CLASSIFICATION OF HEAT SUPPLY SYSTEMS

Topvoldiyev Nodirbek Abdulhamid o'g'li
Assistant of Andijan machine building institute
Tursunov Rozimuhammad
Andijan machine building institute "energy saving and Energoauditi " direction 4-stage K-26-20 Group student

Abstract: The classification of heat supply systems is a fundamental aspect of urban planning and building services engineering. It involves categorizing various systems based on their function, energy sources, components, and design characteristics which are crucial for efficient thermal energy distribution for heating purposes. This paper provides a systematic overview of the existing types of heat supply systems and proposes a comprehensive classification framework that facilitates a better understanding and comparison of different systems. It examines centralized and decentralized systems, delving into their respective advantages and disadvantages concerning energy efficiency, reliability, and maintenance. The central focus is on technical parameters such as heat generation sources (e.g., fossil fuels, renewables), distribution methods (e.g., steam, hot water), and control mechanisms. Furthermore, the ecological and economic implications of each category are explored, shedding light on the lifecycle costs and environmental impacts associated with various heat supply configurations. By providing insights into regulatory standards and advances in heat supply technologies, the paper aims to assist stakeholders in making informed decisions regarding the selection, design, and upgrading of heat supply systems to meet both current and future energy demands in a sustainable manner.

Keywords: Heat supply systems, urban planning, energy efficiency, centralized heat supply, decentralized systems, thermal energy distribution, heat generation, renewable energy, system classification, environmental impact.

In our state, it will not be easy to get out of winter without heating.because in the winter season, the anamal cold comes so hard that it leaves us no choice - all the rooms need to be heated to live

At the moment, hot water is supplied to apartments, organizations and enterprises along with heat.

In order to provide Heat Supply Services, a corresponding contract must be concluded between the supplier and the consumer in accordance with the legislation.

Space heating systems are divided into open or closed.

At the same time, heating also occurs

Centralized (when heating is provided by one boiler room for the entire microdistrict);

Local (installed in a separate building or serving a small complex of buildings).

The difference between closed systems and open systems is huge. The latter involves the supply of heated water to consumers ' homes, taking it directly from the heat network

Open heating system

In this format, boiling water is sent directly from the heating pipes to the water supply, which makes it possible to completely avoid full consumption even if its entire volume is taken. In Soviet times, the work of about half of all thermal networks was based on this principle. Such popularity was due to the fact that the scheme helped to economically use energy resources and significantly reduce heating costs. winter period and hot water supply.

However, this method of supplying residential buildings with heat and boiling water has many disadvantages. The fact is that often heated water does not meet sanitary and hygienic standards due to its secondary purpose. The heat carrier can circulate sufficiently through metal pipes for a long time before entering the cranes. As a result, it often changes color and gets bad smell. In addition, employees of the sanitary and epidemiological service have repeatedly identified dangerous microorganisms in it.

The need to filter such water before delivery to the hot water supply system significantly reduces efficiency and increases heating costs. At the same time, so far there is no real effective way to clean such water. The significant length of the pipes actually makes this procedure useless.

The circulation of water in such a system is caused by the accounting of thermodynamic processes in the design. Due to the increase in pressure, the heated liquid rises and leaves the heater. At the same time, cold water creates a slightly lower pressure at the entrance to the boiler. This allows the coolant to move independently through communications. Water, like any other liquid, increases in volume when heated. Therefore, to prevent overload on heating networks, their design includes a special open expansion tank located above the level of the boiler and pipes. There, excess coolant is squeezed out. This gives reason to call such a system open. Heating in this case occurs up to 65 degrees Celsius, and then water flows directly through the taps into the homes of consumers. This system allows you to install inexpensive simple mixers.

To estimate how much hot water is used, which is impossible, it is always served according to the highest consumption.

