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WATER PURIFICATION OF ARTIFICIAL SWIMMING POOLS

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ABSTRACT

The article presents the results of studies on the purification of swimming pool water carried out on a pilot filtering unit. A high and stable retention capacity of the auxiliary filtering layer of perlite in the mode of constant speed has been established. The possibility and expediency of using the filter perlite of the Tashkent UzPerlit plant as an upstream filtering material for water purification of swimming pools is shown.

Key words: Swimming pool, pool bath, water treatment, dispersed impurities, granular filters, pre-wash filters, filter perlite, filter layer, filtration mode, cleaning efficiency.

Introduction

An artificial swimming pool is a complex of structures and devices, functionally interconnected and providing the necessary established technological regime. The pool complex includes: the pool bath, which is the main structure and determines the type and purpose of the pool; a water treatment station that provides cleaning, disinfection,

heating and water supply to the bath; auxiliary premises and platforms for visitors, athletes, spectators, as well as sanitary and technical and special equipment serving visitors and creating the necessary technological regime. The word "pool" often means baths as the main structure.

The technology for the normal functioning of artificial swimming pools is very specific, especially sports and recreational pools. In terms of basic physical, chemical and bacteriological indicators, the pool bath water should have the same high sanitary and hygienic indicators as drinking water. However, pool water treatment is a more complex process than drinking water treatment, due to the need to carry out it repeatedly.

The existing systems of water purification in pools, using the latest latest achievements of domestic and foreign scientists, have shown that during operation, their efficiency, without reaching the planned working resource, drops to 25-30%. Based on the end result, swimming pools are forced to increase the amount of water they consume.

In addition, much experience in the design and construction of swimming pools in the conditions of the Republic of Uzbekistan has not yet been accumulated, therefore, studies related to improving the efficiency of water purification in swimming pools are very relevant.

The results of the analysis of the current state of water treatment in swimming pools, the newest technologies based on sorption processes are considered, involving the repeated use of purified water. A great contribution to the development of this scientific direction was made by scientists from foreign and domestic scientific schools: G.G. Rudzsky, V.S. Kedrov, S.N. Linevich, V.N. Shvetsov, V.L. Draginsky, B.R. Mishukov, O. G. Primin, L.V. Gandurina, V.I. Kichigin, N.S. Serpokrylov, V.I. Aksenov, A. N. Kim, B. P. Sadkovsky and many others.

The study of literary sources showed that the data on the main parameters of the processes of purification and disinfection of water in public swimming pools in the literature are presented in an extremely insufficient volume, the results obtained are distinguished by noticeable contradictions and scatter of values [1,2,3].

Currently, both in the Republic of Uzbekistan and abroad, filtration on non-pressure and pressure filters with granular loading is most often used to purify liquids with a limited content of dispersed impurities.

Along with such advantages as simplicity of the device and principle of operation, these filters also have significant disadvantages. The latter include the need for the construction of large buildings to accommodate installations, the large size of the filters themselves; the need for large tanks for storing rinse water; installation of special flushing pumps and, finally, the creation of an additional large-scale complex for the purification of the spent flushing water, the volume of which under normal operating conditions ranges from 8 to 15% of the total volume of treated water.

In addition, when processing the wash water of filters with granular loading, it is necessary to create complex devices for thickening and compaction of the sediment from the settled wash water, characterized by a relatively low concentration of the solid phase.

As a method of deep purification of water in swimming pools with a relatively low content of mechanical impurities, it is advisable to use pre-reclamation filtration (filters with auxiliary filtering materials), which, due to the design features and the principle of operation, have a higher throughput and occupy much smaller areas [4,5].

In addition, the use of pre-wash filters reduces the consumption of wash water to 0.2-1.0% of the total plant productivity and creates the possibility of obtaining a sludge with a very high degree of compaction, which cannot be achieved with other devices.

In the Namangan Civil Engineering Institute, studies have been carried out on the effectiveness of a pre-reclaim filter for water purification of the swimming pool of the "Water Sports Palace-Ocean" in Namangan using an experimental setup, the scheme of which is given in [5, 6]. The pilot plant manufactured according to the technological scheme with the adjustments made at the stage of production tests is a technological complex of equipment connected with

pipelines, equipped with monitoring and control devices. Filtration perlite of the Tashkent UzPerlit plant was used as an auxiliary material.

