

ROMAN KOVAL

Adjunct of the Lviv State University of Life Safety; e-mail: *romankoval_ies@ukr.net*

SERHII YEMELIANENKO

Chief of the research work organization department of the Lviv State University of Life Safety, Candidate of Science; e-mail: *ldubgd@i.ua*

ANDRII PRUSKYI

Chief of the Fire Prevention and Life Safety Department of the Institute of Public Administration and Research in Civil Protection Doctor of Science (Eng.), Associate Professor; e-mail: *prusskiy@ukr.net*

ANALYSIS OF FIRE SAFETY OF HOTEL AND RESTAURANT COMPLEXES OF UKRAINE

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ABSTRACT

Formulation of the problem. In recent years, in connection with the numerous incidents of fires occurring in hotel and restaurant complexes, many studies have been conducted on risk management issues, as well as actions in emergencies. Research was often limited to incident analysis rather than how to manage fire safety to minimize risk.

Today the hotel is a complicated, multifunctional complex, which includes not only the number of rooms, but also can have conference rooms, bars and restaurants, gyms, tennis courts, swimming pools, nightclubs and other entertainment and domestic facilities. Some rooms can be multifunctional. Hotel complexes are objects with many people, which makes high demands on fire safety.

There are very few studies that focus on preventive measures. Therefore, the study of management and assessment of fire safety of hotel and restaurant complexes must be given considerable attention.

Purpose. Analysis of fires in hotel and restaurant complexes and the reasons for their occurrence. Research of fire safety of hotel and restaurant complexes.

Methods. The following methods are used in the work: system, theoretical generalization, analysis and synthesis, comparative, statistical.

Results. The creation of a comprehensive fire safety system allows to increase the degree of safety of customers and employees of hotel and restaurant complexes.

The successful solution of the multifaceted and complex tasks to achieve safety, assigned to the administration and employees of hotel and restaurant complexes will depend on the level of their preparation for action in a complex environment that may arise due to emergencies.

The causes of fires and ways to prevent and improve fire safety of hotel and restaurant complexes are analysed.

Conclusions. Ensuring fire safety of hotel and restaurant complexes is based on a set of legal, economic, technical, and other measures. Analytical studies have shown that the fire safety system in modern hotel and restaurant complexes is a complex automated network of warning, extinguishing and fire prevention.

A prerequisite is the provision of automatic warning networks, fire extinguishing systems and modern fire protection systems at these facilities. Also, an integral part of fire safety is the legal and technical documentation, which provides instruction to staff and customers, as well as measures to prevent emergencies and the procedure for their occurrence.

KEYWORDS

hotel and restaurant complex, fire protection systems, automated alarm network, hotel service.

Formulation of the problem.

Today in Ukraine there is a transformation of approaches to the importance of hotel and restaurant business development because it is one of the effective ways to develop the state economy, because this sector can provide the country with foreign exchange earnings, create new jobs and other benefits.

Hotel and restaurant industry is a highly profitable sector of the economy, which is developing dynamically. Hotel service is a key factor that includes a range of services and determines the prospects for tourism [1].

In recent years, due to the increasing number of fires occurring in hotel and restaurant complexes (Table 1), there is a need for a detailed study of the causes of their occurrence and fire safety management of such facilities.

Table 1. The number of fires in hotel and restaurant complexes in 2016-2020

Year	Number of fires	The number of dead (persons)	Injured (persons)	Direct losses (dollars)
2020	30	0	1	36 691 000
2019	14	9	10	6 025 000
2018	18	0	8	7 225 000
2017	9	1	0	3 559 000
2016	13	1	2	277 000

