

Short Reports

CALCULATIONS OF HYDRAULIC REGIMES OF HEAT-AND-WATER SUPPLY SYSTEMS IN CONDITIONS OF FAR NORTH

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A normal functioning of heat-and water supply systems of the far north nowadays is not simply or only a necessary level of comfort for each citizen, it is a problem of life support, trouble-free supply of consumers with energy in necessary amounts. Heating season here last for at least nine months a year, and sometimes it comes up to eleven. For example, in Sakha republic (Yakutia) heating period consists of more than two hundred forty days, and in Norilsk – three hundred days! An existing system of heat-and water provision of cities suffers significant alterations. Replacement of parts of conduits with water conduits of different diameter, an emergence of new inserts and broadening of the whole system leads to significant changes in hydraulic regimes of networks. Besides, far north develops, slowly or quickly, and it means a problem of providing new construction objects with energy has to be solved. To meet the needs of consumers in definite points it is necessary to increase work pressure on pumping stations that leads to an increase in electric energy consumption, increase in wearing of technological equipment, increase in possibility of an emergency situations in critical areas, and, therefore, increase in financial costs to maintain systems of heat-and-water supply systems and energetic ineffectiveness of the system work as a whole. What isn't done today will be absolutely necessary tomorrow, but the costs will be significantly higher. A necessity to carry out constant calculations of hydraulic regimes of water and heat networks on existing actual scheme that will allow us to reveal critical areas of the network and form suggestions on their unloading and replacement of them with water conduits of different diameter. Based on these calculations, we can forecast, when is the best time to carry out repairs or reconstructive works.

Making hydraulic calculations allows us to:
– define calculative circular pressure;
– find necessary diameter of a conduit that will allow us to transmit the necessary amounts of hot or cold carrier.

During our hydraulic calculation it is necessary to carry out some operations:

– construct a calculative scheme of water supply, on which a length and diameter of water conduit should be pointed as well as local resistance and calculated consumption of heat carrier at all system points;

– within our calculation we should define a loss of pressure at all sections of conduits in order to choose hydraulic regime correctly in future and define, what pressure we will have at final sections.

The results of hydraulic calculations are used to construct piezometric graphics, choose schemes of service introductions, define capital investments into systems of heat supply, develop exploitation regimes of heat supply systems.

Earlier such tasks for municipal water supply systems were carried out only by project and scientific-research organizations. Having outdated software and carrying out calculations manually makes heat-hydraulic calculations really laborious and low-effective. This is defined by the fact that introducing any, even the slightest changes into the calculation network at this stage requires recalculation that takes a lot of time and energy. And the development of systems of modernization and rationalization stays at the same level. It is necessary to solve all problems that are linked to development, projecting, and exploitation hydraulic systems of different purposes for specific conditions and creation of program-calculative complexes.

References

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