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A LIST OF TACTICAL AND TECHNICAL CHARACTERISTICS OF COMBAT EQUIPMENT OF SECURITY FORCES PERSONNEL, WHICH ARE SUBJECT TO REGULATION

The author formulates the contradictions that cause the inconsistency of the composition and tactical and technical characteristics of combat equipment of security (defense) forces personnel with the requirements of practice. The generalized structure of the system of combat equipment for security (defense) forces personnel is presented. On the basis of the analysis of typical scenarios of performing tasks by security forces units, the reasons influencing the choice of combat equipment elements are identified. The author substantiates the list of tactical and technical characteristics of combat equipment for security forces personnel, which are subject to regulation in order to obtain combat equipment complexes that meet the requirements of practice.

Keywords: *combat equipment, security forces, tactical and technical characteristics, requirements, regulation.*

Statement of the problem. In the modern world, national security is one of the important conditions for the existence and stable development of society, nation and state. One of the tasks of national security is to ensure the protection of society and citizens from such potential threats as military aggression, interethnic or interreligious clashes, terrorist acts, major natural disasters, epidemic diseases, man-made disasters, etc. [1, 2].

In Ukraine, the task of ensuring national security is entrusted to state institutions, in particular to the security forces. According to [3], the components of the security forces are: The National Police of Ukraine (NPU), the National Guard of Ukraine (NGU), the State Border Guard Service of Ukraine (SBGS), the State Migration Service of Ukraine (SMSU), the State Emergency Service of Ukraine (SESU), the Security Service of Ukraine (SSU), the Judicial Protection Service (JPS), the State Protection Department of Ukraine (SPD), the State Service for Special Communications and Information Protection of Ukraine, and the Intelligence Agencies of Ukraine (IAU).

Considering the definition of "security forces" and the tasks and functions of state bodies attributed to the security forces by the Law of Ukraine "On National Security of Ukraine", they can be conditionally divided into security forces with law enforcement functions (NPU, NGU, SBGS, SSU, ROP, SLSO), intelligence agencies, and civil protection forces. Thus, the security forces are based on military formations, state and executive bodies with law enforcement functions, which ensure the fulfilment of the tasks and functions of ensuring national security assigned to them by the Law of Ukraine [3].

Based on the analysis of legal acts [3–8], a generalized list of the main tasks of the security forces and their components with law enforcement functions involved in the performance of such tasks has been formed (Table 1).

According to the general scientific methodology, a unit, group or individual serviceman performing a task can be considered as systems of different levels [9]. Then, according to the systems theory, the main categories considered are the purpose of the operation, active means, other means, situational conditions and strategy for achieving the goal [10].

Currently, the focus is on developing the best strategy for achieving the goal (improving system efficiency), provided that the other components are fairly fixed and not subject to significant influence. And there is a significant amount of truth in this. Indeed, we cannot significantly influence the so-called "other means", i.e. the forces and means at the disposal of other managers (interacting structures, allies, adversaries, etc.). Usually, the possibilities of influencing the conditions of the situation (i.e., the set of factors that significantly affect the change of the situation and determine the state of the system) are also significantly limited or practically non-existent.

Table 1 – Main tasks of the security forces, which involve components of the security forces with law enforcement functions

No.	Main tasks of the security forces	Components of security forces with law enforcement functions				
		NGU	NPU	SBGS	SSU	ROP
1	Ensuring the protection of human rights and freedoms, the interests of society and the state	■	■		■	
2	Protection of public order and ensuring public safety	■	■			
3	Protection of state authorities and officials	■		■		■
4	Protection and defense of the state border of Ukraine	■		■		
5	Combating crime and suppression of terrorist activities, activities of illegal paramilitary or armed groups, organized criminal groups and organizations	■	■	■	■	■
6	Maintaining or restoring law and order in areas of particularly severe man-made or natural emergencies	■	■			
7	Protection of important state facilities	■				■

Table 1 shows that the NGU is the only structure that is involved in all the main tasks of the security forces. Therefore, it is the NGU units that, compared to other units of the security forces, should be more versatile in terms of both training and equipment.