Of considerable scientific and practical interest is the realization of the possibility of water purification in swimming pools on pre-wash filters, the use of which in this case allows not only to achieve a high effect of removing mechanical impurities, but also to significantly reduce the costs of construction and operation of a water treatment plant. Washable filters provide a stable degree of water clarification from the moment the filter is switched on until the end of the filter cycle, the duration of which is limited by the permissible pressure drop across the filter.

The process of water purification using upstream filtration consists of three operations:

-Application (alluvial) of the auxiliary filtering layer;

- filtration of pool bath water;

- regeneration of the filtering layer of the element.

The formation of a precoated filtering layer is an extremely important stage, at which a suspension of a certain concentration is gradually introduced into the filter apparatus using a pump and is evenly layered on the filter element.

The use of cylindrical filter elements in pre-wash filters allows the most complete use of the volume of the apparatus.

So, for example, in a pre-wash filter with a diameter of 2.0 m, the filtration surface is 70-100 m2. At filtration rates of 2-3 m / h, the productivity of such a filter is 140-300 m3 / h, which is 5-10 times higher than the productivity of a bulk mechanical filter of the same diameter [7].

Filtration perlite is a product obtained from expanded perlite as a result of mechanical and thermal processing of perlite ore. Due to the fact that filter perlite is environmentally friendly, absolutely non-toxic, insoluble and not exposed to chemical influences, it has found its application in various industries as a special and additional material for filtering liquids and suspensions. Perlite

filtering powder is used as an auxiliary filtering material for the formation of a precoat layer on modern filters when filtering various suspensions: technological oils at metallurgical plants; petroleum products, lubricants; solutions in chemical plants; antibiotics; vegetable oils; waste and drinking water; sugar juices and syrups; beer; wine; fruit juices, etc.

DISCUSSIONS

The choice of cylindrical filter elements was justified by the fact that in the process of siltation of the element there is an increase in the filtering surface and a corresponding decrease in the filtration rate in the upper precoated layer, stabilizing the increase in pressure loss.

The experiments were carried out in the filtration mode at a constant rate. The lightening effect at different content of suspended solids in the source water was quite stable and high (about 90%). The analysis of individual samples showed a decrease in color by 50-60% (up to 12-20 degrees). When using filter perlite, the duration of the application of the primary layer was 7-12 minutes, the limiting pressure loss was 0.15-0.25 MPa. The use of a pre-wash filter reduces the cost of the water purification process due to the reduction of areas for filtration facilities and a decrease (up to 1.0% of the total productivity) of water consumption for washing filters.

Thus, research has established the possibility and feasibility of using for deep water purification of a swimming pool by the method of reclamation filtration using filter perlite of the UzPerlit Company in the city of Tashkent as an auxiliary filtering material.

CONCLUSION

Namangan Civil Engineering Institute and the Department of Construction and Installation of Engineering Communications invite

interested in cooperation in the implementation of the most modern,

highly efficient and economical technologies for purification and disinfection

of swimming water
swimming pools.

REFERENCES

1. Kedrov V.S., Rudzsky G.G. Water supply and drainage of swimming pools.-M .: Stroyizdat, 1991.-160 p.

2. Alluvium filters for clarification of natural waters / GI Aleinikov, AP Mamet, DL Tsyrulnikov, others // Energomashinostroenie. 1980. No. 10. S.40-43.

3. Gizzatova GL, Khramov VA Uchevina as an indicator of anthropogenic pollution of water in swimming pools / VA Khramov, GL Gizzatova // Hygiene and Sanitation. - 2006. - No. 3. - S. 3-5.

4. Soatov U.A., Negmatov M.K. Some recommendations on the granulometric composition of the loading of filters in swimming pools with a recirculating water supply system / New technologies are the main factor of economic progress.In the materials of the Republican Scientific and Practical Conference, Namangan. 2013.

5. Negmatov M.K., Atamov A.A., Buriev E.S. Automation of water supply systems and instrumentation. Study guide / -Tashkent: ed. "Tafakkur Bustoni", 2017.-368 p.

6. Negmatov M.K. Using local materials for loading water treatment filters. Methodical manual.-Namangan .: Namangan Engineering Pedagogical Institute, 2000. 34 p.

7. Negmatov M.K., Zhuraev K.A., Yuldashev M.A. Treatment of Sewage Water of Electrical Production on Recycled Filters // International Journal of Advanced Research in Science, Engineering and Technology Vol. 6, Issue 10 , October 2019, Pages 11132- 11135.