Closed circuit heating systems

The difference from this scheme of centralized heating of houses from the previous one is that hot water is used only for heating. Hot water supply is provided by a separate scheme or separate heating devices. The circulation of the coolant occurs in a vicious circle; the small losses that occur are compensated for by an automatic pump when the pressure disappears. The temperature of the given water is regulated directly in the boiler room. The volume of boiling water in this system remains the same. Thus, the intensity of space heating directly depends on the temperature of the liquid circulating through the pipes. Heat points play an important role in this house heating scheme. In them, water comes from a thermal power plant, and there, with its help, coolant is heated, which is supplied to consumers.

In early 2013, amendments were made to the law governing the provision of heat supply services.

In accordance with them, in 2022, it is necessary to complete the complete transition from an open circuit of heat and hot water distribution. Connecting new buildings to this type of heating and water supply is already prohibited. Experts believe that the implementation of this plan requires a truly titanic effort. But lawmakers are confident that this task can be overcome.

In this regard, it is noted that the transfer of the entire country to closed systems

- The account is provided by:
- Reduce heat losses;
- Extension of the service life of communications;
- Slowing down the aging of the heating equipment;
- Improving the quality of services provided;

Reducing the number of accidents on the thermal Highway.

At the same time, at the expense of freeing up resources, heating of new buildings without being built by old objects is organized.

Experts expect the greatest effect in settlements where housing construction is most actively carried out.

1. Formulation of the issue according to the method (technology) under consideration for improving energy efficiency; forecast of excessive consumption of energy resources or description of others possible consequences nationwide while maintaining the status quo

In most cities of the Russian Federation, today the supply of hot water to consumers is carried out in accordance with open circuit.

The presence of such a scheme has the following disadvantages:

- Increase heat consumption for heating and hot water supply;
- High specific consumption of fuel and electricity for heat production;
- Increased costs for the operation of boilers and heat networks;
- Due to the large amount of heat losses and numerous damage in the heat networks, it is not possible to provide consumers with quality heat;
- increased costs for chemical water treatment.

2. availability of methods, technologies, etc. to solve a given problem

It is necessary to transfer thermal energy transportation and distribution systems to work according to a closed scheme with the construction of new heating points and reconstruction of existing ones, reconstruction of heat consumption systems in houses in accordance with SP 41-101-95. .

3. A brief description of the proposed method, its novelty and awareness of it, the presence of development programs; leads to mass implementation on a nationwide scale.

The preparation of hot water with a closed Heat Supply Scheme is carried out at Heat points, where purified cold water and coolant are obtained. In a heat exchanger, cold water heats up, which runs along the heat carrier pipes. So that cold water does not interfere with coolant and hot water, heated in such a system cold water goes to the consumer. The used coolant (its temperature drops at the output of the heat exchanger) is added to the new coolant, and this "technical" water is used for heating according to a dependent or independent scheme.

The transition to a closed circuit of connecting DHW Systems provides:

- reduce heat consumption for heating and hot water supply due to the transition to qualitative and quantitative regulation of heat carrier temperature according to the temperature table;
- reduction of internal corrosion of pipes (for the northern regions of the country) and salt deposits (for the regions located in the South);
- reduce the wear rate of heat stations and boiler equipment;
- radical improvement of the quality of heat supply to consumers, loss of "excessive heat" at positive outside air temperature during the heating season;
- reduction of the volume of work on cleaning additional water with chemical water and, accordingly, costs
- reducing the accident rate of heat supply systems.

Forecasting the effectiveness of the method in the future

- increased prices for energy resources;
- growth of Population Welfare;
- introduction of new environmental requirements;
- other factors.

As a result, the saved heat capacity of the stations and boilers can be used to provide heat to newly connected consumers after abandoning the Heat Supply Scheme open to the hot water supply and switching to the closed circuit.

5. List of subscriber groups and objects that can be used with the maximum efficiency of this technology; the need to conduct additional research to expand the list

Maximum efficiency from implementation this event is observed in intensively developing cities. Within the framework of the corresponding urban programs, it is advisable to establish new microdistricts along with the organization of heat supply according to a closed scheme.

6. Identify the reasons why the proposed energy-efficient technologies are not used on a mass scale; outline an action plan to eliminate existing barriers

Currently, most of the Heat Supply Systems in the Capital (JSC" Moscow United energy company" and JSC "Moscow heat network company") work according to a clearly closed scheme.

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