Obviously, it is pointless to influence the purpose of the operation, since the purpose is the system-forming factor. This leaves the active means, which in military terminology are "forces and means". Due to the desired unification of units, various historical factors and traditions, as well as the understanding dictated by logistical problems, the "means" available to the respective "forces" are rather uniform. Therefore, in the process of solving the above-mentioned task of increasing the system's efficiency, the possibilities of changing active means are considered to be rather limited. However, in conditions when there is a need to improve the efficiency of performing combat and service-combat tasks (SCT) by security forces, it is advisable to consider the possibility of a positive impact on performance indicators by improving the relevant "means".

One of the main "means" at the disposal of a security (defense) officer is his/her combat equipment, which, by its composition and tactical and technical characteristics (TTC), should provide him/her with maximum opportunities to achieve the required result of performing the assigned combat and service combat tasks. However, in practice, some contradictions arise when choosing the necessary equipment elements.

The first contradiction is between the requirement for high functional characteristics of combat equipment elements and the requirement for mobility of a security (defense) force member. Usually, increasing the functional characteristics of equipment elements is associated with an increase in its weight and dimensions, which negatively affects the functional characteristics of a security (defense) officer, namely, leads to a decrease in mobility, reaction, attention, visual acuity and other important characteristics.

The second is the contradiction between the requirements for the unification of combat equipment elements and the requirements for their specialization. In most cases, in order to create universal items, the requirements for individual specifications are somewhat relaxed or cancelled, which leads to a decrease in the degree of compliance of combat equipment items with the requirements of the specific tasks for which they are used.

The third contradiction is between the need to introduce modern technologies into combat equipment systems (CES) and the requirements for cost-effectiveness. The introduction of modern technologies makes it possible to increase the capabilities of CSCM, but it is necessary to consider the ratio of the increase in the efficiency of the implementation of the CSCM to the costs that cause this increase.

One of the ways to eliminate these contradictions is to create a scientific and methodological apparatus for substantiating the requirements for combat equipment of a security (defense) forces officer.

Analysis of recent research and publications. Changes in the nature of the implementation of CSCM in recent decades, the emergence of new types of threats, the rapid development of weapons and a number of other factors have led to an increase in scientific interest in the world to the problems of combat equipment for military personnel. Leading foreign countries are actively working to improve existing and create new equipment for military personnel. Such research is based on the concept of the "soldier of the future" [11–19].

Ukraine also conducts research and development work on the development of CES for servicemen of the Army units of the Armed Forces of Ukraine. The results of this work are highlighted in a number of scientific papers.

The scientific article [20] presents the results of a study of the rational construction and development directions of the military combat equipment complex, considering the experience of the armed forces of the world's leading countries. It is noted that the experience of advanced countries indicates the need to apply a modular approach to the construction of modern equipment for soldiers, which opens up prospects for further capacity building on the basis of the basic complex and modernization of its individual components.

Some works highlight the issues of development and improvement of individual components of the CES, in particular: destruction systems [21], protection [22], control [23], power supply [24], life support [25], military uniforms [26], tactical backpacks and unloading systems [27]. In addition, proposals have been made for the integrated use of military equipment elements in conditions of radiation and chemical contamination [28].

Studies on the distribution (echeloning) of elements of combat equipment of a serviceman, depending on the nature of service-combat (combat) tasks, were conducted in [29, 30].

Also, the formation of requirements for the tactical and technical characteristics of firearms for security forces was studied in articles [31–39].

However, these research results are mostly limited to the formation of requirements for the characteristics of individual elements of combat equipment, but do not consider their joint impact on the results of tasks performed by a security (defense) force officer.

