

*Valerii Pershakov, PhD, Andrei Bielyatynskiy, PhD, Evheniy Bakulin Ph.D.,
Valentyna Bakulina, assistant, Gregory Bolotov, PhD,
Ivanna Popovych, postgraduate student
(National Aviation University, Ukraine)*

Problems and anti fire hazard fire resistance of high-rise buildings

Considered structuring of existing approaches to solving problems in combating fire hazards and fire high-rise buildings, resistance to progressive collapse of buildings that justified tendency security construction projects for people and the environment. Ensuring trouble-free operation of existing and construction of tall buildings requires the ability to predict their behavior in the event of an emergency (partial loss of the bearing capacity, fire, earthquake and etc.).

The Department of airports and road reconstruction Education Research Institute of the National Aviation University Airports published two new monograph edited PhD, Professor V.M. Pershakov, publishing house NAU:

Part 1 Experience in design, construction and operation. - Kyiv: NAU, 2016. - 104 p.

The following history of the development and building construction and civil engineering. LED record the highest and the best and unique high-rise buildings in the world. Presents the trends of high-rise house-building. Winners are given global competition eVolo Skyscraper high-rise architecture of the future, which took place on 23 March 2016.

For scientists, engineers and technicians, staff research, design, construction companies and building and students of higher educational institutions and faculties.

Contents *Part 1* includes:

- introduction, terms and symbols;
- history and development of high-rise house-building;
- the highest building in the world;
- record high-rise buildings in the world;
- the best tall buildings in the world;
- a unique high-rise buildings in the world;
- high-rise house building trends;
- the winners of the global contest altitude architecture of the future;
- list of references.

Part 2. CAUSES AND EFFECTS OF DESTRUCTION OF TALL BUILDINGS FROM A FIRE. - K .: NAU, 2017. - 282 p.

The reasons and consequences of the destruction of tall buildings from fire, as well as analysis of extinguishing fires and rescue people from tall buildings in case of fire. The review of regulatory documents and publications on combating fire hazards and fire high-rise buildings.

For scientists, engineers and technicians, staff research, design, construction companies and building and students of higher educational institutions and faculties.

Contents *Part 2* includes:

- introduction, terms and symbols.

Chapter 1. The causes and consequences of the destruction of tall buildings from a fire:

- anthology worldwide fires, fires - disaster in world history;
- statistics worldwide fires, the element of fire;
- fire in high-rise buildings "Grozny-City";
- stunning photos of the construction of skyscrapers in New York.

Chapter 2. Analysis of combating fire hazards and fire high-rise buildings:

- fire protection tall buildings;
- basic requirements for fire resistance of high-rise buildings;
- analysis of the causes and consequences of the destruction of tall buildings due to fire;

- specificity fire hazard tall buildings;
- fire protection system (SDR) tall buildings, tragedy fires high-rise buildings in the world;

- determining the effects of fire and fire risk, fire-and explosion safety;
- the degree of fire resistance of buildings;
- fire danger, fire resistance of high-rise buildings, fire safety classification of fires;

- fire technical and organizational measures, fire-rise buildings;
- american school of architecture, new fireproof constructions.

Chapter 3. Analysis of extinguishing fires and rescue people from tall buildings in case of fire:

- fighting in buildings increased heights;
- rescue people from tall buildings in case of fire;
- fire resistance of multi-storey buildings;
- causes and types of fires, safe height - building skyscrapers;
- fire safety of tall buildings;
- fighting in buildings increased heights;
- floors and the degree of fire resistance;
- problems with the evacuation of tall buildings during fires;
- list of references.

The one who does not think about the distant difficulties,
certainly waiting for close troubles.

Confucius

Ensuring fire safety is an integral part of state policy of any country to protect human life and health, national wealth and the environment. Every fire has a negative impact both directly to the person affected and for society as a whole. The fires directly caused the destruction of property, endangering the lives and health of people, but most importantly - cause significant and sometimes fatal damage to the environment.

At the end of XX century on land registered annually about 7 million. fires, at which killed nearly 70 thousand. People in fact, the fires in the world there is a lot more, but many fires (especially small) for various reasons are not registered.

According to world statistics data of one who died in a fire trauma accounts for 25-30 who received burns and injuries of varying degrees. Loss for the treatment

of people suffered burn injuries and fires requiring prolonged and expensive treatment, make up about 21% of total losses set fires.

Today, when mankind has entered the third millennium its long history, the issue of fire safety remain relevant. Every five seconds in the world there is a fire, and in Ukraine - every 10 minutes. During one day in Ukraine there is 120-140 fires, which killed 6-7, 3-4 are injured; Fire destroyed buildings 32-36, 4-5 units. Daily loss from the fires is 500 thousand UAH.

Despite significant advances in science and technology, mankind has found absolutely perfect facilities for fire safety. The problem of fires is global in scope, affects not only national but also international interests. In today's industrial environment - financial, human and material losses from the fires are burdensome for the economies of the world.

To ensure effective fire protection annually each country allocates more funds to basic research, maintenance of fire protection and prevention of fires. According fires and their effects cause significant damage to the entire global economy. Thus, in terms of social, economic and environmental consequences of losses from fires, actualizes the problem of effective fire protection safety of people, property and the preservation of the ecological environment of each country.

Fire risk shows that in Ukraine there every year more than 50 thousand. Fires, which killed people and property damage exceeds 20 million UAH., Consequential damages 20 times larger. Mostly such alarming statistics due to the increasing fire risk buildings and structures that are erected and operated by changing production technology, increasing the number of storeys and density of development, changing traditional and material-technology construction of houses in new advanced technologies with efficient building materials of wood, plastics, polymers , metal, etc. and. The above materials are highly sensitive to high temperatures and fire. Metal structures under fire exposure quickly heated to the critical temperature, leading to the loss of carrying capacity and destruction.

