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Features of Installing the Circulation Pump

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ABSTRACT: To ensure stable rotation of the heat engine, two pumps can be installed in the system: the main and standby pumps. In addition, socks should be provided to ensure a constant natural circulation of fluid and insulation.

KEYWORDS: pump, buildings, electronic, characteristic, tripod-mixer, dry.

I. INTRODUCTION

Initially, the rules for installing a roaming pump in the opposite direction from the heating wall were established. This is due to the desire to extend the life of the installation by reducing exposure to high temperatures. Modern equipment of well-known manufacturers allows the refrigerant to withstand its operating temperature, so they can be installed and maintained by a heating pipe in accordance with the specific requirements of the heating system.

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II. RELATED WORK

The circulation pump divides the entire heating system into two zones:

- Suction zone in front of the pump
- Pump area after pump

The zero point of the suction injection is the expansion tank. Hydrostatic pressure must be considered in these parts of the system. In the ventilation zone, the pressure may drop below atmospheric pressure, which will cause the system to pass through the air and increase in the flow zone, which can lead to boiling liquid. To avoid the negative consequences of these events, you should adhere to the rule: at any point in the suction zone, the hydrostatic pressure in the gas pipeline must be excessive. The methods for following this rule are different: from changing the position of the wave tank and the circulation pump to using special equipment.

Although you can sometimes choose and install your own circular pump, it is best to trust such professionals. Our company employs heating engineers to calculate the heating system and select the necessary equipment, and qualified craftsmen carry out authorized installation in accordance with modern requirements and rules. We strive to create warmth and comfort in your home!

The main parameters of the circulation pump are the head (H), measured in the water column, and the size m^3 / h (B) or capacity. The greatest hydraulic resistance of the system that can be overcome without maximum pump head. In this case, its feed is zero. The maximum flow is the maximum volume of the heat transfer medium at which the pump sways to zero for 1 hour with the hydraulic resistance of the system. The dependence of system performance on pressure is called the characteristic of the pump. Single speed pumps have one characteristic, two and three speed pumps two and three, respectively. Constant rotor speed pumps have many features. When calculating the parameters of the pump of the heating system, the height of the pump must be taken into account. But this is not so. In addition, the heating system, which has a closed oven and the height of the cooling water, dumps the same amount to the “backside”. These two supports balance each other, and therefore, when calculating the pump, only the resistance to removal of pipes, fists and other parts should be taken into account.

The starting point for choosing a heat pump is the building’s heat demand, calculated for the coldest time of the year. With professional design, this indicator is determined using special computer software. This can be calculated by the area of the heating zone.

For 1-2 storey buildings:

- 173 W / h at a temperature of about -25 ° C;

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• 177 W / m² -30ºC.

For 3-4 floors:

• 97 and 101 W / sq.m, respectively.

To determine the heat consumption (Q, B) for your home, you need to increase the heating area with an appropriate value.

Determine the heat consumption (Q, B), calculate the required pump volume (flow) using the following formula:

$$V = Q / 1.16\ DT\ (kg / h), \quad (1)$$

DT - temperature difference in the supply and return of the heating circuit (standard two-pipe system 20 ° C; low temperature 10 ° C; 5 ° C for underfloor heating);

1.16 Specific heat capacity of water (W / kg.ºC). If you are using another refrigerator, you must make the appropriate adjustments to the formula.

To convert the obtained value to m³ / h (as a rule, this unit is used in the technical documentation for measuring pump performance), it should be divided by the density of water at the design temperature; 971.8 kg / m³ at 80ºC.

In addition to the necessary supply, the pump must provide sufficient pressure in the heating system (pressure) to prevent the resistance of the pipe. For the right choice, it is necessary to determine the losses in the longest electronic line (up to the longest emitter).

When designing a new system, accurate calculations can be made taking into account the resistance of all gear elements (pipes, fittings, fittings and equipment); Usually the necessary information is indicated in the equipment passport. Here you can use the following formula:

$$H = (R.l + Z) / g\ (m), \quad (2)$$

You are here:

R is the resistance in the straight pipe (Pa / m);

l - pipe length (m);

Z is the resistance of the armature, etc. (Pa);

p - density of the pumped medium (kg / m³);

g is the speed of gravity (m / s²).