At the same time, it is advisable to formulate requirements for the TTC of combat equipment in several stages. At the first stage, based on the analysis of the conditions of use of an item of equipment, a list of its characteristics that are subject to regulation is determined. During the second stage, research is conducted to determine the dependencies of the performance indicators of the performance of the CSCM by a security (defense) force member on the TTC of combat equipment items. The third stage involves the formation of requirements for partial technical specifications of combat equipment elements based on the obtained dependencies. The formation of requirements for the TTC of combat equipment systems is carried out at the fourth stage.

Therefore, to implement the first stage of forming requirements for the TTC of combat equipment, it is necessary to analyze the peculiarities of the conditions of its use and determine a list of specific tactical and technical requirements (TTR) for it.

The purpose of the article is to determine the list of tactical and technical characteristics of combat equipment for security forces personnel which are subject to regulation.

Summary of the main material. The combat equipment of a security (defense) forces employee CESDO should be understood as a set of interconnected means of individual use that ensure the employee's vital activity, individual protection, target destruction, management of employees during the performance of CSCM and power supply of energy-consuming means of employee's combat equipment. All equipment elements are divided into several subsystems according to their functional purpose (Figure 1).

When performing tasks, an employee may be equipped with various subsystems consisting of different elements.

Using the developed typical scenarios of tasks performed by security forces units, we will consider options for equipping an employee with combat equipment depending on the task. Table 2 shows the initial data for the scenarios of involving security forces units in the performance of tasks.

Based on the analysis of the initial data and the tactics of the security forces units during the performance of the tasks specified in Table 2, the peculiarities of combat equipment for security forces personnel were determined.

