Main Directions and Problems of Fire Safety of the Railway Transport of Ukraine

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The article points out the typical elements of the fire safety system and the mechanisms for regulating the provision of fire safety in railway transport. A list of legislation acts is given. They are an information-documentary and regulatory framework used to control the fire safety condition. An analysis of the main causes of fires at railway enterprises is briefly reviewed. It has been established that there are flaws in the system of legislative regulation of fire safety, in particular, an excessive number of outdated laws and regulations for fire safety issues, inconsistency of domestic practices with the standards and regulations of the European Union and international institutions. The main regulatory acts for fire safety issues were analyzed. The legislative and technical issues in the field of fire safety were assessed. The basic principles of fire safety provision in JSC Ukrzaliznytsia were given, in particular, the structural and organizational diagram of departmental military security service providing high-quality control over the state of fire safety at railway transport enterprises and in rolling stock was indicated. Directions for improving the process of ensuring fire safety in railway transport enterprises were proposed.

Key words: fire, fire safety regulations, causes of railway fires, fire prevention, international standards, certification.

Problem statement. Rail transport is transport, which works are associated with higher risk. Work of rail transport is clearly regulated by regulatory acts.

According to the Law of Ukraine “On Railway Transport” approved by the resolution of Verkhovna Rada of Ukraine dated 04.07.1996 No. 274/9-VR, the railway transport is a production and technological complex of railway transport enterprises aimed to meet the needs of social production and the population of the country for transportation through domestic and international communications and the provision of other transport services to all consumers without restrictions on grounds of ownership and types of activities [1].

Ensuring of fire safety is a complex social and economic task aimed at preventing fires in all spheres of human activity and eliminating of fires, if any, with minimal consequences.

The main areas of fire safety provision are the elimination of fire occurrence conditions and the minimization of its consequences. In the legal sense, the term “fire safety” can be considered as a state of protection of an individual, property, object, settlement, region or state from fires.
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The study objective. The objective of the study is to establish the main issues in the field of fire safety in railway transport, to develop ways to improve the mechanisms for regulating the process of ensuring fire safety at the enterprises of JSC Ukrzaliznytsia.

The presentation of the main material.

The following domestic researches raised the issues of fire safety and public administration in their scientific works. They are T. V. Parpan, who analyzes the current state of legal regulation of fire safety in Ukraine [2], O. Melnichenko, who considers fire safety as an object of public administration [3] and M. V. Andrienko, who offers methods for improving the mechanisms for regulating the process of ensuring fire safety [4].

Problems of fire safety ensuring are becoming increasingly important. In modern conditions, they are interrelated and interdependent with the problems of economic, social, technological and environmental safety, i.e. a fire hazard condition makes the responsible authorities and organizations work to avert and prevent fire hazards. In order to reduce the severity of the consequences of fires, the joint efforts of state authorities, local governments, as well as enterprises and, most of all, citizens shall be intensified and improvement of legal, organizational, economic, social and scientific and technical measures, which will guarantee their more active use in the process of ensuring fire safety, shall be taken. Considering this, the issue of finding ways to improve the mechanisms regulating the process of fire safety ensuring becomes particularly relevant.

The fire safety issues in railway transport are quite relevant nowadays, in particular, because most of the buildings, production equipment, facilities and rolling stock have a high level of fire danger, as well as possible actions of passengers may cause a fire. Therefore, to ensure fire safety at the facilities of JSC Ukrzaliznytsia, it is mandatory from time to time to carry out an audit on fire safety issues and improve the existing firefighting system of the railway.

The main causes of fires at the enterprises of railway transport of JSC Ukrzaliznytsia are as follows [5]:

1. Carrying in of an external source of ignition – 23%
2. Careless fire handling – 23%
3. Technical failure of the rolling stock – 18%
4. Short circuiting – 18%
5. Arsons – 6%
6. Violation of fire safety regulations during works with fire – 6%
7. Violation of the requirements of fire safety rules during the operation of electrical plants – 6%

So, in most of the causes of fires breaking-out (over 60%), human factor plays the main role (careless fire handling, entering of an external source of ignition, operation of electrical appliances, arsons).

Some of the main fire hazard in railway transport are smoke, fire, toxic products of combustion, electrical current, which occur from high voltage transfer to the conductive parts of structures, dangerous explosion factors that pose risk to life and health of people.

In order to talk about the fire hazard of some object, it is necessary to say a few words about what a fire is in general.

Fire is an uncontrolled burning out of a special fire bed developing in time and space and causing material damage [6].

In turn, combustion is an exothermic oxidation reaction of a substance accompanied by the occurrence of flame and luminescence and (or) smoke emission [7].

Fire safety in railway transport is provided by fire prevention and fire protection systems including organizational and technical measures.

The fire safety system performs a variety of tasks such as:
– to exclude the occurrence of fire;
– to ensure the fire safety of people;
– to ensure fire safety of material assets;
– to ensure fire safety in rolling stock [8].

Facilities must have fire safety systems aimed at preventing people from effect of dangerous fire factors including their secondary influences at the required level.

In the legal field, fire protection of the railway transport of Ukraine is governed by the following laws and regulations:
– Code of civil protection of the population;
– The fire safety regulations of Ukraine approved by the Order of the Ministry of Internal Affairs dated 31.12.2014, No. 11417 and registered with the Ministry of Justice of Ukraine on 05.03.2015, No. 252/26697;
– DSTU 2272-93 “Fire safety. Terms and Definitions”.
– GOST 12.1.044-89 SSBT. “Fire and explosion hazard of substances and materials. Nomenclature of indicators and methods for their determination «;
– DSTU EN 2: 2014 “Classification of fires”.

