

TYPES OF BULLETPROOF VEST. CLASSIFICATION

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Abstract: This report proposes a classification of the bulletproof vest according to various features, which is based on a study and analysis of modern threats and the use of vest by military, police and other units. This classification would allow for a quick, easy, adequate and reasoned choice of the appropriate vest kind and type depending on the tasks and the environment of operation.

Key words: BULLETPROOF VEST, CLASSIFICATION, CLASSIFICATION SIGNS, LEVEL OF PROTECTION, STANDARDS

1. Introduction

Modern multi-component bulletproof vests are an important and indispensable element of the equipment of the officers of various types of forces. Different types and purpose bulletproof vests exist. Recently, modular type vests are becoming more and more relevant, which can be transformed depending on the task being performed and the degree of risk. To the main part of the armor (back and chest securing section providing full torso protection at the front and rear), additional safety components in the form of separate modules can be attached to protect the side parts of the torso, shoulders, neck, and the loins. Bulletproof vests play an important role in preserving the health and life of anti-terrorists in fulfilling their duties and resolving crisis arising in various critical situations.

2. Classification of bulletproof vests

The study carried out on the state of the art of the bulletproof vests available at the market and the vests used by anti-terrorists found the existence of a wide variety of models produced by both Bulgarian and foreign companies [1, 2, 3, 4, 5, 6].

Based on the analysis of the results obtained from the study, a classification of the bulletproof vests can be suggested according to the following features:

- in terms of purpose;
- by the levels of protection;
- by the way of wearing;
- by gender of the individual carrying it;
- by the protective panels materials.

➤ CLASSIFICATION BY PURPOSE

Depending on their intended use, the bulletproof vests can be assigned to one of the following groups:

- Military;
- Police;
- Civil.

Military bulletproof vests can be divided into:

- *Tactical*;
- *Special*;
- *Water inflatable*.

Tactical vests provide ballistic protection to the front, rear and side parts of the torso. Lateral overlap of ballistic panels ensures complete torso coverage. These bulletproof vests are comfortable to carry, allow free movement of the hands and do not restrict the movement when squatting. They are designed for use in various tactical actions. Typically, the outer case is made of a masking cloth that matches the terrain in which it will be used. Most often the spots are in the so-called desert variant or in the shades of green colors. These bulletproof vests are mainly with protection classes IIIA, III under NIJ and levels 4 and 5 under GOST.

Specials vests provide ballistic protection for the front, rear and side parts of the torso, as well as protection for the neck, throat, shoulders, biceps and loins. They are mainly used for patrolling. The outer case is made of a masking cloth depending on the terrain in which it will be used [7]. Most often the spots are in the so-called desert variant or in the shades of green colors. These bulletproof vests are mainly with protection classes III and IV under NIJ and levels 6 and 6a under GOST.

Water inflatable vests provide ballistic protection to the front, rear and side parts of the torso as well as to the neck. The collar of the vest is inflatable and through it the body of the fighter is kept on the surface of the water. This type of bulletproof vests has extra belts that ensure safer grip on the body in buoyancy conditions. These vests are mainly used by special and anti-terrorist forces. The outer case of the vests is made in a signal color or in the color of the uniform. These bulletproof vests are mainly with protection levels IIIA, III under NIJ and levels 4 and 5 under GOST.

Police bulletproof vests can be divided into:

- *Tactical*;
- *Special*.

Tactical vests provide ballistic protection to the torso's front, back and sides to ensure full torso coverage. The protection of the torso side portions is ensured by the lateral overlapping of the ballistic panels. This type of bulletproof vests is comfortable to wear throughout the day, providing freedom of movement for the hands and feet while walking, running and squatting. They are intended for use in various operations. The outer case is made in black. These bulletproof vests are mainly with protection levels IIIA, III under NIJ and levels 4 and 5 under GOST.

Specials vests provide ballistic protection for the front, rear side of the torso, as well as protection for the neck, throat, shoulders, biceps and loins. They are mainly used in patrolling. The outer case is made in black. This type of bulletproof vests is mainly with protection levels III and IV under NIJ and levels 6 and 6a under GOST.

Civil bulletproof vests can be divided into:

- *Ordinary*;
- *VIP*.

Ordinary vests provide ballistic protection to the front and rear of the torso. They are used by security guards and civilians. They are light and comfortable for long wearing and can be placed above and below the clothes. These bulletproof vests are mainly with protection levels I, II under NIJ and levels 1, 2 and 3 under GOST.

VIP bulletproof vests provide ballistic protection for the front and rear of the torso. They are mainly used by businessmen and high-ranking persons. They are lightweight and comfortable to wear for a long time. They usually wear under clothes and are not noticeable. These bulletproof vests are mainly with protection levels I, II under NIJ and levels 1, 2 and 3 under GOST.