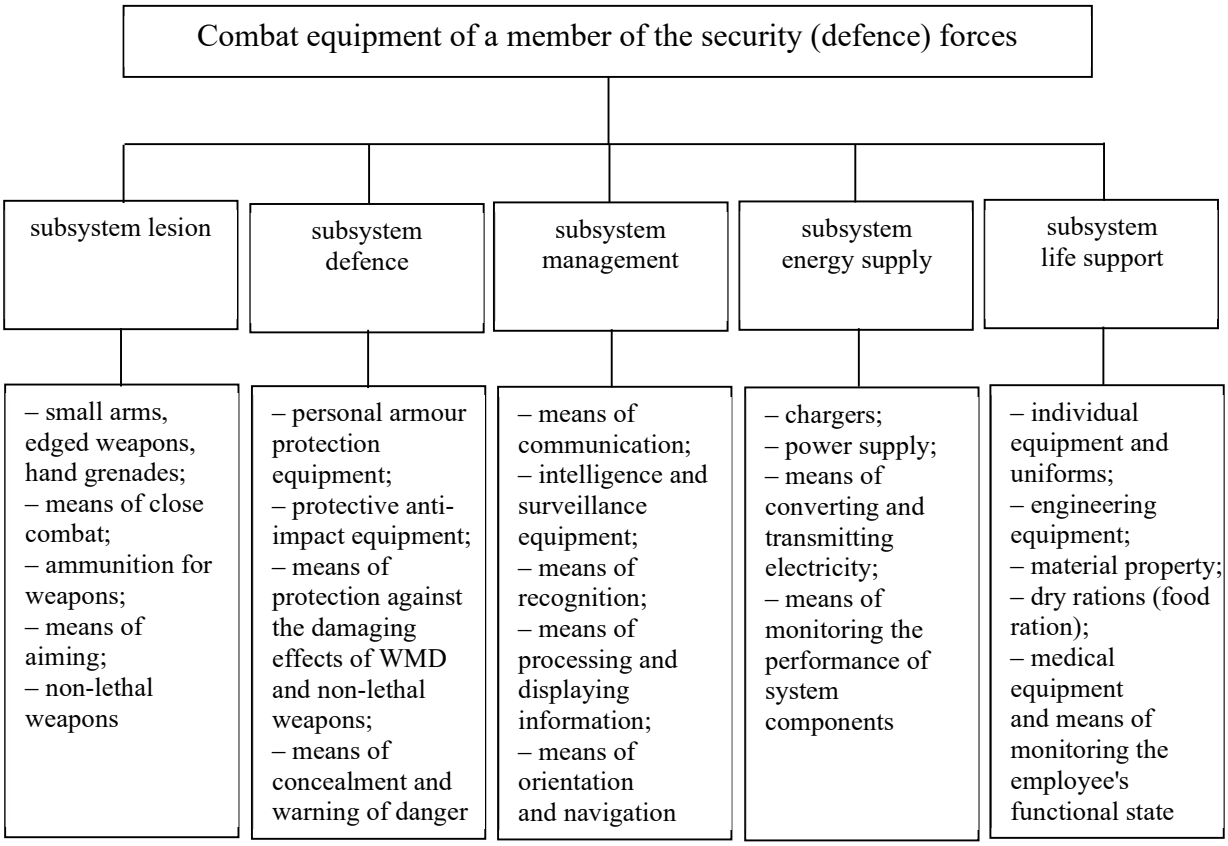

Figure 1 – Generalized structure of the employee's combat equipment system of the security (defense) forces

Features of the combat equipment of the assault group

Destruction subsystem. Considering the possible presence of civilians in the premises, it is advisable to use non-lethal light and noise weapons, firearms with high accuracy at short distances and ammunition with minimal ricochet parameters of the striking elements. The limited space available for operations inside a building requires the use of small-sized weapons with ammunition that has a sufficiently high stopping power. The requirements for ensuring the secrecy of the actions of security personnel necessitate the use of firearms with silent and flameless firing devices.

Protection subsystem. Given the presence of firearms of various calibers and the tactics of security personnel during assault operations (in most cases, the officer takes a frontal position in relation to the enemy), it will be sufficient for a security officer to have reliable armor protection for the head, eyes and frontal projection of the torso. The degree of protection of the rear torso projection can be reduced to positively affect the maneuverability and functional performance of the security personnel.

Control subsystem. Conducting assault operations in urban areas, short distances to the command post and requirements for communication stability necessitate the use of radios operating in the decimeter wave range. The requirements to ensure concealment of control and maneuverability determine the need to use small-sized radios with a special headset.

Operations in the darkness necessitate surveillance equipment (optoelectronic systems). Short distances to targets allow the use of surveillance equipment that does not provide image magnification. The absence of this feature will reduce the weight and size of surveillance equipment, which, in turn, will have a positive impact on the maneuverability of a security officer. At the same time, surveillance equipment should have maximum field of view angles.

Life support subsystem. Considering the limited space, it is advisable to use a load-bearing vest that provides convenient placement of ammunition and first aid equipment without significantly increasing the width of the employee's torso and does not constrain his or her movements in a confined space.

Operations in the dark and the requirement for a high level of concealment necessitate the use of dark-colored uniforms with absorbent properties; the material, style and fittings should ensure that the components of the uniform are silent.

Table 2 – List and content of input data for scenarios of involving security forces in the performance of tasks

