ORGANIZATION OF CONSTRUCTION TECHNOLOGY AND CONSTRUCTION PROCESSES CONCRETE HARDENING

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Annotation. This article presents the results of experiments on the dehydration of the concrete mixture, the reduction of negative effects in the hardening process of concrete, as well as the destructive processes that occur as a result of the plastic shrinkage of concrete. If the hardening of the concrete is not adequately controlled, its strength can reach 50% of the design strength. In this experiment, the processes of plastic subsidence during the initial period of hardening of concrete of different classes for the maintenance of freshly laid concrete were taken into account.

Keywords: concrete, dry hot climate, evaporation, plastic shrinkage, concrete maintenance, ambient temperature, constant evaporation, plastic sink.

Under the influence of solar radiation and high temperature, the amount of water in the newly laid concrete mixture begins to evaporate rapidly [11.14]. As a result of intensive evaporation of water in the concrete mixture from the bottom to the top, interconnected pores are formed, which leads to a decrease in concrete strength.

As a result of dehydration of the concrete mixture, the cement hydration process slows down. If the hardening of the concrete is not adequately controlled, its strength may be only 50% of the design strength. Rapid dehydration of curing concrete in a low humidity environment adversely affects the hydration mechanism of cement stone, resulting in large plastic, general shrinkage and cracking in structures. If the hardening of the concrete is not adequately controlled, its strength can reach 50% of the design strength. According to the researches of Krylov B.A, Hakimov Sh.A [7, 9], dry hot climatic conditions are one of the main factors for negative processes occurring in concrete and deterioration of physical and mechanical properties [2]. In the experimental work, a concrete mixture with a water-cement ratio was used. The expansion of the concrete mixture according to cone subsidence was 1-3 cm, and the following fillers were used in it: portland cement, a product of the Okhangaron plant, brand M400, crushed stone, a product of the Aktosh quarry plant, mainly from local factories, crushed grain 5-20, quartz sand Mkr = 3, 4 in demand. The highest indicator of ambient temperature was 34-360C and relative humidity was 37-32% on average [4.5]. The main part of the experimental work was carried out in the process of production of concrete and reinforced concrete products at the "4 - Experimental Construction Constructions - Testing Plant" in Oktash, Namangan Region, under the Ministry of Agriculture and Water Management, in the dry and hot climate conditions, the indicators of continuous evaporation of water from the surface of newly laid concrete in an open landfill, was carried out using the effect of natural solar energy [3].

In this experiment, the processes of plastic subsidence during the initial period of hardening of concrete of different classes for the maintenance of freshly laid concrete were taken into account. The obtained experimental results show that in dry-hot climatic conditions, plastic shrinkage occurring in hardening concrete occurs depending on the amount of water leaving its surface, i.e. "evaporation". If the non-stop evaporation indicator - j is 0.2 = 0.3 ≤ j ≤ 1.0 = 1.1 kg/m^2.h in the following intervals, $(\Delta l / l)_{max}$ amount is the same or changes imperceptibly, if this value - j ≥ When it is 1.1 kg/m^2.h, we observe that the $(\Delta l / l)_{max}$ indicator gradually increases. The increase in the level of evaporation from the surface of hardening concrete, if j =

1.0-1.1 kg/m^2.hour is greater than the indicator, it causes the value of $(\Delta l / l)_{Max}$ to increase. is associated with the appearance of a voltage indicator in small spaces (Fig1).