➤ **CLASSIFICATION BY PROTECTION LEVEL**

The protective qualities of the bulletproof vests are determined depending on the level of protection provided by them, in accordance with the requirements of existing standardization documents [8, 9, 10, 11, 12, 13, 14, 15, 16]. The latter are prepared in accordance with a number of regulatory requirements for individual ballistic protection means, environmental conditions, the degree of risk in specific structures, and weapons used in the region.

Some of the most widely used worldwide standardization documents on ballistic resistance of bulletproof vests are the standards of: US National Institute of Justice - NIJ 0101.04 and NIJ0101.06; National Standard of Russia - GOST 50744-95; German - German Schutzklassen and VPAM; as well as those of the UK Police - PSDB and HOSDB.

As regards the bulletproof vests resistance to puncture, these are: the US National Institute of Justice - NIJ 0115.00 and the United Kingdom Police Standard - HOSDB 2007. Part 3.

Table 1 shows equivalent ballistic protection levels, and Table 2 - equivalent puncture protection levels, specified in some of the most commonly used standards for bulletproof vests.

Table 1. Equivalent ballistic protection levels

Ballistic protection level according to some of the leading standards in this field		
GOST 50744-95 (Russia)	NIJ 0101.04 NIJ0101.06 (USA)	German Schutzklassen (Germany)
1	I	SK L
2	II — IIIA	SK 1
2a	—	SK 2
3	—	SK 3
4	III	SK 4
5	—	—
6	IV	SK 4
6a	—	—

Table 2. Equivalent puncture protection levels

Puncture protection level according to some of the leading standards in this field	
NIJ 0115.00 (USA)	HOSDB 2007. Part 3 (United Kingdom)
1	KR1+SP1
—	KR1
2	KR2+SP2
—	KR2
3	KR3+SP3
—	KR3

➤ **CLASSIFICATION BY THE WAY OF WEARING**

- *for visible wearing*;
- *for hidden wearing*.

Visible wearing - this type of armor is worn on the clothes. They are mainly used by military and police, as well as by some security guards. The outer case is made in black for police; in camouflage, with various patterns for military; in black, signal or the color of uniform for guards. These bulletproof vests are mainly with protection levels IIIA, III, IV under NIJ and levels 5, 6 and 6a under GOST - for police and military; and with protection levels I, II under NIJ and levels 1, 2 and 3 under GOST - for security guards.

Hidden wearing - this type of armored vests are worn under the clothes. They are mainly used by security guards, officials and businessmen. The outer case of these vests is usually made in white or black. These bulletproof vests are primarily of protection levels I, II under NIJ and levels 1, 2 and 3 under GOST.

➤ **CLASSIFICATION BY THE GENDER OF THE INDIVIDUAL**

- for men;
- for women.

For women - they are made according to the specific of the female body in all classes of ballistic protection, according to the standards and in the colors and patterns of the outer case depending on the purpose.

For men - they are made in all classes of ballistic protection, according to the standards and in the colors and patterns of the outer case depending on the purpose.

➤ **CLASSIFICATION ACCORDING TO THE MATERIALS OF THE PROTECTIVE BALLISTIC PANELS**

- Flexible ballistic panel;
- Hard ballistic panel / armor plate.

The flexible ballistic panels can be divided to:

- *single-component*;
- *multi-component*.

Single-component flexible ballistic panels are made of one type of ballistic material. Special materials are used, such as: UHMWPE - Dyneema®, Spectra®; p-aramids - Kevlar®, Twaron®, Artec®; PBO -Zylon®; Polyhydroquinone-diimidazopyridine-M5®.

Multi-component flexible ballistic panels are made of combined two or more ballistic materials. It is possible to combine any of the above materials with m-aramids, ceramic materials and more.

The hard ballistic panels can be divided to:

- *single-component;*
- *multi-component.*

Single-component hard ballistic panels are made of one kind of material, while different combinations of materials are used in the production of *multi-component hard ballistic panels*. [17]

Some materials used in hard ballistic panels are: steel and steel alloys; titanium and titanium alloys; composite materials; ceramic materials; UHMWPE materials; p-aramid materials, etc. [18]

3. Conclusion

Excellent knowledge of modern weapons and existing means of individual ballistic protection are crucial to the right choice of means to protect the health and life of the officers during law enforcement, anti- and counter-terrorist, peace supporting, military and other operations.

The classification of the various bulletproof vests by a given feature allows for a quick, adequate and reasonable choice of the kind and type of a bulletproof vest, according to the specific needs and requirements of the given organization, depending on performed tasks, degree of risk and environment of the operations.

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