# Maintenance and Repair of the Systems of an Apartment House

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***Abstract:*** ***The welfare gain of the citizens of the Russian Federation means a further solution to the housing problem both due to new construction and largely reconstruction, modernization and master overhaul of available residential buildings, i.e. the reconstruction and renewal of the housing facilities of the old building system.***

***Index Maintenance, Systems of an Apartment House, construction, old building system.***

## I. INTRODUCTION

Preserving housing facilities from early decommissioning causes the need for a technical investigation. The technical investigation of buildings and facilities is an independent area of engineering activity covering a wide range of issues related to ensuring the maintenance reliability of buildings, carrying out repair-and-renewal operations, as well as the development of design documentation for master overhaul, modernization, building reconstruction or enforcement of individual structures. [1]

The scope of carried out investigations increases year by year, which is the consequence of a number of factors: wear and tear and functional obsolescence of building, expiry of the useful life of buildings, change of the functional purpose of premises, reconstruction, an increase in real estate prices. Carrying out investigations after various man-induced and natural impacts (fires, earthquakes, floods, hurricanes) and when reconstructing old buildings, which is often associated with the change of acting loads, structural, planning and engineering and technical solutions, is particularly important.

The relevance of the chosen theme is a high-quality and effective investigation of buildings, the improvement of the organization of technical investigation of the buildings of housing facilities for carrying out master overhaul, modernization and reconstruction operations. [3], [4]

The purpose of the research is the organization of technical investigation of the buildings of housing facilities for carrying out MEP systems, modernization and reconstruction operations.

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The object of the research is the MEP systems of an apartment house.

The subject of the research is the process of maintenance and repair of the MEP systems of an apartment house.

## II. THEORETICAL BASES

The operation of public facilities consists of a set of measures for ensuring the functioning and fail-safe performance of all their elements and systems throughout at least regulatory useful life of an object.

Functioning is direct usage of a building in accordance with its purpose. Let's consider the main requirements for the operation of buildings and facilities. [6], [7]

General information Operation of buildings and facilities includes: routine maintenance; sanitary maintenance; repair system.

Routine maintenance involves ensuring following of regulatory treatments and project indicators, an inspection of building envelopes and bearing structures, MEP equipment setup. [5]

Sanitary maintenance implies cleaning of premises, surrounding area, garbage collection. Repair system includes master and routine overhaul.

## III. ANALYSIS AND DISCUSSION

The tasks of the Measure for the operation of buildings and facilities are aimed at ensuring: fault-free operation of the object's structures; compliance with proper sanitary-hygienic conditions; correct operation of engineering equipment; increasing the level of object's public services and amenities; carrying out the repair in time, etc. [[8]

Tekhnologiya LLC of Dzerzhinsk city conducts all types of repair operations related to the MEP systems of an apartment house:

- The master overhaul of water-supply and water removal systems.
- Heating system.
- The majority of apartments have traditional radiators, which are heated with the advent of stable low temperatures.
- Sewage facilities.
- Electricity.
- Ventilation system.
- Elevator system.

However, to ensure the functioning of all MEP systems in the correct mode, i.e. without fail, it's necessary to conduct specific operations aimed at supporting the state of the vital systems of an apartment house. Some of them are carried out regularly, they are routine, and other works

belong to the category of master overhaul.

For example, the electrical wiring master overhaul is being carried out in an apartment house.

Let's consider the system of MEP operation organization of the apartment houses serviced by Tekhnologiya LLC.

The main problem the engineering servicing faces is the effective use of the construction facility with minimal expenses, while the functionality of all systems should be on a high level. The correct approach will ensure the optimization of materials costs for building maintenance. Depending on the season, the operation of residential houses has its features:

The following types of works are typical for the spring-summer period:

- Strengthening of storm sewers, funnels, and joints;
- Repair of sprinkling system, sunken pavings;
- Central heating system suspension, etc.

The autumn and winter period provides:

- Sprinkling system suspension;
- Repair and clearing of flue channels;
- Winterization of balconies, pipelines, garret floors, door and window openings, etc.

When operating residential buildings two problems can arise. The first is the operating instruction developed in an unprofessional way or its absence.

The second is the absence of responsible persons who will be liable for the correct operation. [2]

Having faced the dilettantish attitude of Housing and Utility service's employees, many people fall back upon the help of individual building organizations, which will undertake the solution to all the problems.

The Tekhnologiya organization offers the best level of prices for all provided services. The vast experience and also high qualification of the company's employees allows guaranteeing the high level of the quality of all works. Entrusting us with the comprehensive services of a residential accommodation, you'll get:

- safe and cozy living conditions;
- significant increase in the building's useful life;
- accident-free functioning of all MEP systems;
- quick trouble-shooting.

Building maintenance and operation rates:

Residential houses — 19 – 45 RUR/sq.m.

Office buildings — 23 – 110 RUR/sq.m.

Internal premises — 25 – 40 RUR/sq.m.

The more competently and qualitatively whatever building is built, the longer and more reliably it will serve to its owner.

The MEP systems of buildings play a significant role in ensuring the normal life activity of people and fail-safety of industrial processes.

Heating of premises in the cold season, reliable electrical wiring, safe gas supply, ventilation system, stable supply of cold and hot water as well as wastewater disposal – all this is impossible without high-quality designing of MEP systems and their proper installation. [9]

Besides, specific engineering and technical solution can be necessary for facilities of an industrial or agricultural nature.

It is common to divide MEP systems and communications into internal (they belong to the building directly and are located in its territory) and external (they're an intermediate link between the building and the utility service supplier).