List of initial data	Contents of the initial data	
	case 1	case 2
Tasks	To stop the criminal actions of the terrorist group while preserving the lives of civilians and security forces personnel	Conduct reconnaissance of the enemy's combat strength and combat composition in the depths of its defense and, if possible, acquire important information carriers
Environment	A terrorist (criminal) group occupied premises on the fourth floor of a six-stored building in the city at night. According to preliminary information, there may be civilians (hostages) in the seized premises	The enemy is conducting defensive operations along the border between the occupied settlements and has defensive positions up to 15 km deep, which are equipped with engineering. In front of the enemy's front line, a system of watch posts is located at a distance of up to 750 m along the front. According to intelligence, in the depths of the defense, in the direction of the enemy's units, there is a main command post of divisional importance, which contains carriers of important enemy information
The enemy	Intelligence agencies established that there were 5 to 8 offenders on the floor without personal armor protection, but armed with 5,45 mm, 7,62 mm and 9,00 mm caliber firearms systems	The enemy units organizationally consist of three motorized rifle companies and one tank company, and include a communications unit (platoon), an electronic intelligence unit, grenade launcher, anti-tank, anti-aircraft and mortar platoons. The enemy personnel are mainly armed with firearms and wear personal armor protection. In addition, the enemy is armed with melee weapons, tanks, armored personnel carriers, as well as reconnaissance UAVs and reconnaissance equipment. Fire support for the enemy's defense is provided by a battery of 152-mm self-propelled artillery pieces
Performers	Assault group	Reconnaissance group
Additional conditions for completing the task	The building is located at a distance of 200 m from the mobile command post and the assault group and reserve concentration point; the space for operations inside the building is limited by the linear dimensions of the premises to 20 m; ensuring a high level of concealment during the mission; preserving civilian life	The distance from the line of advance to the deepest object is 30 km. The enemy's guard forces have organized a system of surveillance and patrolling (in the dark), which identifies areas of invisibility and gaps between neighboring patrols. The task is performed in the dark and daytime. A high level of concealment must be maintained throughout the entire period of the task. The area where the task is performed is semi-enclosed (visibility up to 500 m) and has two main types of background (forest and shrubs, settlement). The time to complete the task is up to two days. In the event of contact with the enemy, you should immediately withdraw in the opposite direction and, if possible, destroy the enemy's forces and means

The presence of firearms by intruders increases the likelihood of injuries to employees and civilians during an assault, and therefore the need for first aid equipment that every employee should have with them.

Features of the combat equipment of the reconnaissance group

The destruction subsystem. During fire contact with the enemy, there is a need to quickly engage targets that will be in motion at distances of up to 500 m. Therefore, it is advisable to use firearms with optical sights that have high accuracy at these distances.

The presence of personal protective equipment on enemy personnel requires the use of ammunition with a sufficiently high bullet penetration. During fire contact with the enemy, there is a need to quickly reload the weapon, and therefore, ammunition must be loaded into both weapon magazines and clips.

There is a risk of detection of the reconnaissance group and its pursuit by the enemy, so it is advisable to use offensive hand grenades to detain and defeat enemy personnel.

Protection subsystem. Considering the given conditions of the situation and the enemy's weapons, a security officer must have personal armor protection equipment that provides sufficient protection against bullets and fragments. In the course of performing a task, a security officer will be on the move for a long time, and therefore, personal armor protection should have a minimal impact on reducing his or her maneuverability and functional performance.

The requirements for a high level of concealment, as well as operations against the background of forest and shrubbery, require the use of a camouflage suit by a security officer, which should ensure his/her blending into the surrounding background during ground and aerial surveillance, as well as reduce thermal visibility.

Control subsystem. Operations on rough terrain and in populated areas, long distances to the command post, and requirements to ensure communication stability require the use of radio stations operating in the meter-wave range. Given that security forces personnel will be in the positions of the enemy, who has means of intercepting radio communications, it is advisable to use radio stations with an encrypted radio signal. The requirements to ensure concealment of control and maneuverability determine the need to use small-sized radios with a special headset.

Operations in the dark or with limited visibility necessitate the use of optoelectronic systems, and in daylight – optical surveillance equipment. Due to the fact that the objects of observation are located at different distances, it is necessary to use surveillance equipment with variable multiplicity and rangefinder.

During reconnaissance operations in the depths of the enemy's combat formations, it is necessary to navigate the terrain, which requires the use of both analogue and digital navigation tools.

Power supply subsystem. The requirements for the uninterrupted operation of communication and surveillance equipment determine the need for spare power sources, the number of which should meet the needs and time of the task.

Life support subsystem. Considering that during the performance of the task, the security forces officer will be in different positions, including lying down, it is advisable to use a belt and shoulder unloading system that provides convenient placement and quick access to ammunition and first aid equipment without significantly changing the body position and does not interfere with crawling.

Operations against the backdrop of a settlement and the requirements for a high level of concealment necessitate the use of grey uniforms with absorbent properties; the material, style and fittings must ensure the silent use of the uniform components.