Analysis of recent research and publications. A review of the research literature indicates that many scientists have studied and continue to study fires and fire safety [2-12]: M.V. Biloshycjkyj, O.D. Zarecjkyj, A.D. Kuzyk, O.M. Makhrajev, E.M. Ghulida, I.O. Movchan, A.M. Baratov, M.V. Beschastnov, M.M. Brushlinskiy, Yu.A. Koshmarov, V.G. Gorskiy, A.F. Yegorov, A.S. Yedigarov, A.M. Yelokhin V.I. Izmalkov, V.V. Kafarov, V.A. Legasov, M.A. Makhutov, V.P. Meshalkin, Yu.L. Muromtsev, A.S. Mozhaev, B.V. Palyukh, I.A. Ryabinina, N.P. Tarasova, J.J. Kramer, G.R. Grinberg, V.V. Bjeghun, V.M. Strilecj, D.V. Trushkin, V.S. Illichkin and other scientists. However, there are still quite several unsolved issues of fire safety management, such as in hotel and restaurant complexes.

A hotel is an enterprise of any organizational and legal form of ownership, consisting of at least six rooms and providing temporary residence services with mandatory service [13].

In modern hotel and restaurant complexes there is always many people (staff, administration, visitors, and guests), including at night. The premises have various engineering equipment, there is a certain supply of combustible substances and materials. Fires in such facilities can lead to rapid fires and mass deaths.

The administration of the hotel complex undertakes not only to provide comfortable living and guarantees of good rest, but also to guarantee the safety of people living and working in it, their lives, health, property and more. That is why the most careful control in the field of security of such institutions is necessary.

Ensuring fire safety and minimizing the fire risks of guests and their property is one of the most important tasks of the owners during the operation of the hotel and restaurant complex.

The number of fires by seasons is winter - 40%, spring - 11.1%, autumn - 20%, summer - 28.9%.

The main causes of fire in the common areas of the hotel and restaurant complex (Fig. 1) are:

- Faults in electrical equipment (e.g. electrical distribution systems, motors, transformers, fans, electric heaters and lighting systems), leading to short circuits, overloads, discharges, etc.
- Maintenance work such as welding or soldering.
- Carelessness such as carelessness when switching off electrical equipment, use of combustible materials and liquids (cleaning, painting, etc.) and smoking.
- Ignition of temporary decorations for celebrations and events.
- Self-ignition of cleaning cloths, cotton waste, etc.
- Arson and sabotage.

The main causes of fire in the guest rooms of the hotel and restaurant complex rooms are the following:

- Smoking, especially in bed and under the influence of alcohol or drugs.
- Use of faulty electrical equipment, such as electric blankets, kettles, stoves, irons, razors, heaters, hair dryers and radios, which may not be suitable for a hotel outlet and voltage.
- Carelessness of electrical equipment, especially carelessness when switching off the equipment at night or when leaving the room.



Figure 1. Causes of fires in hotels

Hotels belong to the classes of facilities where safety plays a key role. These are multi-storey buildings with many rooms and long corridors.

Hotel and restaurant complexes have different types of classifications. Fire safety management depends on the type (Fig. 2).

Hotels are fundamentally different from other facilities. On the one hand, the hotel management is interested in creating a certain level of image with the most favourable mode for the maximum number of guests, and therefore any devices of safety should not attract the attention of visitors, but at the same time provide a sense of personal safety and comfort [1].

