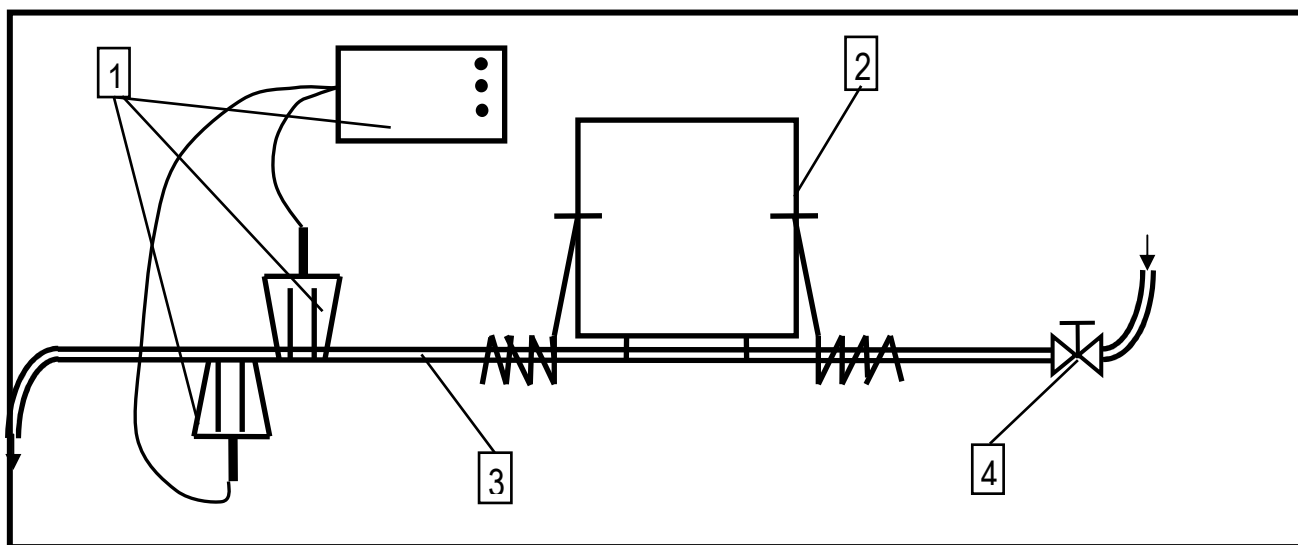


Fig. 1. A stand for magnetic water preparation: 1 – device "Ilios"; 2 – device "Kalmat"; 3 – water; 4 – valve

The task of the research isto carry out comparative studies of the optimization process of magnetic water according to this technology, field parameters and water-cement ratio of the initial formulation of products. To conduct products research after a certain period of time (28 days) (strength gain) using steaming and without steaming. To consider the effect of magnetic water as an activator, with the use of components to obtain concrete with damaged structure and of various chemical compositions, with various additives.

For the experiment over 200 samples of concrete cubes (70×70×70) have been prepared according to the recipe [11, 13 – 15] (for 1 m³ of concrete) in two ways:

1) cement (III I 500) – 250 kg/m³; sand – 760 kg/m³; gravel of fraction 5...10 mm – 350 kg/m³, 10...20 mm – 810 kg/m³; water – ordinary water – 193 l/m³,

2) the same composition but instead of ordinary water magnetic water.

Magnetic water was prepared with the help of magnets "I".

The results of experimental measurements of the magnetic fields generated by the device "I": the magnetic resistant sensor KMZ 10C with susceptibility coefficient 1,5 (mV/V)/(kA/m) has been used. According to the technical documentation the device has two operating modes (1, 2), for work with ferrous and nonferrous metals. The water processing takes place in the regime of preventing scale formation and in the regime of existing deposits.

Accordingly the magnetic field intensity has been measured in two modes:

Cleaning 1 (CL1).

The signal configuration consists of high-frequency pulses that generate a field with strength of 0,23 T to 0,43 T. Each signal consists of pulse packets (packets for 8 pulses). The pulse length is 80 ms with a period of 75

ms between pulses and the interval between packets 1500 ms.