In the case of working heat pipes, such calculations are usually not feasible. In such situations, prophecy is often used.

Experimental data show that the resistance of the straight parts of the pipe (R) is from 100 to 150 Pa / m. This corresponds to the required pump volume of 0.01 - 0.015 m per 1 m of the pipeline. The duration of delivery and forwarding should be taken into account in the calculations.

In addition, it was experimentally established that about 30% of losses in a straight pipe are lost in fittings and contact parts. If the system has a thermostatic valve, an additional 70% is added. A 20 percent mixer tripod that controls the entire heating system or device that prevents natural circulation.

The pump is called a workstation (head and feed), and you must choose a pump with a number of specifications in the catalogs. At the time of operation, the operating point should be about a third of the diagram.

We must not forget that the computational parameters are necessary for the system to work at maximum load. These conditions are rare and most of the heating season is negligible. Therefore, if in doubt, you should always choose a smaller pump. This not only saves purchases, but also reduces energy consumption.

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For example, with this.

The reverse question: Who is directly involved in the preparation of heating systems in our country? Because they come directly. They learn from each other, misunderstand, explain to others, and the chain of "genius" is only growing.

To find out, ask how the pump that heats up the system is correctly selected.

P. The first number indicates the diameter of the nuts for the connection. The second head is sixteen. This is 40 dm - 4 m Well, 4 feet is not enough for a two-story house, it is 6 meters, so most people will answer. Therefore, at least 25-80 pumps are sufficient on the 3rd floor.

As a result of this error, the error is as follows. The coolant flows through an open tank with an open top, the pump has a 4-meter head, and the tank is suspended to a height of 3.5 meters. This conclusion is made by many people. And now, an excellent result: if you install a circulation pump in the system, the tank should be closed. The boiler

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available in the system exceeds 1.2-1.5 atm. he does not survive, he has already forgotten. For convenience, you can add more water than a water source (pressure 2.5 - 3 atm) or fill the infantry pump for infants, which can press up to 4 atm. As a result, the buyer sooner or later loses the bank. We repeat these errors several times in advance.

Now let's listen to the normal operation of the circulation pump, no one else.

Memorization of phrases: "The head of the circulation pump is used without exception to overcome the resistance of the system."

So, the conclusions:

1. vertical rotary pump is not produced.
2. The pressure is the same at all points in the heating system.
3. Flow rate (pump capacity) regardless of system resistance
4. The higher the resistance of the system, the greater the need for a pump.
5. How many liters per second reached the “platform” in the system, the same amount was reduced to “reverse”. and so on.
6. The easiest way to select a circulation pump depends on the capabilities of the entire heating system, based on its heat output.

For example, a pump produces a maximum of 2.5 tons of energy per hour. Choose a pump for a full size of 10-15 inches. This is if the system is 250 liters, it will rotate 25-40 systems 10 times per hour. Please pay attention to the boiler, do not “kill” the heart of the system.

This raises questions about the article.

Before buying a circulation pump, it is necessary to determine the purpose of the pump, know its operating standards, parameters and characteristics and, of course, calculate the pump pump power. The circulation of water in the heating system makes the difference between a cold and a heated fluid. However, if the rotation speed is insufficient, use a rotary pump.

The following equipment criteria should be studied for calculating heat pumps:

- Main characteristics of the pump;
- status of his work;
- Appointment of the device.

And after all the criteria, you can calculate and calculate the pump power.

The effective heat transfer of the heating system directly depends on the compatibility of the parameters of the circulation pump with all the parameters of the system. How to choose the right heat pump for navigation on the topic, find out about its structure and basic parameters.