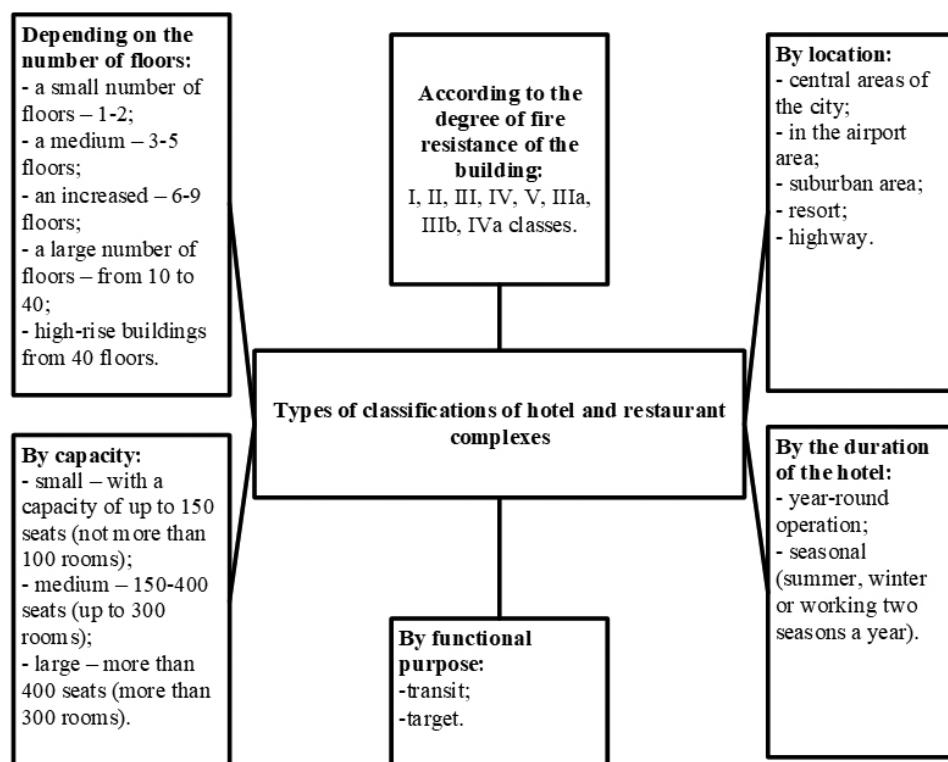


Figure 2. Classifications of hotel and restaurant complexes

Therefore, when developing a comprehensive system of fire safety of hotels, it is important to ensure the function of delimitation of access for each of those present with the possibility of free movement of many people. Only the professional component of the security service of such facilities is not enough to control the situation, some measures and actions cannot do. Comprehensive monitoring is needed, based on analytical information on the parameters of the facility, modelling of probable risks, preparation of all possible scenarios for the formation and spread of fire.

The integrated approach optimally combines organizational and technical measures to prevent and respond to any dangerous situation in the hotel and restaurant complex in a short period of time. An integrated approach includes a variety of forms and methods to ensure the safety of staff, customers, and hotel property.

On August 17, 2019, in the hotel "Tokyo Star" located in Odessa there was a fire which was caused by a short circuit due to overload of the mains in the laundry room. The building of this facility had a faulty fire alarm system, no internal fire water supply system, wall cladding was made of materials with a high degree of flammability, which negatively affected the level of fire safety. Some rooms had no windows at all.

Fires in these facilities pose a significant risk of panic, injury, and death.

The main feature of such fires is the high speed of fire spread in the rooms and the spread of smoke in the stairwell and higher floors, which complicates and makes it impossible to evacuate. Therefore, the issue of ensuring the required level of fire safety of such facilities is very important even in the context of the COVID-19 pandemic.

Results of work. Analytical studies have shown that modern hotel and restaurant complexes need a comprehensive system of fire safety - a complex automated network of warning, evacuation, extinguishing and preventing the formation and spread of fire. A necessary component of this system are regulations that provide training for staff and visitors, as well as measures to prevent emergencies and the procedure for their occurrence.

The basic principles of fire safety in the design and operation of hotels are contained in DBN B.2.2-20: 2008 "Hotels", DBN B.1.1.7: 2016 "Fire safety of construction sites", DBN B.2.2-9: 2018 Public buildings and structures ", DBN B.2.5-56-2014" Fire protection systems ", Rules of fire safety in Ukraine [14].

The main direction of solving the problems of ensuring the safety of people in hotel and restaurant complexes is the installation of fully automated fire protection systems, which is part of the overall complex of security systems. According to the law, any room must be responsible for the fire safety of these systems [13-15].

