

Scientific article

UDC 614.844; DOI: 10.61260/2304-0130-2025-2-103-106

RECOMMENDATIONS FOR THE SELECTION AND INSTALLATION OF AUTOMATIC FIRE PROTECTION SYSTEMS IN PUBLIC BUILDINGS

✉ Mammedov Nazim Magomed ogli

Dymkov Alexander Anatolyevich

Saint-Petersburg University of State Fire Service of EMERCOM of Russia, Saint-Petersburg, Russia

✉ m.nazim68@mail.ru

Abstract. With the growing number of public buildings for various purposes, the issues of ensuring their fire safety are becoming particularly relevant. Automatic fire protection systems are effective means of timely detection and elimination of fires, minimizing damage and saving human lives. This article is aimed at forming a set of recommendations on the selection and installation of automatic fire protection systems in public buildings, taking into account their design features, functional purpose and requirements of regulatory documents.

Particular attention is paid to the classification of automatic fire protection systems, their characteristics and performance criteria. The design features of fire alarm systems, automatic fire extinguishing, warning and evacuation control systems are taken in consideration in the research. Practical advice is given on the optimal placement of equipment, the choice of types of systems depending on the category of the building in terms of fire danger and the nature of potential risks. The recommendations presented can be useful for designers, engineers, specialists in the field of fire safety, as well as for management organizations.

Key words: automatic fire protection, public buildings, fire safety, design, installation of systems

For citation: Mammedov N.M., Dymkov A.A. Recommendations for the selection and installation of automatic fire protection systems in public buildings // Supervisory activities and forensic examination in the security system. 2025. № 2. P. 103–106. DOI: 10.61260/2304-0130-2025-2-103-106.

Introduction

Public buildings, including educational institutions, healthcare facilities, shopping and entertainment complexes, and administrative buildings, are characterized by a high degree of responsibility for human safety. Fires at such facilities can lead to serious consequences, including human casualties and major material damage. In this regard, ensuring effective automatic fire protection becomes one of the priorities in the design, construction and operation of buildings.

The relevance of the research is due to the need to optimize the processes of selecting, designing and installing AFP systems in order to increase their efficiency and reliability.

The purpose of the study is to develop practical recommendations for the selection and installation of AFP systems in public buildings.

Research objectives:

- to classify AFP systems;
- determine the main criteria for the selection of systems;
- develop recommendations for the design and installation of equipment;
- to substantiate the effectiveness of the developed recommendations.

Modern AFP systems are designed for early detection of signs of fire, alerting people to a threat, automatically launching extinguishing agents and ensuring safe evacuation. The selection and installation of such systems requires a deep understanding of the specifics of the facility, compliance with regulatory requirements and the use of advanced technical solutions. This article provides practical recommendations on these issues based on an analysis of current standards.

Recommendations for the selection and installation of AFP systems in public buildings

According to Article 83 of Federal Law № 123-FL dated July 22, 2008 «Technical Regulations on Fire Safety Requirements» (FL № 123-FL), which establishes requirements for the selection and installation of automatic fire protection systems in public buildings:

1. Public buildings must be equipped with automatic fire alarm systems and fire warning and evacuation control systems in cases established by regulatory documents on fire safety.

2. The type of warning and evacuation management system is selected depending on the functional purpose of the building, its number of floors, area and the number of people in the building at the same time.

3. Devices of fire alarm and warning systems must provide:

- timely detection of signs of fire;
- fire alarm signals transmission to maintenance personnel or automatic control systems;
- activation of smoke protection systems and fire extinguishing installations (if available);
- transmitting information about the fire to the fire protection units.

4. The devices of the alarm and evacuation control systems should be placed in such a way that the signals and messages are clearly audible and visible in all public gathering areas [1].

Article 84 of the «Requirements for fire extinguishing installations» states:

1. Public buildings and structures must be equipped with automatic fire extinguishing installations in accordance with the requirements of regulatory documents on fire safety.

2. The choice of the fire extinguishing system (water, foam, gas, powder, etc.) type is determined by:

- the fire threat level of an area;
- characteristics of stored substances and materials;
- the structural features of the building or structure.

3. Automatic fire extinguishing installations must ensure:

- supply of fire extinguishing agent to the fire source;
- activation of systems in automatic or remote mode when receiving a signal from fire detection systems;
- performance in cases of possible damage to building elements due to fire [1].

Based on the above and the analysis of the relevant regulatory literature, the following recommendations can be identified.

According to the provisions of Federal Law № 123-FL, the choice of an automatic fire protection system should be based on:

- functional purpose of the building (school, hospital, shopping center, etc.);
- categories of premises for explosion and fire hazards;
- the number of people in the building at the same time;
- architectural and planning features of the building;
- the specifics of the materials stored or used (flammable liquids, equipment, etc.) [1].

At facilities with a large number of people, it is mandatory to install automatic fire alarm systems, warning and evacuation control systems, as well as automatic fire extinguishing systems, depending on the characteristics of the room. It is particularly important to ensure the targeting of fire alarm systems, which makes it possible to localize the fire location and shorten the response time [2].

The selection of AFP systems is carried out in accordance with the Decree of the Government of the Russian Federation dated September 16, 2020 № 1479 «On the procedure for Mandatory Certification of fire safety equipment», which establishes mandatory certification requirements for all fire safety equipment, such as:

- automatic fire alarm installations;
- warning and evacuation management systems;
- automatic fire extinguishing installations (water, gas, powder, aerosol, etc.);
- technical means included in these systems (for example, fire detectors, reception and control devices, warning devices) [3].

