

УДК 378.016:629.7.08

ББК 74.48

DOI 10.51955/2312-1327\_2022\_4\_17

## IMPLEMENTATION OF MULTIPLE-LEVEL EDUCATION IN THE PROFESSIONAL TRAINING OF SPECIALISTS FOR AIRPORT EMERGENCY SERVICES

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**Abstract.** The purpose of the article is to harmonize the professional training of bachelors and masters in the field of firefighting and rescue support for flights with the current regulatory frame-work governing the activities of rescuers in aviation. As a result, positions with the qualifications of "bachelor" and "master" were allocated in the organizational structure of the airport RFFS. The labor functions corresponding to them are determined; professional competencies and indicators of their achievement are formulated; the courses of the professional block of the curriculum for the preparation of bachelors and masters are proposed.

**Keywords:** rescue and firefighting, civil aviation, Federal State Educational Standard (FSES) 3++.

# РЕАЛИЗАЦИЯ УРОВНЕВОГО ОБРАЗОВАНИЯ В ПРОФЕССИОНАЛЬНОЙ ПОДГОТОВКЕ СПЕЦИАЛИСТОВ АЭРОПОРТОВЫХ АВАРИЙНО-СПАСАТЕЛЬНЫХ СЛУЖБ

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**Аннотация.** В работе предложено согласовать профессиональную подготовку бакалавров и магистров в области противопожарного и аварийно-спасательного обеспечения полетов с актуальной нормативно-правовой базой, регламентирующей деятельность спасателей в авиации. В результате анализа организационной структуры СПАСОП аэропортов выделены должности с квалификациями «бакалавр» и «магистр», а также определены соответствующие им трудовые функции; сформулированы профессиональные компетенции и индикаторы их достижения; предложены дисциплины профессионального блока учебного плана для подготовки бакалавров и магистров.

**Ключевые слова:** аварийно-спасательные и противопожарные работы, гражданская авиация, ФГОС 3++.

## **Introduction**

In the long term, the state of the education system is one of the key indicators of Russia's competitiveness.

Currently, the higher education system of the Russian Federation includes three levels: bachelor's degree; specialist diploma, master's degree; training of highly qualified personnel [Борзова, 2019]. Each level implies separate federal state educational standards (FSES) and independent final certification.

The literature review shows that few studies have reported on the issue of the professional training of specialists of Rescue and firefighting (RFF) services and personnel of civil aviation ground services [Аманкешулы, 2018; Борзова, 2019; Бутузов, 2020; Иванская, 2020; Ломакин, 2021; Остапченко, 2017; Рухлинский, 2020; Тарасов, 2021; Шапошник, 2020]. At the same time, the authors did not find any paper on the issue of university training of airport RFF services.

Professional training of specialists in the field of search and rescue support of aircraft flights in Russia is implemented in the only university, the Ulyanovsk Institute of Civil Aviation. University training of rescuers in aviation is based on the third generation of federal state educational standards (FSES 3 ++), the enlarged group of specialties and areas of higher education training 250000 "Air navigation and operation of aviation and rocket and space technology".

The Ulyanovsk Institute of Civil Aviation trains bachelors in 25.03.03 "Air Navigation", the profile of training "Search and RFF support of aircraft flights"<sup>1</sup>. Also, it trains masters in 25.04.03 "Air Navigation" training profile "Search and Rescue Management"<sup>2</sup>. The main professional educational programs and plans for the preparation of graduates can be found on the university website (<http://www.uvauga.ru/obrazovanie>).

The system of professional education in the implementation of FSES 3 ++ is based on professional standards with labor duties of workers<sup>3</sup>. For rescuers in civil aviation, professional standards are under development. And modern education should be congruent with the functional responsibilities of a specialist. The formation of professionally significant qualities of rescuers is impossible without taking into account the labor functions they perform, which are strictly regulated by the regulatory and legal framework.

In recent years within the framework of the regulatory guillotine, the regulatory support of the functional subsystems of the Unified State System for Prevention and Elimination of Emergency Situations (EMERCOM of Russia) has undergone significant changes.

There was a reform of the structure of search and RFF support of flights. After the introduction of the Federal Aviation Regulations "Flight rescue support" (FAR-517), the general functions of search and RFF support were finally divided into two independent directions<sup>4</sup>. Each direction has separate sources of funding, tasks for

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<sup>1</sup> Об утверждении федерального государственного образовательного стандарта высшего образования – бакалавриат по направлению подготовки 25.03.03 Аэронавигация: пр. Министерства науки и высшего образования РФ от 21 августа 2020 г. № 1084.