Cleaning 2 (CL2).

The signal configuration consists of high-frequency pulses that generate a field with

strength of 0,23 T to 0,43 T. Each signal consists of pulse packets (16 pulses packets). The pulse length is 35 ms with a period of 20 ms between pulses and the interval between packets 1300 ms.

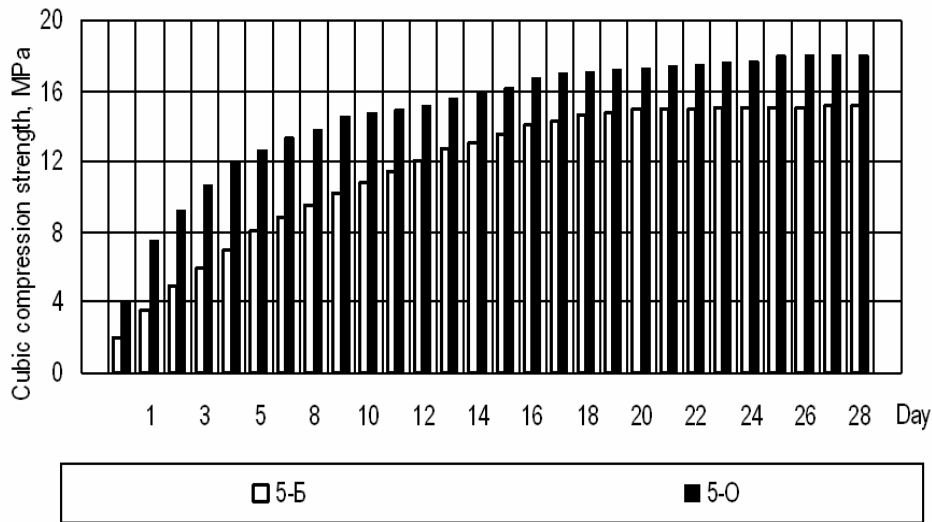


Fig. 2. Dependence of the samples strength on time, 5 – experimental series number. Series «Б» – samples prepared by classical technology using ordinary water. Series "O" – samples prepared with magnetic water. Б-5, W/C = 0,71 (slag Portland cement), CL2 installation mode

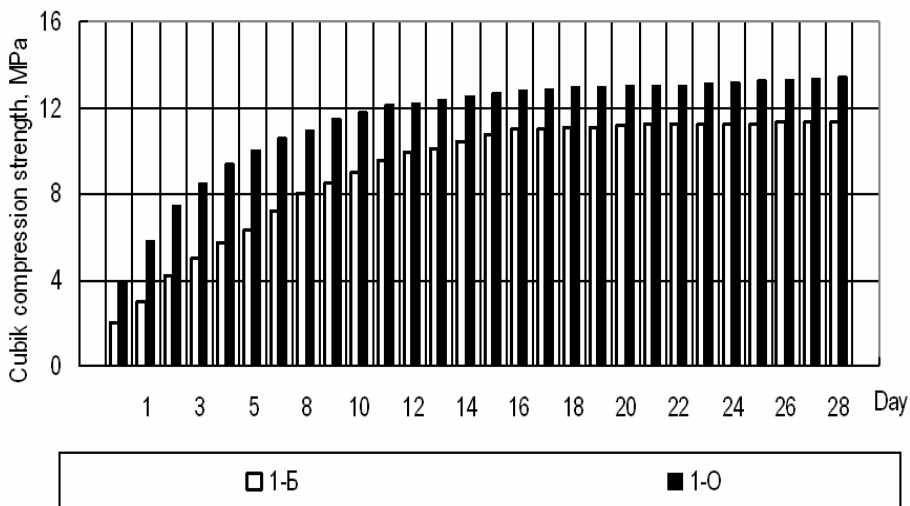


Fig. 3. Dependence of the samples strength on time, 1 – experimental series number. Series «Б» – samples prepared by classical technology using ordinary water. Series "O" – samples prepared with magnetic water. 1–O, W/C = 0,72; CL2 installation mode