The person responsible for the fire condition supervises all engineering communications. Fire protection systems include fire extinguishers, automatic fire alarm and fire extinguishing systems; use of building materials with standardized fire safety indicators; application of fire-retardant paints; devices to limit the spread of fire; warning and evacuation systems; individual means of protection against harmful factors of ignition; means of collective protection; smoke removal systems. To ensure the effectiveness of the fire-fighting system, it is necessary to implement fire safety measures on the basis of modern scientific developments [7, 15].

All hotel staff after hiring must undergo fire safety training and testing of knowledge of fire safety, as well as an annual course of fire safety training program according to the program that complies with current legislation.

At least once every six months, practical training of all staff should be conducted to ensure the safe and rapid evacuation of people and is a supplement to the evacuation plan [15].

All citizens arriving at the hotel must be familiar with the basic fire safety requirements.

Creating a fire safety system in hotels consists of the following stages:

- 1) carrying out organizational measures to create fire protection in the hotel;
- 2) conducting fire training of staff;
- 3) conducting a fire audit.

Carrying out organizational measures to ensure fire protection in the hotel involves the following algorithm. The head of the hotel, who is legally responsible for ensuring and organizing fire safety, appoints the person responsible for ensuring fire safety of the hotel. Also responsible for fire safety in each department of the hotel [13-15].

Rules, fire safety regulations for each unit and instructions on fire safety measures at each workplace are developed.

Fire calculations are created from among the hotel staff who carry out round-the-clock control over fire safety [14].

In the event of a fire, a warning system is developed that takes into account the specifics of the building. The main actions of each member of the fire operational calculation during the occurrence and spread of fire are described. Following a fire alarm on the alert system, all persons appointed by order of the head responsible for fire safety should, if possible, begin the evacuation of people, as well as take all necessary measures to prevent the spread of fire before the arrival of fire and rescue units.

Carrying out fire-prevention training of workers. Fire-fighting training consists of fire-fighting instruction (introductory, primary and secondary) and classes on the program of fire-technical minimum [14].

Introductory and initial fire safety instructions are provided upon hiring. Initial and repeated briefings are conducted at the workplace by the person responsible for fire safety in this unit [13].

To ensure fire safety in hotels, special attractions are developed, which set out the basic recommendations for measures and rules of conduct in case of fire. These attractions are in every room. In high-class hotels to get acquainted with the rules of fire safety use the hotel video channel.

In case of non-compliance with the rules of fire safety by the staff of the hotel and restaurant complex (this can happen not only intentionally, but also due to carelessness, actions or inaction of the hotel staff), the vacationer should first contact the hotel manager. If the violation is not eliminated - to the State Emergency Service of Ukraine [13-15].

Conclusions

Thus, the article highlights the general directions in the application of modern means and methods of fire safety of hotel and restaurant complexes:

1. Traditional mechanical methods of technical strengthening; means and systems of monitoring, including means forming the system of monitoring of building constructions and engineering systems; means and systems of video surveillance and telecommunications; means and systems of access control and management; alarm systems; systems and other protective and blocking devices; means and systems of the alarm system; means and systems of visual and audible warning and evacuation management. The choice of technical means, given the variety of proposals for system safety solutions and the technical devices and equipment, must be made considering a set of criteria.
2. The main direction of solving these problems of comprehensive fire safety in hotels is the installation of automated fire protection systems, which is part of the overall system.
3. Fire protection systems should include: fire extinguishers, including fire equipment; automatic fire alarm and fire extinguishing systems; use of building materials with standardized fire safety indicators; application of fire-retardant paints; devices to limit the spread of fire; warning and evacuation systems; individual means of protection against harmful factors of ignition; means of collective protection; smoke removal systems. To ensure the effectiveness of the fire-fighting system it is necessary to implement fire safety measures based on modern scientific developments.