<sup>2</sup> Об утверждении федерального государственного образовательного стандарта высшего образования – магистратура по направлению подготовки 25.04.03 Аэронавигация: пр. Министерства науки и высшего образования РФ от 21 авг. 2020 г. № 1081.

<sup>3</sup> Трудовой кодекс Российской Федерации: Федер. закон № 197-ФЗ от 30 дек. 2001.

<sup>4</sup> Федеральные авиационные правила. Аварийно-спасательное обеспечение полетов воздушных судов // утв. пр. Минтранса России от 26 нояб. 2020 г. № 517.

search and rescue of people, tactics, technology and equipment, requirements for the qualifications and personnel training.

The first direction is associated with search and rescue flight support (SRFS) in aviation. It is carried out throughout the territory of the Russian Federation in order to search and rescue aircraft in emergency or aircraft crashes, their passengers and crews. The search and rescue flight support provided by the forces and means of state authorized bodies. The second direction includes the rescue and firefighting flight support (RFFS) of civil aviation. The rescue and firefighting flight support is organized and carried out: at aerodromes and in the area of aerodromes involving the forces and means of the aerodrome operator.

In our prior research we considered the relevance of the division of university training of bachelors in aviation rescue into two areas of training, due to the regulatory framework. The direction 25.03.03 "Air navigation" as search and rescue flight support for aircrafts (SRFS). And the direction 25.03.04 "Operation of airports and aircraft flight support" as RFF support for aircraft flights<sup>5,6</sup> [Селезнев, 2009].

At the same time, the issue of the need to train qualified managers (masters) in the field of firefighting and rescue support of aviation flights in the airfield and airport area is valid and relevant. The authors see the possibility of such training in the framework of the training direction 25.04.04 "Operation of airports and aircraft flight support" of the training profile "Management of firefighting and rescue flight support"<sup>7</sup>.

New functional goals and structure of the emergency rescue service have caused the need to revise the qualification requirements for the training of personnel of the emergency rescue and firefighting service. A revision of the professional competencies of the personnel is also necessary. Consequently, before the introduction of professional standards, it is necessary to agree on by-laws in the field of firefighting, emergency rescue operations at airports and the system of higher education for training rescuers in civil aviation.

The aim of the work is to harmonize the professional training of bachelors and masters in the field of firefighting and rescue flight support with the current regulatory framework governing the activities of rescuers in aviation.

The results of the analysis of modern tasks on the formation of mechanisms for the implementation of new regulatory legal acts in the professional training of bachelors and masters in the field of firefighting and rescue support for flights based on the requirements of FAR-517<sup>8</sup> and the current qualification handbook<sup>9</sup> are given below.

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<sup>5</sup> Об утверждении федерального государственного образовательного стандарта высшего образования – бакалавриат по направлению подготовки 25.03.03 Аэронавигация: пр. Министерства науки и высшего образования РФ от 21 августа 2020 г. № 1084.

<sup>6</sup> Об утверждении федерального государственного образовательного стандарта высшего образования – бакалавриат по направлению подготовки 25.03.04 Эксплуатация аэропортов и обеспечение полетов воздушных судов: пр. Министерства науки и высшего образования РФ от 21 августа 2020 г. № 1078.

<sup>7</sup> Об утверждении федерального государственного образовательного стандарта высшего образования – магистратура по направлению подготовки 25.04.04 Эксплуатация аэропортов и обеспечение полетов воздушных судов: пр. Министерства науки и высшего образования РФ от 21 авг. 2020 г. № 1080.

<sup>8</sup> Федеральные авиационные правила. Аварийно-спасательное обеспечение полетов воздушных судов // утв. пр. Минтранса России от 26 нояб. 2020 г. № 517.

## Materials and methods

As the object of the study, the conditions for the implementation of multiple-level education in the professional training of specialists of airport emergency rescue services in the absence of professional standards were selected.

The implementation of the current FSES 3 ++ begins with the preparation of the Basic Professional Educational Program (BPEP) for the training profile.

The quality specialist training reflects the quality of the formation of competencies laid down in the standard and educational programs.

FSES 3 ++ contains a list of mandatory universal competencies (UC) and general professional competencies (GPC). Professional competencies (PC) are formulated by the university. It is possible to assess the development of competencies only after the completion of the full cycle of specialist training [Султанов, 2019].

The main elements of the BPEP are formed in accordance with the demand of the labor market. These are the areas and spheres of professional activity; types of problems and tasks of professional activity; professional competencies and indicators of their achievement.