The task involves acting in isolation from the main forces and in hostile territory, so it is advisable to have food, means of checking the area for explosive devices and medical supplies to provide first aid in case of injury and stabilize the wounded.

Therefore, the options for equipping a security officer for the first and second cases will be different. Table 3 shows the difference between the subsystems of combat equipment for an assault and reconnaissance group, as well as the features of the elements of each subsystem. The reasons for this difference are caused by the conditions of the situation and the specifics of the tasks.

For example, the choice of elements of the destruction subsystem was influenced by the conditions of the area where the employees perform the task, information about the enemy and unauthorized persons. The choice of elements of the protection subsystem was influenced by information about the enemy's weapons and the tactics of each group in question. Terrain conditions, time of day, and tactics of the groups influenced the composition of the elements of the control subsystem. The presence of the power supply subsystem in the combat equipment was influenced by the power-consuming means available to the employee and the time allocated for the task. The main reasons for the difference in the elements of the life support subsystem are differences in the tactics of the groups, the conditions of the terrain in which the task is performed, and the time allocated for the task.

Table 3 – Features of combat equipment subsystem elements for assault and reconnaissance groups

Subsystems of combat equipment	Assault group		Reconnaissance group	
	subsystem elements	features of the subsystem element	subsystem elements	features of the subsystem element
Damage	Firearms	Small overall dimensions	Firearms	High accuracy at medium distances
		High accuracy at short distances		
		Devices for silent and flameless firing		High bullet penetration at medium distances
	Aiming devices	Collimator type	Aiming equipment	Optical type
	Ammunition for weapons	Outfitted in magazine	Ammunition for weapons	Equipped in stores and are additionally in clips
		Minimum ricochet parameters of striking elements		
	Non-lethal weapons	Light and noise control	Hand grenades	Offensive type
Protection	Personal protective equipment	Reduced rear body protection	Personal armor protection equipment	No additional ballistic elements
			Means of concealment and hazard warnings	Camouflage suits for actions in the forest
Management	Means of communication	Small-sized radios with a special headset that operate in the decimeter wave range	Means of communication	Small-sized radios with an encrypted signal and a special headset that operate in the meter-wave range
	Intelligence and surveillance equipment (optoelectronic systems)	Do not provide image magnification	Intelligence and surveillance equipment (optical devices, optoelectronic systems)	Provide image magnification
				Integrated rangefinder
		Maximum field of view angles	Navigation and orientation tools and orientation	Analogue and digital
Energy supply	None	None	Power sources	None
Life support	Individual equipment and uniforms	Unloading vest	Individual equipment and uniforms	Belt unloading system
		Uniforms in dark colors		Uniforms in grey shades
	Medical supplies	For first aid in case of injury	Medical supplies	To provide first aid in case of injuries and support the wounded during the day
			Dry rations	For two days
			Engineering facilities	Folding infantry spade
				Multitool
				Telescopic stylus

Thus, from the above scenarios of tasks performed by security forces units, we can draw the following conclusion: the composition of combat equipment subsystems and the presence of certain elements in them will depend on the specifics of the tasks performed by security (defense) forces personnel.

Publications [31, 35, 40] consider the special conditions for the use of firearms by security forces only, but other subsystems of combat equipment may also have special conditions of use, in particular:

– the need to ensure the maneuverability and concealment of the employee when performing tasks indoors or in confined spaces, as well as at short distances to the offender (enemy);

– ensuring the possibility of visual and auditory control over the situation in conditions of limited visibility;

– the need to provide a security officer with a sufficient level of protection, considering the potential threat, maneuverability and functional performance of the security officer;

– ensuring constant access to information exchange during the release of hostages, actions in the premises in order to protect both the employee and third parties;

– the need to ensure the modularity of combat equipment due to the diversity of tasks performed by security forces.

In order to ensure the maneuverability of a security officer, it is necessary to regulate the requirements for the total weight of combat equipment and its overall dimensions, as well as the procedure for placing elements of combat equipment on the officer.