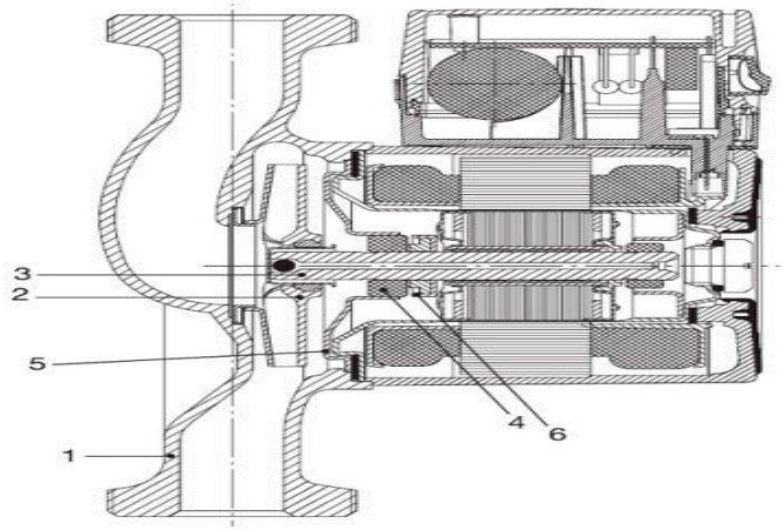

Figure 1

Consider the pump section. It consists of a pump and an electric motor with a control unit. Case material can be:

- stainless steel,
- bronze,
- Aluminum
- cast iron.

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A stainless steel propeller pump or mechanical shaft mounted on a mechanical shaft rotates by rotating it to increase fluid flow. The axes of the inlet pipe and the axis of the axis are usually located in the same direction. Bearings and shafts of rotating shafts are made of ceramic, which positively affects the noise level and durability of the device.

A.CHAIN PUMP TECHNICAL PARAMETERS

The functionality of the device can be found in its technical passport. You can find out about these heat pump options:

• Pump flow rate (flow rate, capacity) is the value of the rod (unit of measure m3 / hour) equal to the maximum amount of water that can be pumped per hour.

• The pressure of the circulation pump is the maximum value of the hydraulic resistance at which all elements of the heating circuit are fluid and can overcome the pump (flow = 0). Measured in meters (meters).

• Pump characteristic - a clear relationship between the number of derivatives, the pump head and its efficiency. So, for a single-speed (single-speed) pump, there are two or more functions - one and two on one - what about a pump with constant variable power? ..

In partnership with Teplo Profi, each client is provided with full consultation and support on all issues related to the selection of equipment. We are always ready to help. We will calculate the pressure of the rotary pump and help you choose the right equipment that suits you as a client.

B.DESCRIPTION OF TYPICAL PUMPS

Pumps rotating on top of each other are not significantly different. All of them are classified according to the type of rotor. Separation:

• wet rotor pumps

• Dry rotary pumps.

The devices of the first type differ from the rotor in liquid, and its chamber is separated from static electricity by a stainless steel cap. Advantages of this pump: compactness and noiselessness, no need for lubrication (as well as coolant and coolant). However, such a device is less efficient than dry pumps.

Dry pumps do not have a direct connection between the rotor and the system cooler. The waterproofing is supplied in stainless steel, charcoal or ceramic rings. A high degree of "placement" of the rings on each other and their rotation leads to the formation of a thin brine that seals the electrical part of the pump. When using spring rings, the rings are always pressed and “self-compressing”.And before choosing a circular pump for the heating system, make sure that the registration pump is in a separate room. The peculiarity of the “dry” type is that it works very well.

III. EXPERIMENTAL RESULTS

After a pump test, its number is displayed. For example, Grundfos UPS 25-50 N180

The first two numbers are the diameter of the connecting pipes. In our case, 25 mm (1 inch). The diameter of the iron is provided by a circulation pump.

The second number represents the hydrostatic head of the cooling system in the system. In our example, the elevator can create pressure up to 50 dm, which is up to 0.5 atm.

Installation length of the pump N180.

In accordance with these values, the choice for heating the pump pump is made theoretically after calculating the pressure of the circulation pump and calculating the capacity of the pump pump.

By the way, the energy consumption of the pump is regulated stepwise (position 3) or smoothly (electronic control of the pump motor). Power consumption is indicated on the nameplate located on the pump housing.

Pumps equipped with an electronic control unit are characterized by economic growth and are able to independently regulate their performance by analyzing the flow and pressure in the system.

The calculation of the pump pump is based on the needs of the heat exchanger - this is the basis for calculating the heat pump. The cost is obtained in the coldest season of the year. According to SNiP 2.04.07-86 "Heat Networks", one-story buildings with an area of 173-177 W / m2 "outside" are 25-30 ° C. Three or four floors. houses at 97 and 101 W / m2, respectively.