When choosing equipment for the AFP systems, it is necessary to use only certified products that have passed the mandatory fire safety compliance check. When choosing the components of the AFP system, it is necessary to check the availability of certificates of conformity and make sure that the products meet the requirements of reliability and functionality for public facilities [4].

When designing fire alarm systems, it is important to consider:

- the type of detectors (smoke, thermal, combined, etc.) depending on the operating conditions;
- ensuring the targeting of signals to accurately determine the location of the fire;
- minimizing the time from the start of the fire to the alarm;
- compliance of sensor placement with the requirements of regulatory documents;
- minimizing false alarms of systems;
- ensuring the reliability of communication and power channels [5].

Special attention should be paid to the placement of sensors in places where fire is most likely to occur, along the path of smoke propagation and to possible obstacles affecting the functioning of the equipment. The list of devices subject to certification is published and updated by authorized bodies. When designing, it is necessary to check that the selected devices that are included in the current list and have valid certificates [6].

The choice of fire extinguishing installation is determined by the characteristics of the protected room:

- sprinkler systems are recommended for use in shopping and office centers;
- drainage systems are effective at sites with a high risk of rapid fire spread;
- gas and powder systems are suitable for server rooms, archives, museums [7].

It is important to ensure the integration of fire extinguishing systems with fire alarm systems to automatically start extinguishing when a fire is detected.

Evacuation warning and management systems should be:

- multi-level (sound and light signals);
- capable of transmitting both automatic and voice messages;
- synchronized with evacuation control systems (opening doors, switching on emergency lighting, etc.) [8].

Installation of the equipment must be carried out in accordance with the design documentation, the requirements of SP 485.1311500.2020 and other regulations. Special attention is paid to:

- compliance with the minimum distances between the detectors;
- taking into account the features of the ceilings and structural elements of the building;
- protection of devices from mechanical damage and environmental influences [9].

At the stage of installation of AFP systems in public buildings, it is necessary to comply with the installation requirements specified in the technical specifications for certified products. It is necessary to ensure that the main notification channels can be duplicated in case of failure of individual components. It is recommended to regularly check the operability of all systems with the frequency established by regulations [10].

Conclusion

Effective management of public buildings requires an integrated approach, including the right choice of system type, competent design and high-quality installation of equipment. Compliance with current regulatory requirements, taking into account the specifics of facilities and the use of modern technical solutions significantly increase the level of fire safety and minimize the possible consequences of emergencies. The use of modern technical means, taking into account the features of facilities and compliance with the requirements of regulatory documents ensure timely fire detection, effective evacuation of people and minimization of material damage.

The application of the recommendations given in the article will create a safer environment for people to live and work in public buildings. The results obtained can be used in the design of new facilities, as well as in the modernization of existing fire safety systems.

List of sources

1. Technical regulations on fire safety requirements: Feder. Law №. 123-FL of July 22, 2008. Access from the ConsultantPlus legal reference system.
2. Puchkov V.A. Fire safety of buildings and structures. M.: Akademiya, 2019. 237 p.
3. On the procedure for mandatory certification of fire safety equipment: Decree of the Government of the Russian Federation. Federation of September 16, 2020. № 1479. Access from the ConsultantPlus legal reference system.
4. Shlyakhovoy A.A. Design of fire protection systems. M.: DIA, 2018. 387 c.
5. SP 484.1311500.2020. Fire protection systems. Fire alarm systems and automation of fire protection systems. Norms and rules of design // ELECTRONIC FUND of legal and regulatory-technical documentation. URL: <http://www.docs.cntd.ru> (date of reference: 19.04.2025).
6. Martynyuk V.V. Fire protection systems of buildings. SPb.: Piter, 2021. 126 p.
7. SP 485.1311500.2020. Fire protection systems. Fire extinguishing installations are automatic. Norms and rules of design // ELECTRONIC FUND of legal and regulatory-technical documentation. URL: <http://www.docs.cntd.ru> (date of reference: 19.04.2025).
8. SP 3.13130.2020. Fire protection systems. Fire alarm and evacuation management system. Fire safety requirements // ELECTRONIC FUND of legal and regulatory-technical documentation. URL: <http://www.docs.cntd.ru> (date of reference: 19.04.2025).
9. GOST R 53325-2022. Technical means of fire automation. General technical requirements. Test methods // ELECTRONIC FUND of legal and regulatory-technical documentation. URL: <http://www.docs.cntd.ru> (дата обращения: 19.04.2025).
10. Babkov V.F., Pirogov Yu.F. Fundamentals of fire safety of buildings. M.: Stroyizdat, 2020. 452 p.

Information about the article: submitted for editing: 13.05.2025; accepted for publishing: 09.06.2025

Information about authors:

Mammedov Nazim Magomed ogli, Deputy Head of the Center for the Organization of Research and Editorial Activities of St. Petersburg University of State Fire Service of EMERCOM of Russia (196105, Saint Petersburg, Moskovskiy ave. 149), PhD in Educational Sciences, Associate Professor, e-mail: m.nazim68@mail.ru, SPIN-code: 9209-8667

Dymkov Alexander Anatolyevich, student of St. Petersburg University of State Fire Service of EMERCOM of Russia (196105, Saint Petersburg, Moskovskiy ave. 149), e-mail: dymkov.sanya347@bk.ru