In order to conceal a security officer from intruders (enemy), it is necessary to regulate the requirements for his/her visual, acoustic and thermal concealment, namely the requirements for deformation coloring, noise level, infrared background.

In order to ensure constant visual control over the situation, it is necessary to regulate the minimum field of view angles for optical surveillance equipment, as well as the range of target detection in conditions of limited visibility and behind obstacles for optoelectronic systems.

To ensure the required level of protection, it is necessary to regulate the requirements for the area and degree of protection, considering the maneuverability of the security officer and potential threats that may occur during the task.

To ensure constant access for information exchange, it is necessary to regulate the requirements for the power and autonomy of the means of receiving and transmitting information.

To ensure the modularity of combat equipment, it is necessary to regulate the requirements for the selection and placement of its elements, considering their complex impact on the effectiveness of the task.

It is worth noting that due to the diversity of tasks performed by the security forces, the listed requirements for CESDO should be coordinated with each other, considering their complex impact on the results of a particular task.

Thus, the process of formulating requirements for combat equipment for security forces has its own specific features, so there is a need to develop special methods for formulating tactical and technical requirements for the CESDO.

Conclusions

1. The article formulates the contradictions that cause the discrepancy between the composition and tactical and technical characteristics of combat equipment of security forces personnel and the requirements of practice, and suggests ways to resolve them.

2. The reasons that affect the composition of subsystems of combat equipment of security forces personnel and the special conditions of their use are determined.

3. The list of tactical and technical requirements for combat equipment of security forces personnel, which are subject to regulation in order to obtain combat equipment complexes that meet the requirements of practice, is proposed.

Directions for further research are to determine the degree of influence of tactical and technical characteristics of combat equipment on the results of tasks performed by security forces personnel and to develop special methods for formulating tactical and technical requirements for combat equipment of security forces personnel.

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ПЕРЕЛІК ТАКТИКО-ТЕХНІЧНИХ ХАРАКТЕРИСТИК БОЙОВОГО ЕКІПІРУВАННЯ ПРАЦІВНИКІВ СИЛ БЕЗПЕКИ, ЯКІ ПІДЛЯГАЮТЬ РЕГЛАМЕНТАЦІЇ

Обґрунтовано перелік тактико-технічних вимог до бойового екіпірування працівників сил безпеки (оборони), які підлягають регламентуванню.

На основі аналізу нормативно-правових актів сформовано узагальнений перелік основних завдань силових структур та їх складових з правоохоронними функціями, які залучаються до виконання таких завдань.

Виявлено протиріччя, що є причиною невідповідності складу та тактико-технічних характеристик бойової техніки працівників сил безпеки (оборони) вимогам практики виконання завдань. Виникають такі протиріччя: між вимогою до високих функціональних характеристик елементів бойової техніки та вимогою до мобільності працівника сил безпеки (оборони); між вимогами до уніфікації елементів бойової техніки та вимогами до їх спеціалізації; між необхідністю впровадження сучасних технологій у комплекси бойового екіпірування та вимогами до економічної ефективності.

Проведено аналіз сучасних підходів до створення або вдосконалення бойової техніки та запропоновано етапи формування вимог до її тактико-технічних характеристик.

Наведено узагальнену структуру системи бойової техніки працівника сил безпеки (оборони). За допомогою розроблених типових сценаріїв виконання завдань підрозділами сил безпеки наведено відмінність підсистем бойової техніки десантно-штурмової та розвідувальної груп, а також особливості елементів кожної підсистеми. Основними чинниками, які вплинули на різницю у виборі елементів обладнання для працівників, є умови зовнішнього середовища та специфіка поставлених завдань.

Сформульовано особливі умови використання бойової техніки особовим складом силових структур. Обґрунтовано і запропоновано перелік тактико-технічних вимог до бойової техніки працівників силових структур, які підлягають регламентуванню з метою отримання комплексів бойової техніки, що відповідатимуть вимогам практики.

Ключові слова: *бойове екіпірування, сили безпеки, тактико-технічні характеристики, вимоги, регламентація.*

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