There are the following engineering and technical systems of buildings:

- energy supply;
- sanitary-engineering;
- low current systems (telephone inputs, networks of collective radio- and teletransmission);
- vertical transport (elevators);
- refrigeration supply and usage systems (shopping centres, skating-rinks), etc.

Sanitary-engineering systems provide:

- stable cold and hot water supply;
- wastewater disposal (sewage communications);
- heating;
- gas supply;
- ventilation;
- garbage chutes.

The huge experience of Tekhnologiya LLC engineers and technologists allows designing engineering services of any complexity. [10]

Starting the preparation for construction, renovation or overhaul, the customer should take into account:

- the type of a building;
- its purpose;
- feasibility and economic returns of the works planned.

That's why the requirements for MEP equipment and communications become clear already at the stage of stating the design specification.

Depending on the implemented consumer functions, there are buildings of the following nature:

- civil (for example, residential houses, hotels, theatres, offices);
- industrial (factories, power plants, etc.);
- agricultural (hothouses, farms, etc.) nature.

The systems of MEP equipment of civil buildings are planned in such a way as to maximally improve the conditions of people's life activity and/or working conditions.

The communications and networks of industrial and agricultural buildings should not only ensure the workers' normal labor activity but also withstand a specific load corresponding to one or another production process.

Besides, the need for replacement of old communications and major modernization of various types of equipment arises. In this case, works for inspection, redesigning of all or several MEP systems are done.

The maintenance of MEP systems is a kind of the basis in the effective and continuous operation of any building. Obviously, it's much simpler to prevent an accident than to eliminate the problem, when it already happened.

Works aimed at the prevention of failure in the operation of the building technological infrastructure depends on the documents where all equipment indicators are specified directly by the manufacturing plant.

The effective operation of equipment is impossible without the timely performance of maintenance and repair in definite volume and of established quality.

The long-term retention of functionality by the equipment and the cut in the cost rate for its support and diseconomies of the main production

associated with equipment downtime due to failure require the rational organization of operation and mandatory provision of maintenance services.

Maintenance and repair works of manufacturing (mechanical) equipment are done based on the Uniform system of preventive maintenance and rational operation of the manufacturing equipment of machine builders, which includes:

• definition of repairs by types and their description; planning of preventive operations (adjustment, tightening of bolt connections, etc.) and monitoring their execution;
• establishment of the duration of repair cycles, time between repairs; definition of the categories of the complexity of repair for all types of equipment;
• organization of a service for carrying out repair works;
• use of modern methods of equipment repair, simplifying the technology and methods of restoration of worn parts;
• organization of purchase of ready spare parts, the introduction of advanced technological processes of manufacturing spare parts, their storage and records;
• availability of lubricants;
• organization of material supply of the maintenance service;
• organization of maintenance and equipment care testing.

The analysis of MEP systems maintenance and repair activity of an apartment block by Tekhnologiya LLC showed the problems in the process of maintenance and repair works organization, which should be solved at the level of State legislation:

• Struggle against debtors

According to the new legislation, the mechanism of struggle against debtors – private persons is made more rigorous. Thus, in case of debts, State housing inspection forwards a letter to a regional operator and it – to a management company. If within 60 days the latter fails to get the non-payer to clear the debt, it has a right to initiate the general meetings of tenants, where a decision on debt repayment measures will be made up to court and dispossession.

• Master overhaul time extension

This process is mainly associated with the state officials' effort to raise more money in a corresponding fund for the convenience of corrupt schemes. That's why if, according to the updated Legal basis, the causes of time extension come short of this action, it's necessary to go to the corresponding bodies.

• Repair unsatisfactory quality

The most common problem of master overhauls in houses is their unsatisfactory quality and damage to the apartment owners' private property: apartment water damage, finish spottings, puddles on the roof, incomplete replacement of gas or other pipes and similar complains.

Currently, master overhaul includes works for replacement (restoration) of the building structure, engineering services or their elements, and the remaining is routine overhaul. That's why regional operators (the contractors they choose) are obliged to undertake repair and winterizing of facades, roof, basements, and communications, while management companies should repair the entrance and carry out similar works.

In this situation, it should be specified what exact works are planned and their quality should be monitored.

• Failure to meet the overhaul deadline

Another problem during the master overhaul of an apartment house is its delayed execution. The most usual causes:

• The shortage of a material resource, which appears in the course of the overhaul. In other words, at the minimal master overhaul contributions (per sq. m.) established by the regional authorities, the actual scope of work exceeds the raised amount.
• The deficit of qualified specialists

In the absence of qualified specialists directly in the Fund, questions should arise to the regional operator or its regulatory body, considering the average salary of such specialists (about 60 000 roubles).

The absence or poor quality of master overhaul is often attributed to the scarcity of funds. However, according to statistics, in early 2017 the planned collection (average) across regions is 80% and in some entities of the Russian Federation it reaches 85%. Given this, the owners of privatized housing pay contributions in full and the municipalities' debts understate the indicator. But even these funds are used in many regions only by 50%. That's why this cause lies in another thing, and, probably, inspection concerning law violation is necessary.

• Breach of the law and crimes of officials

As we can see, problems and difficulties arise at all levels of the execution of the apartment house master overhaul program. Some of them stem from the shortcomings of the legal basis, which didn't take into account all the nuances. However, the majority of claims based on the violation of citizens' rights for living under safe and favourable conditions, which arises due to abuse of power, embezzlement, and schedule overrun

## IV. CONCLUSION

Thus, the carried out research of the organization of the technical servicing of apartment houses for MEP systems maintenance improves the welfare of the citizens of the Russian Federation and means a further solution to the housing problem both due to new construction and largely reconstruction, modernization and master overhaul of available residential buildings, i.e. the reconstruction and renewal of the housing facilities of the old building system.

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