References

- [1] Law of Ukraine On Approval of the Rules for the Use of Hotels and Similar Means of Accommodation and Provision of Hotel Services [Electronic resource]. Access mode: www.zakon.rada.gov.ua/laws/show/z0413-04
- [2] A.M. Gulida, O. I. Bashinskiy, I.O. Movchan // Fire safety: Collection of scientific works. - Lviv: LDU BZD 20, pp. 150-154 (2012).
- [3] V.V. Holshevnikov, D.A. Samoshyn Academy GPS MCHS of Russia, 212 pp., (2009).
- [4] Illichkin V.S., Bukin A.S., Smirnov V.L. (2002) Dva podkhoda k opredeleniyu pokazatelya toksichnosti produktov goreniya kombinirovannykh materialov (sравнение результатов и оценка применимости) [Two approaches to determining the toxicity index of combustion products of combined materials (comparison of results and assessment of applicability)]. Fire-explosion safety, vol. 4, pp. 16 – 20.
- [5] Yemelyanenko, S., Ivanusa, A., Klym, H. Mechanism of fire risk management in projects of safe operation of place for assemblage of people. Proceedings of the 12th International Scientific and Technical Conference on Computer Sciences and Information Technologies, CSIT 2017. 1,8098792, p. 305-308. [www.ieeexplore.ieee.org/document/8098792](http://ieeexplore.ieee.org/document/8098792).
- [6] Chernov S.K. Risk management system in organizational projects [Text] / S.K. Chernov // Bulletin of the National University of Shipbuilding, – Mykolaiv: NUS, 2006. – No.2. – P. 163-168. (in Russian).
- [7] Yemelyanenko, S., Rudyk, Y., Kuzyk, A., Yakovchuk, R. Geoinformational system of rescue services. MATEC Web of Conferences. Volume 247, 10 December 2018, № 000302018 Fire and Environmental Safety Engineering, FESE 2018; Lviv State University of Life SafetyLviv; Ukraine; DOI: 10.1051/matecconf/201824700030.
- [8] Sivenkov A.B., Serkov B.B., Aseeva R.M., Sakharov A.M., Sakharov P.A., Skibida I.P. (2002) Ognezashchitnye pokrytiya na osnove modifitsirovannykh polisakharidov. Chast 2. Dymoobrazuyushchaya sposobnost i toksichnost produktov goreniya [Fire retardant coatings based on modified polysaccharides. Part 2. Smoke-generating capacity and toxicity

- of combustion products]. Fire-explosion safety, vol. 2, pp. 21 – 26.
- [9] Trushkin D.V. (2003) Otsenka pozharnoy opasnosti stroitelnykh materialov na osnove analiza dinamicheskikh kharakteristik II. Toksichnost letuchikh produktov gorenija, vosplamenyaemost i rasprostranenie plameni [Assessment of the fire hazard of building materials based on the analysis of dynamic characteristics II. Toxicity of volatile combustion products, flammability and flame spread]. Fire-explosion safety, vol. 1, pp. 19 – 23.
- [10] Kholshchevnikov V. V., Samoshin D. A. (2009) Evakuatsiya i povedenie lyudey pri pozharakh [Evacuation and behavior of people in case of fires]. Moscow: Academy of the State Fire Service of the Ministry of Emergency Situations of Russia. (in Russian).
- [11] Koshmarov Yu. A. (2000) Prognozirovaniye opasnykh faktorov pozhara v pomeshchenii [Prediction of indoor fire hazards]. Moscow: Academy of the State Fire Service of the Ministry of Internal Affairs of Russia. (in Russian).
- [12] N.N. Brushlinskiy, Yu. M. Glukhovenko, V. B. Korobko, S. V. Sokolov (2004) Pozharnye riski. Osnovnye ponyatiya [Fire risks. Basic concepts]. Moscow: Bulletin of the National Academy of Sciences of Fire Safety. (in Russian).
- [13] Roik OR Research of the current state and trends of the hotel industry of the Lviv region / OR Roik, Ya. D. Sulyatytska. // Effective economy. - 2020. Sychevsky SM Fire safety of hotel complexes / SM Sychevsky, IM Rykun. // Actual problems of technical and social sciences in ensuring the activities of the civil defense service: Proceedings of the All-Ukrainian scientific-practical conference. - 2014. - P. 44.