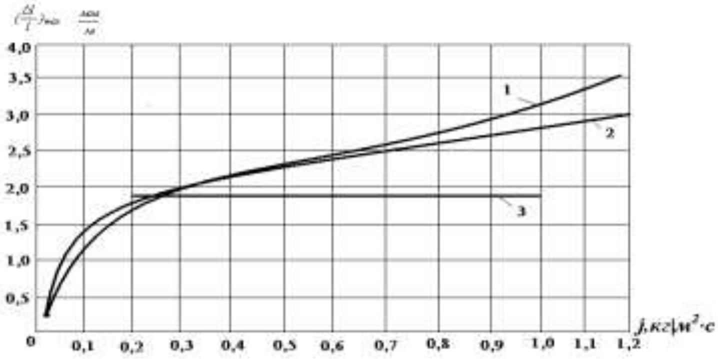


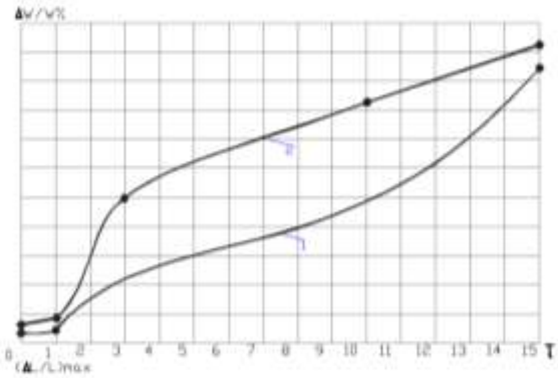
Figure 1. The largest amount of plastic shrinkage resulting from continuous evaporation of concrete. Comment:

Notes: 1) and 2) – according to the results of experiments in different series; j, kg/m2.h; 3) Results determined by [1,2,5,6].

That is, the amount of "plastic subsidence" occurring as a result of continuous evaporation remains unchanged in the interval 0.2-0.3 ≤ j ≤ 1.0-1.1 kg/m^2.hour, but it clearly determines the rate of its occurrence in a significant indicator - the amount of j Therefore, the larger the value of j-, the faster the "plastic shrinkage" that occurs in it.

For this, it is necessary to take into account the effect of physical processes occurring in the initial period when choosing the most perfect condition of the space layer between concrete and heliocoupling, based on the above-mentioned points. Fig.1 shows the graph of connection ***j** = f(b)* obtained on the basis of experimental results.

It is shown by curve 1, the amount of water that continuously evaporates from freshly poured concrete, which mainly depends on the thickness of the void layer when it is hermetically closed. This, in turn, (j) for concrete, if the surface of the sample is set in a dense state, it differs insignificantly when d=20-25mm and averages 0.043 and 0.072 kg/m^{2}h (Fig.1). The increase of the void layer on the surface of the concrete leads to the continuous evaporation from the concrete. That is, when the thickness of the layer is d=60-65mm j =0.32 kg/m^{2}h, d=200-205mm is j=0.44 kg/m^{2}h. In this case, the rate of continuous evaporation from concrete hardening in the open air is about j=0.99 kg/m^{2}h. The relationship between the obtained results is: $(\Delta l / l)_{Max} = f(j)$. As shown in Figure 2, this amount j=0.043 and j=0.072 kg/m^{2}h can produce a small value $(\Delta l / l)_{Max}$, when j ≥ 0.32 kg/m^{2}h, the plastic shrinkage can reach a significant amount. These data are expected , confirmed based on their study and experimental results on plastic shrinkage and continuous evaporation of concrete. In fact, we know that d=0mm, $(\Delta l / l)_{Max}$ =0.2mm/m and d=20-25mm $(\Delta l / l)_{Max}$ =0.45mm/m (Figure 2) [1.2.3.4.5]. On the basis of the curve 2 in Figure 2, which is shown on the experimental results, we can say that the rate of water loss in the last period of concrete hardening at d=0 and 20-25mm is between 3 and 5.5% of the total amount of concrete water, if d=40- At 45mm, ΔW/W=17...18%, thus it was observed that the dehydration indicator continues. Thus, if the thickness of the air gap between concrete and heliocoupling is densely covered around the surface part, based on the results of the experiment, taking into account the physical processes occurring in concrete, we determine that the thickness of the gap layer is on average 20-25 mm. To determine this rule, we cast a sample-prism and put it under a 2-layer film coating for a day, changing the thickness of the cavity layers in different ways, one part in a standard temperature shop room, and one part in an open landfill with a densely covered polymer film coating, remaining under 28 and during the day, we ensured that he would stay in the sex room. As a result, we determined their prism strength.



