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MEASURES TO PREVENT CAVITATION IN PUMPS

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Abstract
Pump stationinstallation of suction pipes in pump units, its working order plays an important role in its operation and increasing its efficiency. It is precisely due to the rapid bending of the water pump details, the change in the size of the details in the working wheel, and the phenomenon of "cavitation" that occurs in the pump, it has a very negative effect on the efficiency of the pump station. As a result, the pump impeller needs repair before the due date, and the pump stops until the station is stopped. .

Keywords: Pump stations, aggregates, suction pipes, cavitation, repair.

A more important influence on the performance of centrifugal pumps is the size of the gap, the distance between the sealing rings and the outer flange of the impeller discs. As a result of the bending, the surface of the working thickening sheets had an uneven grainy wavy appearance. The most bending of the working surface of the compacting ring took place in the corners of the places where the flow turns, its last parts, which have a groove-like shape on the radius.
Cavitation is a violation of the viscosity of the liquid flow, which occurs in sections where the local pressure drops and reaches a critical value. This process is accompanied by the formation of a large number of bubbles filled with more liquid vapors and also gases coming out of the solution.

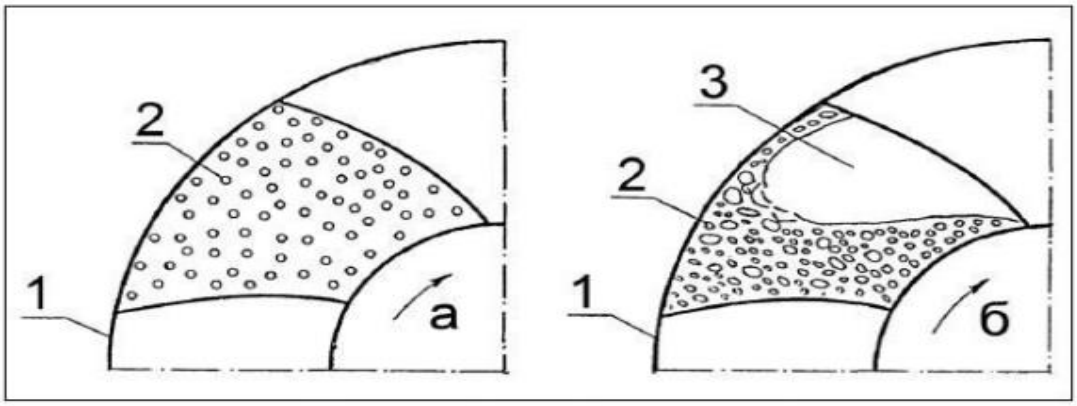

Figure 1. Without the cavitation that occurs in centrifugal pumps and Cavitation conditions.

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1st worker; 2-air in water; 3- air shell.

Separation of air from the composition of waterleads to the formation of cavitation cavities, and accelerates the shrinkage of the final parts of the surface of the compacting ring.

The rotation of the disk results in a lumpy motion of the flow, which is an additional source of shear intensification.

In the period of use of pumping devices, in addition to those listed above, failures due to cavitation corrosion also occur.

Reasons for failure of pumping equipment:

Cavitation is a violation of the viscosity of the liquid flow, which occurs in sections where the local pressure drops and reaches a critical value. This process is accompanied by the formation of a large number of bubbles filled with more liquid vapors and also gases coming out of the solution.

The formation of bubbles has something in common with the boiling of a liquid. Accordingly, since these 2 processes are often similar, the vapor-saturated liquid pressure is taken as the critical pressure at which cavitation begins at this temperature. Cavern bubbles are formed in the low pressure area. Then the bubbles flow with the flow to the area where the pressure is above the critical limit, where a disturbance is formed. Thus, a well-defined cavitation zone full of moving bubbles is formed in the flow.

The phenomenon of cavitation is clearly manifested in the example of water flowing through a glass tube (Venturi cone) with a local constriction. A gradual increase in consumption causes the pressure to drop to a critical value at the narrowing point at a much higher flow rate.

At first, cavitation appears in the form of an irregular ring-shaped zone, and due to some pulsation, the pressure periodically appears and disappears on the surface. and finally, at a certain value of flow, the cavitation zone occupies the entire flow section and spreads far downstream.

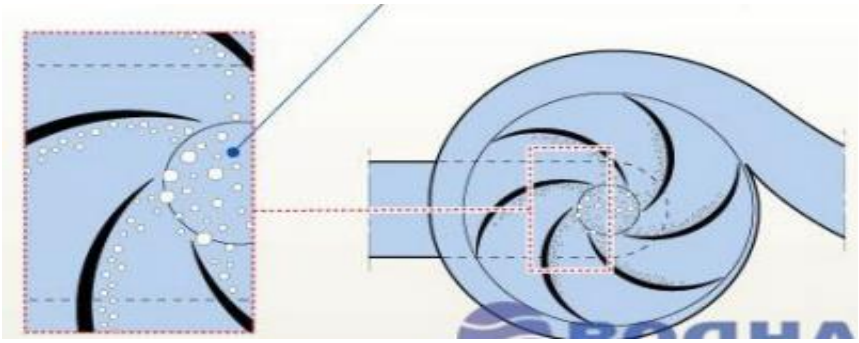

Figure 2. Location of cavitation in centrifugal pumps

As an example, the flow diagram in the impeller of a centrifugal pump is given. In this case, cavitation bubbles appear on the blades of the impeller. Leaving the surface of the foil, they form a cavitation zone, are carried away by the flow and disappear at some distance from the foil. Another example of cavitation is the condition that occurs near the surface of an oscillating body in a liquid. At a sufficiently high frequency and a certain amplitude of vibration, cavitation bubbles are formed on the surface of the body, and during that part of the period of vibration, the pressure near the surface drops, the bubbles enlarge, and during the rest of the period, the pressure rises and the bubbles burst.

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Generally, cavitation is divided into two types: surface cavitation and separation cavitation. Surface cavitation occurs on or directly near the surface of the guide element. The case of cavitation in the impeller of a centrifugal pump that we have just described is an example of surface cavitation. Separation cavitation occurs far from the surface and is the result of turbulent mixing, usually caused by entrained elements, impellers of some hydraulic machines, and separation of the flow from the directed surface.

In the main hydromechanical equipment of pumping devices, cavitation and hydroabrasive bending of some elements occurs, as a result of which their operating mode deteriorates and their useful work coefficient decreases and causes significant losses. The reason for the decrease of the pumps during the cavitation collapse is the incorrect location of the unit in relation to the lower water level, according to their operational characteristics.

In order to prevent cavitation bends in pumps, it is necessary to ensure the following:

- ✓ Ensuring that the level of water absorbed by the pump is normal;
- ✓ Ensure that the joint of the pump with the suction pipe is hermetic;
- ✓ Reducing the speed of water movement in a straight line inside the pump;
- ✓ To ensure that the elements of the centrifugal pumps are adjusted to tighten the side cracks of the working blades;

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