ANALIZA BEZPIECZEŃSTWA POŻAROWEGO KOMPLEKSÓW HOTELOWYCH I RESTAURACYJNYCH UKRAINY

STRESZCZENIE

Sformułowanie problemu. W ostatnich latach w związku z wielką ilością incydentów występowania pożarów, w hotelowo – restauracyjnych kompleksach, przeprowadzono wiele badań, dotyczących kwestii zarządzania ryzykiem, a także działań w sytuacjach awaryjnych. Badania były często ograniczone analizą incydentu, bez rozpatrzenia, dotyczących zarządzania bezpieczeństwem pożarowym w celu zminimalizowania ryzyka.

Teraz hotel jest skomplikowanym, wielofunkcyjnym kompleksem, posiadającym nie tylko pokoje, ale również sale konferencyjne, bary i restauracje, siłownie, korty tenisowe, baseny, kluby nocne i inne obiekty rozrywkowo - gospodarcze. Niektóre pomieszczenia mogą być wielofunkcyjne. Kompleksy hotelowe to obiekty o dużej liczbie osób, co stawia wysokie wymagania co do bezpieczeństwa pożarowego.

Istnieje bardzo mała ilość badań, które koncentrują się na środkach zapobiegawczych. Dlatego należy poświęcić dużo uwagi badaniom zarządzania i oceny bezpieczeństwa pożarowego dla kompleksów hotelowych i restauracyjnych.

Cel. Analiza pożarów w kompleksach hotelowo-restauracyjnych i przyczyn ich występowania. Badania bezpieczeństwa pożarowego kompleksów hotelowych i restauracyjnych. Metoda naukowa. W pracy zastosowano metody: systemowa, uogólniająca teoretyczna, analityczno-syntetyczna, porównawcza, statystyczna.

Główne wyniki. Stworzenie kompleksowego systemu bezpieczeństwa pożarowego pozwoli znacznie podnieść poziom bezpieczeństwa klientów i pracowników kompleksów hotelowo-restauracyjnych.

Skuteczne wykonanie założonych wieloaspektowych zadań, jakie powierzono administracji i pracownikom kompleksów hotelowo-restauracyjnych, żeby osiągnąć bezpieczeństwo, będzie zależeć od stopnia ich przygotowania do działań w trudnych sytuacjach, jakie mogą pojawić się w nadzwyczajnych warunkach kryzysu. Przeanalizowano przyczyny wystąpienia pożarów, dróg ostrzeżenia i polepszenia bezpieczeństwa pożarowego kompleksów hotelowo-restauracyjnych.

Wnioski. Zapewnienie bezpieczeństwa pożarowego hotelowo-restauracyjnych kompleksów oceniono, na podstawie zestawu środków prawniczych, gospodarczych, technicznych i innych. Badania analityczne pokazały, że system bezpieczeństwa pożarowego w nowoczesnych hotelowo-restauracyjnych kompleksach – to jest złożona, zautomatyzowana sieć alertów gaszenia i zapobiegania pożarom.

Warunkiem koniecznym jest przewidywanie w tych obiektach automatycznych sieci alertów, przeciwpożarowych, nowoczesnych systemów ochrony przeciwpożarowej. Nieodłączną częścią zapewnienia bezpieczeństwa pożarowego jest także normatywnoprawna i techniczna dokumentacja, z instruktażem personelu i klientów oraz środków mających, na celu zapobieganie sytuacjom awaryjnym i procedury przy ich występowaniu.

SŁOWA KLUCZOWE

hotelowo-restauracyjny kompleks, systemy ochrony przeciwpożarowej, zautomatyzowana sieć alertów, obsługa hotelowa.



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