Here we characterize the authors' vision of the main elements of the professional component of future BPEP.

First, for bachelors in the direction of training 25.03.04 "Operation of airports and aircraft flight support" with the training profile "Firefighting and rescue flight support". Second, for masters in the direction of training 25.04.04 "Operation of airports and aircraft flight support" with the training profile "Management of rescue and firefighting flight support".

The areas of professional activity of graduates correspond to 12 Ensuring safety in the field of organization and provision of rescue and firefighting operations; 17 Transport in the field of airport activities were selected<sup>10, 11</sup>.

The intended bachelor's degree correspond to the 6th level of qualification, and the master's degree corresponds to the 7th level of qualification with the following indicators (table 1)<sup>12</sup>.

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<sup>9</sup> Квалификационный справочник должностей руководителей, специалистов и других служащих: утв. пост. Минтруда РФ от 21 авг. 1998 г. № 37.

<sup>10</sup> Об утверждении федерального государственного образовательного стандарта высшего образования – бакалавриат по направлению подготовки 25.03.04 Эксплуатация аэропортов и обеспечение полетов воздушных судов: пр. Министерства науки и высшего образования РФ от 21 августа 2020 г. № 1078.

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<sup>12</sup> Уровни квалификации в целях разработки проектов профессиональных стандартов: утв. пр. Министерства труда и социальной защиты Российской Федерации от 12 апреля 2013 г. № 148н.

Table 1. Levels of qualifications for the development of projects of professional standards<sup>13</sup>

Level	Skill Level Indicators		
	Authority and responsibility	Skill type	Knowledge type
6	Independent activity, involving the determination of the tasks of one's own work and / or work of subordinates to achieve the goal. Ensuring interaction between employees and related departments. Responsibility for the result of work performed at the level of a department or organization.	Development, implementation, control, assessment and adjustment of areas of professional activity, technological or methodological solutions.	Application of professional knowledge of a technological or methodological nature, including innovative ones. Independent search, analysis and evaluation of professional information.
7	Defining a strategy, managing processes and activities, including innovative ones, with decision-making at the level of large organizations or departments. Responsibility for the performance of large organizations or departments.	Solving the problems of developing the field of professional activity and (or) organization using a variety of methods and technologies, including innovative ones. Development of new methods and technologies.	Understanding of the methodological foundations of professional activity. Creation of new knowledge of an applied nature in a specific area. Determination of sources and search for information necessary for the development of the field of professional activity and / or organization.

Taking into account the functional responsibilities of the positions of the heads of the RFFS, the range of positions with the required level of education was determined:

- bachelor: head of the rescue unit, head of the rescue department, first class rescuer, international class rescuer;
- master: head of the RFFS, deputy head of the RFFS, head of emergency response at the airport<sup>14, 15</sup>.

The types of tasks of professional activity most relevant to the specialty have been specified, they are operational and technological, and organizational and managerial.

<sup>13</sup> Уровни квалификации в целях разработки проектов профессиональных стандартов: утв. пр. Министерства труда и социальной защиты Российской Федерации от 12 апреля 2013 г. № 148н.

<sup>14</sup> Федеральные авиационные правила. Аварийно-спасательное обеспечение полетов воздушных судов // утв. пр. Минтранса России от 26 нояб. 2020 г. № 517.

<sup>15</sup> Квалификационный справочник должностей руководителей, специалистов и других служащих: утв. пост. Минтруда РФ от 21 авг. 1998 г. № 37.

## Results

For each type of tasks for bachelors and masters, the following formulations of tasks and objects of professional activity, professional competencies and indicators of achievement (ICA), as well as the names of courses the of the professional block, are proposed, presented in tables 2-5.

Table 2. Characteristics of the BPEP components for the operational and technological type of tasks of the professional activity of bachelors of the training profile "Firefighting and rescue flight support"