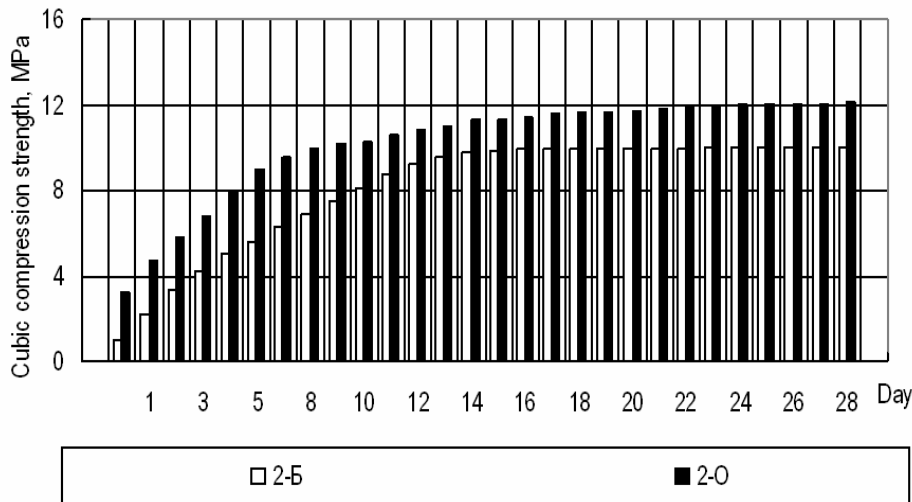


Fig. 4. Dependence of the samples strength on time, 2 – experimental series number. Series «Б» – samples prepared by classical technology using ordinary water. Series "O" – samples prepared with magnetic water. 2–Б, W/C = 0.61 (15% from the proposed formulation), CL2 installation mode

Note: The figures were taken directly from the surface of the core.

Samples prepared in the form of cubes, with a working section 70×70 have been made in batches (with or without steaming up to 28 days). The steaming chamber ($t = 80\text{ }^{\circ}\text{C} = 6\text{ h}$) has been used for steaming.

The results of these studies are shown in (Figs. 2 – 4). The determination of the samples compression breaking strength was performed according to current standards.

On the 7th day the strength of the samples prepared with the magnetic water is 17...42% more than the strength [12] of samples prepared with ordinary water. On the 7...11 day samples prepared with the magnetic water gain the same strength as the samples with ordinary water on the 28th day. On the 28th day the strength of the samples prepared with magnetic water is 9...15% more than that of the samples prepared with plain water.

CONCLUSIONS

Our studies confirm the practicability of the magnetic water use as an activator in the production of construction materials, which

will let use energy-efficient nanotechnologies in the production. This requires a deep study of complex physical and chemical systems, which is scheduled by the author in the following series of experiments.

The use of water treated with high-frequency electromagnetic fields obtained from devices "I" lets reduce energy and ecological consumption during heat treatment of concrete (steaming) [10].

To receive detailed experimental data on the magnetic field of the device "II" is a subject for further study: with the purpose to warn potentially adverse environmental and economic consequences it is recommended to use the latest advanced technologies (plasticizers et al.), activated (magnetic) water in the concrete and reinforced concrete production.

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ЭНЕРГОСБЕРЕГАЮЩИЕ ТЕХНОЛОГИИ С ИСПОЛЬЗОВАНИЕМ ВОДЫ, ОБРАБОТАННОЙ В МАГНИТНЫХ ПОЛЯХ

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Аннотация. Выполнен анализ существующих гипотез структуры воды и влияния магнитного поля на изменение ее структуры. Сформулированы гипотезы о целесообразности применения высокочастотных электромагнитных полей для усиления их влияния на изменение структуры воды и устойчивость этого процесса. Проведены экспериментальные исследования с использованием воды, обработанной в высокочастотных электромагнитных полях для производства экобетона.

Ключевые слова: омагниченная вода, плотность поля, частота волнового движения, время обработки воды в области.