In practice, the flammability of the materials used and low fire resistance of building structures are the main cause significant property damage and loss of life in fires. Therefore, reducing the flammability of materials and improve the fire resistance of building structures is actual scientific and technical problem, part of the State program of fire safety in Ukraine.

The growing number of fires and fire hazard buildings and structures raises the need for special preventive measures. However, the development of effective measures largely depends on the correct assessment of fire danger and fire resistance of constructions materials. To determine the nature of the material handling and construction, assessment of the means of fire protection and high temperature firing conducting tests.

In world practice now fire risk assessment of building materials studied more than 200 methods. Noteworthy methods for evaluating flammability of materials in developed countries: UK, Germany, France, USA and CIS countries. Unfortunately, the general trend in the development of common evaluation indicators and flammability of materials are significant differences and contradictions in their definition. Thus, in determining one of the most important criteria - flammability, because of the diversity and differences methodical approach

practically impossible to talk about obtaining unambiguous results and their reliability, which complicates and hinders international cooperation. Assessment of fire resistance of building structures are in two directions - a pilot evaluation of methods, designs patterns, designs and calculation methods for assessing the fire resistance of structures.

The analysis methods for assessing fire resistance of structures showed that along with the advantages of the methods are recommended, they also have significant drawbacks: considerable variation in the data (20% or more), high cost, complexity of work, low efficiency to accumulate and generalization of data, and others.

Due to the significant deterioration of assets in the country, and therefore the increasing number of accidents manmade ensure structural safety of building systems is becoming increasingly important.

Statistics show that 80% of accidents occur in the construction of the collapse of supporting structures of the object, arising in consequence of human errors, admitted in the design, construction and operation of buildings or structures. These errors form the inner (object) the risk of accidents, the value of which depends on the duration of use (resource) structure. In addition to anthropogenic factors (explosions, fires, traffic accidents, falling crane, local overload of structures, error designers, negligent builders etc.), There are also natural factors (seismic, the occurrence of karst failures in the foundations of buildings, landslides, hurricanes, etc.), because of the influence which may cause partial or total destruction of the building.

Currently, Ukraine in solving this problem has been paid more attention. But the main part is staging publications (representative) character. We also know that the account of and comply with all the requirements of regulations does not provide the required level of reliability of the building. The rules establish only the minimum level of safe operation and longevity of structures using complex factors that so far remain empirical. In fact, these factors provide the design stage designs their lifetime.

Lack of reasonable method of calculation of the individual components and systems exposed to a combined emergency influences sometimes lead to unreasonably inflated margin and, consequently, to a significant material cost overruns, but neglect such a way often leads to serious social consequences and great material damage. Designing, taking into account the combined load and the likelihood of their occurrence, can increase the "vitality" of buildings during emergency effects.

Recently, the problem has become very serious risk value and to date has attracted increasing attention of specialists in different areas of knowledge. This concept is so peculiar as security and reliability, the term "reliability", "danger" and "risk" often combines.

The main purpose of the analysis of reliability and safety associated with it is to reduce failures (especially traumatic) and related casualties, economic losses and disturbances in the environment.

The proposed monograph is an overview and will develop four parts, two of which have already been issued. It is planned for publication:

Part 3: CIRCUIT DESIGN FEATURES AND STRUCTURES THREE-DIMENSIONAL HIGH-RISE BUILDINGS. In this part provides an overview of publications worldwide experience of designing tall buildings, the evolution of structural systems and circuits from high heights of buildings to ultra-high skyscrapers and modern design features described three-dimensional structures and architectural and design solutions.

Part 4: CALCULATION METHOD, DESIGN AND EXPERT-FIRE MENTAL RESEARCH STRUCTURES TALL BUILDINGS. In this part of the stated features calculation methods, design of skeletons of high-rise buildings on the basis of fire hazard and fire, the experimental studies, existing guidelines and standards based counter fire hazard and fire high-rise buildings and justified the problem and identified research problems of survivability, reliability, stability, seismic, security, technical state of constructions skeletons of tall buildings.

Finally, we note that, on the whole, the monograph is aimed at structuring the existing approaches to solving problems on the problems of combating fire hazards and fire high-rise buildings, buildings resistance to progressive collapse that justified tendency security construction projects for people and the environment. Ensuring trouble-free operation of existing and construction of tall buildings requires the ability to predict their behavior in the event of an emergency (partial loss of the bearing capacity, fire, earthquake and etc.).

The monograph (Part 1.2) is composed of a group of authors National Aviation University and the National University of Life and Environmental Sciences.

References

1. Проблеми протидії пожежної небезпеки та вогнестійкість висотних будівель. Частина 1. Досвід проектування, будівництва та експлуатації. / Першаков В. М., Белятинський А. О., Бакулін С. А., Бакуліна В. М., Болотов Г. І., Попович І. О. Монографія.--К.: Видавництво НАУ, 2016. - 104 с.
2. Проблеми протидії пожежної небезпеки та вогнестійкість висотних будівель. Частина 2. Причини та наслідки руйнування висотних будівель від дії вогню / Першаков В. М., Белятинський А. О., Бакулін С. А., Болотов Г. І., Попович І. О. Монографія.--К.: Видавництво НАУ, 2017. - 270 с.
3. ДБН В.1.1-7-2002. Пожежна безпека об'єктів будівництва / [Чинний від 2003-05-01]. – Мінбуд України. – К.: Держбуд України, 2002. – 87 с. (Національний стандарт України).
4. ДБН В.1.2-7-2008. Система забезпечення надійності та безпеки будівельних об'єктів. Основні вимоги до будівель і споруд. Пожежна безпека. – К.: Мінрегіонбуд України. 2008. – 53 с.