Code and name of professional competence	Code and name of the indicator of achievement of professional competence	Courses of the professional unit
The task of professional activity is organization, provision, and conduction of rescue and fire-fighting operations on aircraft and civil aviation infrastructure facilities		
Objects of professional activity are processes, methods and means of organizing and conducting rescue and fire-fighting operations.		
PC-1. Able to ensure the readiness of the emergency rescue forces and means of the RFFS for prompt response to emergencies, actions to extinguish fires and conduct emergency rescue operations (ERO) at the airfield and in the airfield area.	ICA 1 <sub>PC-1</sub> . Supervises the staffing and professional training of the airport rescue team.	– Rescue and firefighting vehicles and equipment, – Professional training and certification of the RFFS.
	ICA 2 <sub>PC-1</sub> . Provides safety, uninterrupted operation and troubleshooting of machinery, tools and equipment.	
PC-2. Able to organize and control the ERO on the aircraft.	ICA 1 <sub>PC-2</sub> . Organizes and controls fire extinguishing on the aircraft.	– Tactics of ERO on aircraft and airport infrastructure facilities, – Assessment of resources and tasks of the RFFS.
	ICA 2 <sub>PC-2</sub> . Organizes rescue operations.	
	ICA 3 <sub>PC-2</sub> . Organizes and controls the work of interacting forces and assets involved in the ERO at the airport and in the airport area in accordance with the plans of interaction.	
	ICA 4 <sub>PC-2</sub> . Operatively supervises actions to extinguish fires and conduct the ERO at the airport and in the airport area.	

PC-3. Able to monitor the fulfillment of regulatory operational and technological requirements for the RFFS service and the airport emergency rescue teams (ERT).	ICA 1 <sub>PC-3</sub> . Organizes the preparation of regulatory and operational documentation in the according to the requirements established by the Government of the Russian Federation.	<ul style="list-style-type: none"> <li>– State regulation of activities in the field of rescue flight support (RFS),</li> <li>– Professional training and certification of the RFFS,</li> <li>– Organization of work of the RFFS,</li> <li>– Labor protection and work environment safety in the RFFS,</li> <li>– Office work in the RFFS.</li> </ul>
	ICA 2 <sub>PC-3</sub> . Ensures the observance of discipline by the personnel of the emergency rescue unit and compliance with the rules of labor protection, fire safety and sanitary and hygienic standards.	
	ICA 3 <sub>PC-3</sub> . Keeps records of the performed ERO, and prepares reports on the performed ERO in accordance with regulatory documents.	
PC-4. Able to prepare documentation for the professional training and certification of personnel of the RFFS, as well as certification of the service for the right to conduct an automated control system according to the requirements established by the Government of the Russian Federation.	ICA 1 <sub>PC-4</sub> . Prepares documentation for the certification of the RFFS, the personnel of the emergency rescue department for the right to conduct the ERO according to the requirements established by the Government of the Russian Federation.	<ul style="list-style-type: none"> <li>– Professional training and certification of the RFFS.</li> </ul>
	ICA 2 <sub>PC-4</sub> . Organizes vocational training classes, supervises their implementation.	

Table 3. Characteristics of the BPEP components for the organizational and managerial type of tasks of the professional activity of bachelors of the training profile "Fire and emergency flight support"

Code and name of professional competence	Code and name of the indicator of achievement of professional competence	Courses of the professional unit
The task of professional activity: organization, support, and management of rescue and fire-fighting support of flights in a civil aviation enterprise.		
Objects of professional activity: processes, methods and means of organizing and managing rescue and fire safety of flights in a civil aviation enterprise.		
PC-5. Able to develop documents for the organization and	ICA 1 <sub>PC-5</sub> . Develops an emergency plan, an operational plan for extinguishing fires on the aircraft, operational cards	<ul style="list-style-type: none"> <li>– RFF planning,</li> <li>– Assessment of</li> </ul>

management of the ERO on aircraft and airport infrastructure facilities.	for extinguishing a fire and conducting an ERO on an aircraft, cards for extinguishing fires at airport infrastructure facilities.	resources and tasks of the RFFS.
PC-6. Able to organize interaction with additional forces and means, and develop interaction plans.	ICA 1 <sub>PC-6</sub> . Organizes interaction with additional forces and means, develops plans for interaction.	– RFF planning, – Assessment of resources and tasks of the RFFS.
PC-7. Capable of predicting the development of an emergency, planning resource costs in accordance with the expected factors of an emergency.	ICA 1 <sub>PC-7</sub> . Forecasts the development of an emergency, plans the optimal use of resources in accordance with the development of emergency factors.	– Risk management in the RFFS, – Assessment of resources and tasks of the RFFS, – RFFS planning.
PC-8. Able to monitor the progress of rescue operations, coordinate the actions of the participating forces and means.	ICA 1 <sub>PC-8</sub> . Supervises the ERO process, coordinates the actions of the participating forces and means.	– Management of rescue operations.