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Multiplying these "norms" by the number of "squares" of the heating room, we estimate the heating needs of the building.

In addition, the calculation of the parameters of the circulation pump can be performed based on the capacity of the boiler.

The required value is calculated using the following formula:

$$Q = \frac{N}{t_2 - t_1} \quad (3)$$

Q is the calculated value corresponding to the flow rate of the pump (m3 / h);

N - power of the main heater (boiler), (V);

t_2 - temperature of the supply of refrigerant to the inlet pipe (at the outlet of the boiler), (OS);

t_1 - temperature of the refrigerator inside the "return" (boiler input), (OS).

If you set the required parameters in the formula, we will get the required flow without a pump.

The temperature of the refrigeration boiler is usually + 85 to 95 ° C with a return temperature of 60-70 ° C.

The pressure required to overcome the hydraulic resistance is determined by special formulas. You can use this information for a simplified choice:

Flat sections of the pipeline are 100-150 Pa / m, which is equivalent to the required pump head - 0.01-0.015 m per meter of pipeline.

Note! The calculation takes into account the total length of the loop (inlet pipes and return).

Armature receives 30% of the calculated "direct" resistance;

Triple mixer - 20%;

Thermostatic valves make up 70%.

It is interesting!

The height (layers) of the building is not taken into account when calculating the hydraulic resistance of the entire heating system. However, the pumping height does not matter here!

The system is closed. Therefore, the height of the supply line is equal to the height of the interaction - the liquid columns in them are balanced with each other.

The total amount of hydraulic resistance depends only on the resistance value of all types, tees, valves.

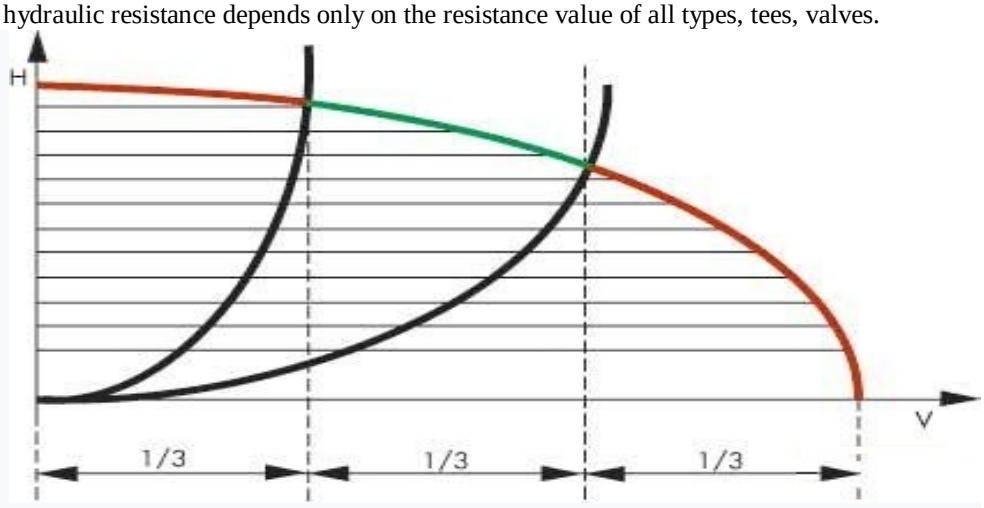

Figure 2

Using the calculated head and flow data, the necessary pump characteristics are determined and selected from this catalog.

After choosing a rotary pump in the heating system, we worked with data on the maximum load for the pump, then it is enough to choose a less powerful option for daily work. He and "silent" will be cheaper, and electric "food" will be cheaper.

INSTALLATION FEATURES

When installing the pump, this rule must be taken into account: “The pump shaft must be in a horizontal position!”

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Such devices pump coolant in only one direction. Therefore, when pumping, the correct installation direction must be observed.

You can choose a rotary pump for heating with natural circulation. In this case, the existing cooling system with natural cooling water circulation will be updated by installing a circulation pump. The “built-in” pump in this system improves the uniformity of heating of all radiators. In addition, the introduction of such pumps during heating can save about 20-30% of gas.

Check the valve with the pump installed in the sockets, cut to the system “return” and installed on the main pipe, which allows the system to work in case of sudden power outages.

IV. CONCLUSION

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