Picture 2. The amount of continuous evaporation in freshly poured concrete is -1; and water loss during permanent solidification at the last time (ΔW / W) - 2; depending on the thickness of the gap layer between the heliocoupling based on its indicators.

When the evaporation (dehydration) of concrete is continuous, j ≥0.32 kg/m^{2}h is required, indicating that its plastic shrinkage continues, and the largest amount is in the range of 1.75-2.77 mm/m. If the air gap layer is d=40 - 45mm, continuous evaporation in newly poured concrete will be between the smallest and largest critical values in the transition area, and as a result, the largest plastic shrinkage value of concrete will be on average - 0.8 mm/m. This figure 2 confirms that the rate of "plastic shrinkage" resulting from continuous evaporation of concrete is directly related. Based on the conditions of the data of the conducted experiments, we know that the amount of the largest "plastic shrinkage" of concrete j ≥ 0.32 kg/m2 h varies somewhat.

This is evident when we compare it with Figure 2 [1.3].

Many studies on the determination of heat treatment regimes have shown that the holding time should be at least 2 hours. The time of raising the temperature depends on the rate of raising the temperature, which is determined depending on the initial strength of the concrete (Table 1). For this purpose, experiments were conducted in order to study the influence of the initial temperature of the concrete mixture and the temperature of the external environment on the procedures of heat treatment [13;16].

Rate of temperature rise during heat treatment of concrete.

Table 1.

Initial compressive strength of concrete, MPa	Rate of temperature rise, degree/hour
0,1-0,2	10-15
02-0,4	15-25
0,4-0,5	25-35
0,5-0,6	35-45
More than 0,6	45-60

Experiments have shown that the strength of dehydrated concrete (when dehydration occurs before or after the placement of the concrete mixture) can decrease by 20-35% or even 50%.

Figure 3. Concrete samples depending on the method of care; t = 43^{0}C, α = 35%, project brand of concrete-300.

To determine the compressive strength of concrete, 100x100x100 mm samples were prepared. Film forming components (SET-water-soluble and SDT-water dispersion and consumption 350-400 g/m^2) were sprinkled on the prepared samples. The solidification environment of the samples was t = 43^{0}C, α = 35%. Hardening samples were taken under soaking sand for reference. Samples were tested after 1, 3, and 28 days (Fig. 3).

The decrease in concrete strength is explained by the formation of pores in concrete as a result of rapid evaporation of water during the cooling period. The filtration capacity of freshly laid concrete in a dry-hot climate (t = 43^{0}C, α = 35%) is 70 times greater than that of concrete hardening under "normal" conditions. This indicator has a very negative impact on concrete strength and its operational ability. Any actions aimed at preventing dehydration of concrete in the process of hardening will lead to a significant increase in its strength indicators.

Based on the above experimental results:

1. The negative effect of the increase in ambient temperature is manifested in the loss of flowability of the concrete mixture. In hot weather conditions, the specified strength of concrete can be ensured by increasing the water consumption and, accordingly, the cement consumption.

2. High ambient temperature can have a positive effect on the hardening process of concrete. An increase in temperature accelerates the hydration reaction and cement hardening. It is of practical importance that this factor is taken into account when determining the methods of heat transfer to concrete.

To reduce or eliminate these negative effects, it is recommended to take care of newly laid concrete:

1. Cover the newly laid concrete surface with water-absorbing material (sand, sawdust, cover cloth, etc.) and keep it wet regularly. After the newly laid concrete is poured into the mold and compacted, after 25-30 minutes, its surface is covered with

water-absorbing material and moistened 3 times a day for 7 days.

2. Keeping open horizontal surfaces of concrete under a layer of water (the method of retaining water basins). In this case, a mold with waterproof edges is used, which rises 6-7 cm above the newly laid concrete. 30 minutes after the concrete is laid, the open surfaces of the devices are filled with water 2-5 cm thick.

3. Continuous spraying of water in the form of small drops on the newly laid concrete surface using various moistening devices. This method can be used only in

places where there is a centralized water supply.

4. Covering the concrete surface with inventory thermal insulation coatings (ITVP). These covers are made by stretching two layers of polyethylene film over

wooden or metal frames.

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