Table 4. Characteristics of the BPEP components for the operational and technological type of tasks of the professional activity of masters of the training profile "Management of rescue and firefighting flight support"

Code and name of professional competence	Code and name of the indicator of achievement of professional competence	Courses of the professional unit
The task of professional activity is organization, support, rescue and fire-fighting work in aviation		
Objects of professional activity are processes, methods and means of management and organization of rescue and fire-fighting operations		
PC-1. Able to develop proposals for the development and equipping of educational and material-technical bases and personnel of the RFFS.	ICA 1 <sub>PC-1</sub> . Develops proposals for the development of educational and material-technical bases of the RFFS.	– Assessment of resources and tasks of the RFFS, – Professional training and certification of the RFFS
	ICA 2 <sub>PC-1</sub> . Develops proposals for equipping the RFFS personnel with rescue equipment.	
PC-2. Able to organize and supervise aircraft rescue operations.	ICA 1 <sub>PC-2</sub> . Organizes certification of the RFFS and personnel of the RFFS.	– Professional training and certification of the RFFS, – Organization and conduct of emergency rescue operations.
	ICA 2 <sub>PC-2</sub> . Organizes and controls the conduct of professional training of personnel of the RFFS in accordance with their official duties.	
PC-3. Able to ensure the development, maintenance, timely correction and updating, processing and storage of service documentation RFFS.	ICA 1 <sub>PC-3</sub> . Provides the development, maintenance, timely correction and updating, processing and storage of service documentation of the RFFS.	– Planning the work of the RFFS.

Table 5. Characteristics of the BPEP components for the organizational and managerial type of tasks of the professional activity of masters of the training profile "Management of firefighting and rescue flight support"

Code and name of professional competence	Code and name of the indicator of achievement of professional competence	Courses of the professional unit
The task of professional activity is management and coordination of rescue and fire-fighting operations at the facilities and territory of responsibility of the RFFS		
The object of professional activity is processes, methods and means of management and interaction of rescue teams during rescue and fire-fighting operations		
PC-4. Able to interact with subdivisions of the aerodrome operator, enterprises, organizations, federal executive authorities on the organization of RFF and the activities of RFFS.	ICA 1 <sub>PC-4</sub> . Interacts with subdivisions of the aerodrome operator, enterprises, organizations, federal executive authorities on the organization of rescue flight support and the activities of the RFFS.	- Planning the work of the RFFS.

### Discussion

Thus, a mechanism for the implementation of the FSES 3 ++ of the enlarged group of specialties 250000 "Air navigation and operation of aviation and rocket-space technology" for specialists in firefighting and rescue flight support is proposed.

The research is based on the actualization of the educational standard through the prism of the professional standard. The professional standard is currently under development. Therefore, the authors relied on regulatory legal documents containing qualification requirements, job duties and labor functions of professional rescuers.

Another approach to the professional training of rescuers is possible. It was proposed before the introduction of the Bologna education system in Russia [Селезнев, 2009; Селезнев, 2010].

The starting point in the proposed system for training of rescuers is the characterization of a hypothetical emergency. The more precisely its parameters are set, the more accurately you can determine the requirements for the training results, and for the training system or model.

This approach is consistent with the position of the authors of the article on dividing the professional training of rescuers in civil aviation into two areas - search and rescue and emergency rescue. This approach corresponds to the selected objects of professional activity. It is being implemented in the context of the regulatory guillotine and the renewal of the regulatory legal framework governing the activities of aviation rescuers, and the absence of professional standards.

### Conclusion

In conclusion the findings of this study can be understood as follows:

– the ways of formation of professional competences of bachelor's and master's degrees in the conditions of a new regulatory and legal framework for the activity of the RFFS in the absence of professional standards have been proposed;

– the tasks and objects of professional activity for the level education system in the professional training of specialists of airport emergency rescue services of civil aviation based on the analysis of the labor functions of the RFFS employees have been formulated;

– the categories of RFFS employees with the qualifications "bachelor" and "master" have been identified;

– professional competencies for multiple level training. For bachelors of the direction of training 25.03.04 "Operation of airports and aircraft flight support" profile "Rescue and fire fighting flight support". And masters of the direction of training 25.04.04 "Operation of airports and aircraft flight support" training profile "Management of fire and rescue flight support" have been developed;

– the indicators of achievement of professional competencies for a complex of disciplines of the professional block of the curriculum for the preparation of bachelors and masters have been proposed.

However, we argue that while preparing both bachelors and masters, the consequences of the negative environmental and economic impact of aviation accidents are little taken into account [Николайкин, 2016a]. Therefore, future research should certainly develop curricula in the direction of preparing trainees to solve production problems to reduce the environmental consequences of negative aviation events [Николайкин, 2016b].

### **Библиографический список**

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