To provide fire safety in full scope, specialists, who should control whether Ukrainian railway transport comply with fire safety requirements and who carry out current monitoring of the maintenance of a fire and utility water supply system, fire hydrants and fire equipment, as well as who take direct part in conducting of fire-technical inspections on the premises related to the railway transport, shall follow provisions of DBN V.2.3-7-2010, DBN V.1.1-7-2016 “Fire safety of industrial projects”. General requirements”, DBN V.2.5-56: 2014 “Fire Protection Systems”, Rules for the Installation of Electrical Plants (RIEP), DNAOP 0.00-1.32-01 “Rules for Electrical Plant Construction, electrical equipment of special plants” and, technological design standards and other regulatory acts based on their scope, which regulate the fire safety requirements.

Currently, Ukraine is in the process of integration into the international community and the European Union, and, therefore, a significant number of laws and regulations (including on fire safety issues) require updating and adaptation to the requirements of international standards. However, during the termination of some legal acts, unfortunately, either other acts are not established at all or new documents do not always replace them in time.

At the present time, the following changes took place in laws and regulations on fire safety issues:
– NAPB B.01.012-2007 “Rules for fire protection” was canceled and the new document was not put into effect.
– GOST 27331-87 “Fire equipment. Fire classification” was canceled, it was replaced by DSTU EN 2: 2014 Classification of fires.
– “Standard Regulations on Fire Safety Commission” approved by the Ministry of Ukraine on issues of emergency situations and on protecting the population from the consequences of the Chernobyl catastrophe of 20.05.2009, No. 347, has been abolished.
– the fire safety regulations for fire extinguishers requirement (NAPB B.03.001-2004), approved by Order of the Ministry of Ukraine on issues of emergency situations and on protecting the population from the consequences of the Chernobyl catastrophe dated 02.04.2004, No. 151, were abolished; instead, “Rules of operation and typical standards of fire extinguishers requirement” were brought into force by the Ministry of Internal Affairs of Ukraine dated 01.15.2018, No. 25.


The list of legislative issues can be continued.

In addition, at this stage of railway transport reform, there are many other problems, in particular:
– the need to replace and upgrade outdated industrial equipment, fire protection systems, cabling and wiring products and, the most of all, rolling stock.
– the need to introduce products of domestic production.
– modernization of firefighting trains.

For good quality prevention of fire safety in railway transport, employees and management of enterprises may be held to the following types of liability for violating fire safety laws:

**Administrative** provided by the articles of the Code of Ukraine on administrative violations [9]:

- Art. 110, part 2. Smoking in passenger cars, electric and diesel train cars – a fine is from 5 to 10 tax-exempt minimums;
- Art. 120. For violation of fire safety rules in railway transport, citizens face a fine from 3 to 7 tax-exempt minimums and officials – from 5 to 10 tax-exempt minimums;
- Art. 175. For violation of fire safety requirements, as well as the use of firefighting equipment and fire extinguishing equipment not for the intended purpose, citizens will pay fine from 0.5 to 7 tax-exempt minimums and officials – from 2 to 10 tax-exempt minimums;
- Art. 183. For a deliberately false call of the fire brigade, a fine is from 3 to 10 tax-exempt minimums;
- Art. 188. For non-compliance with rules and regulations of officials of Fire Safety Authority or obstruction of their activities, they may issue a warning or impose a fine from 0.5 to 7 tax-exempt minimums on citizens and from 2 to 10 tax-exempt minimums on officials.

**Criminal** liability, of course, is much stricter than administrative. According to Art. 270 of the Criminal Code, it is imposed if the fire safety requirements have been violated as a result of any actions (inaction), which have caused a fire that has harmed human health or caused material damage on a large scale (i.e. if direct losses amount is 300 times more than the tax social privilege (TSP). Moreover, the form of guilt of a person, who is obliged to follow the rules of fire safety, can be of any kind, for example,
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Figure 3 – Structured diagram of the departmental military security service

Conclusions. Fire safety in the railway transport of Ukraine is one of the pressing issues of our time both for the employers and for railway users, as well as for the management of JSC Ukrzaliznytsia. First of all, this is the problem of financing, since the provision and modernization of fire protection systems (automatic fire extinguishing systems, fire alarm systems, fire warning systems, smoke protection systems, centralized fire monitoring and dispatching systems) is a matter of significant investment, the solutions of which can be delayed many years and during this time, other equipment is deteriorated. However, despite the above problems, the fire protection condition of the railway transport is satisfactory and close to the requirements of the present, which is evidenced by the decrease in the number of fires here. Usually, to ensure the high-quality of fire safety in railway transport, it is necessary to engage new equipment as much as possible, to upgrade firefighting trains, to ensure the strict implementation of laws and regulations and international standards, as well as constantly provide an adequate funding for fire prevention measures.
Currently, the enterprises of railway transport are updating fire requirements according to international standards on fire safety issues, namely, DSTU EN 2: 2014 “Fire classification” [11] and DSTU ISO 6309: 2002 “Fire protection. Fire safety signs” [12]. Revised standard DSTU EN 2: 2014 “Classification of fires” will be able to help railway employers to choose the right extinguishing agent, technical means and tactical methods of fire fighting in case of fire extinguishing. And with the help of the standard and DSTU ISO 6309: 2002 “Fire protection. Fire safety signs” managers of railway transport enterprises will be able to develop a high-quality fire protection system at enterprises, thereby ensuring fire safety, which will reduce the number of fires at JSC Ukrzaliznytsia.

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