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**Соколова В.В., кандидат наук, доцент
Доцент кафедры «Иностранные языки»**

Уфимский государственный нефтяной технический университет

Россия, г. Уфа

Васильев Г.Д., аспирант

1 курс, факультет «Горно-нефтяной»

Уфимский государственный нефтяной технический университет

Россия, г. Уфа

ГИДРАВЛИЧЕСКАЯ НАЛАДКА ТЕПЛОВЫХ СЕТЕЙ

Аннотация: Тепловые сети являются неотъемлемой частью инфраструктуры для комфортной жизни человека. Наладка сетей часть процесса эксплуатации трубопроводов. После завершения монтажа системы, ее необходимо отрегулировать для равномерного распределения тепловой энергии по всем потребителям.

Ключевые слова: Тепловая сеть, регулирование, централизованное теплоснабжение, отопление, водоснабжение.

Sokolova V.V.,

Candidate of Sciences, Associate Professor

Associate Professor of the Department "Foreign Languages"

Ufa State Petroleum Technical University

Russia, Ufa

Vasiliev G.D., PhD student

1st year, Faculty of Mining and Petroleum

Ufa State Petroleum Technical University

Russia, Ufa

HYDRAULIC ADJUSTMENT OF HEAT NETWORKS

Annotation: *Heating networks are an integral part of the infrastructure for a comfortable human life. Network setup is part of the pipeline operation process. After the installation of the system is completed, it must be adjusted for the uniform distribution of thermal energy to all consumers.*

Keywords: *Heating network, regulation, district heating, heating, water supply.*

Heat network adjustment is an optimization of thermal and hydraulic modes of heat networks and sources. Heat network adjustment makes it possible to implement correct heat distribution through the consumers' networks in strict accordance with their loads.

The tasks of regulation of district heating systems include: providing the estimated flow rate of heat transfer fluid of all heat consumption systems connected to the heat network, as well as by appliances; providing calculation of indoor air temperatures in the premises.

At the beginning of the adjustment, the district heating systems are inspected, the actual operating modes and possible defects in the plan and installation are detected, and information is selected in order to investigate the features of the system.

Subsequently, the following inspections are carried out: the capacity of the heat network; the capacity of the heat source; the network, and booster pumps (are checked).

Based on these studies, the actual roughness of the internal surface of pipelines in each separate section of the heat network, the pressure loss in the heat source communications, and the characteristics of the network pumps are formed. Research is carried out at a stage between two heating seasons [1].

The stages of heat networks adjustment are divided into:

1. Instrumental stage, which includes an examination of the heat network system; identification of the condition and losses; finding loads of consumers.
2. Calculation stage, which is the determination of the heat transfer fluid flow rate; implementation of hydraulic and thermal calculations of heat networks, the choice of throttling device.
3. Practical stage including installation of throttling devices, quality control, and implementation of energy-saving measures.

As a consequence of the adjustment, the required conditions for the operation of heating systems are formed and the technical and economic indicators of heat supply are increased as a result of increasing the capacity of heating networks, reducing overheating of consumers, reducing electricity consumption for pumping the heat transfer fluid [2].

Application of existing industry-specific methods of carrying out tests of heat networks on hydraulic and heat losses does not lead to a problem alleviation/solution due to insufficient regulation of conditions of carrying out of tests and absence of a guarantee of obtaining of results of necessary completeness and accuracy. The use of existing methods of parametric identification in conditions of passive observations of the normal functioning of thermal networks does not guarantee a solution due to the lack of measurement points and a small range of variation of modes.

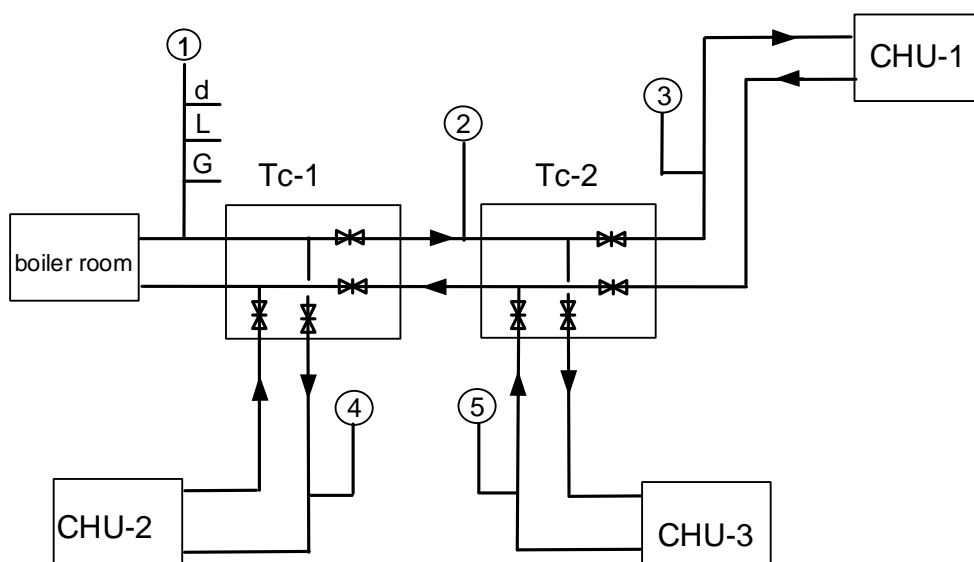


Figure 1. District heat supply scheme from source to consumers

Legend:

1 – section number

d – bore diameter

L – section lengths

G - network water consumption in a section

TC - thermal chamber

CHU – central heat unit

In order to increase stability, the calculation method should be used to adjust the hydraulic mode. Nowadays, heat supply companies use the development of computer models [3]. Often, when calculating branched multi-ring hydraulic networks, the use of computer models, which reproduce the processes in the networks as a single hydraulic system, is an effective way. Such models make it possible to determine pressures, flow rates, velocities of medium flow, pressure losses, energy consumption for medium movement, etc [5].

In order to ensure hydraulic adjustment, the correct pressure distribution within the heating network is guaranteed. It is reasonable to use the surplus of the

water pressure, which is formed by pumps if we transfer the head throttling to the branches from the mains to the consumers [6]. Increasing the difference between the levels of the pressure of the direct and reverse flow at the subscriber supply pipe connection unit will make it possible to increase the dimensionality of supply and ease of adjustment of heat networks.

Thus, currently, the most effective method of reducing energy losses is considered to be the optimization of the heat supply mode utilizing hydraulic adjustment of heating networks. Costs during adjustment works are considered minimal in comparison with capital and current works on heat supply systems.

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