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Police ballistic resistance of body armor

警用防弹衣

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Police ballistic resistance of body armor

1 Scope

This standard specifies the terms and definitions, classification and naming, technical requirements, test methods, inspection rules, quality assurance rules, packaging, transportation and storage of police ballistic resistance of body armor products (hereinafter referred to as ballistic resistance of body armor).

This standard applies to police ballistic resistance of body armor.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GJB 3196-1998 Bullet test method

FZ/T 01004-2008 Coated fabrics - Determination of resistance to perforation by water

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Police ballistic resistance of body armor

A garment, that absorbs and dissipates the energy of a warhead, prevents perforation, mitigates blunt trauma, effectively protects the body's protected parts, including ballistic resistance body armor vests, trunk armor panel, accessory of ballistic resistance of body armor.

3.2

Armor panel

A general term for protective structures, that effectively prevent warheads from penetrating and prevent or reduce blunt trauma to the human body, including

Figure 3 -- Schematic diagram of body armor structure

5.1.2 The ballistic resistance of body armor's material shall be non-toxic and have no natural harm to the human body.

5.1.3 The ballistic resistance of body armor shall be flexible and easy to put on and take off. After wearing, the free movement of the two arms and the movements of the human body, such as kneeling, jumping, squatting, pitching, turning, shall not be restricted.

5.1.4 The jacket of the ballistic resistance of body armor is compatible with the specifications of the armor panels AND shall be separable.

5.1.5 The armor panel of the trunk shall be marked with the strike face or wear face.

5.2 Appearance requirements

5.2.1 The jacket of the body armor shall be free from defects such as damage, floating lines, missing stitches.

5.2.2 There are no holes, deep pits, scratches, cracks, corner burrs and other defects on the surface of the ballistic panel material. Metal materials shall be subject to anti-rust treatment. The non-metal materials shall be even and smooth.

5.2.3 The ballistic material of the same layer shall be uniform and consistent, without defects such as splicing, local bulges, wrinkles.

5.2.4 For the ballistic panel composed of multiple layers of ballistic materials, the specifications and dimensions of each layer shall be consistent. For the soft ballistic materials, the raw materials shall not be chemically treated and thermally bonded.

5.2.5 The ballistic panel structure and material of accessory of ballistic resistance of body armor shall be consistent with the trunk armor panels.

5.2.6 There shall be clear and permanent product marks on the body armor and the ballistic insert plate. The position of the body armor sign shall be 10 cm below the neckline on the inside of the back AND at the center of the strike face on the protective cover of ballistic panel. The sign of ballistic insert plate shall be on the lower right corner of the strike face.

The information on the body armor sign shall include:

a) Manufacturer's name or trademark;

b) Product name and code;

c) Product number;

d) Product specifications;

e) Implemented standard number;

f) Degree of protection;

g) Date of manufacture;

h) Production batches;

i) Validity period;

j) Instructions for use and precautions.

The information on the signs of ballistic insert plates and protective cover of ballistic panel shall include:

a) Manufacturer's name or trademark;

b) Product name and code;

c) Implemented standard number;

d) Degree of protection;

e) Date of manufacture;

f) Production batches;

g) Validity period.

5.3 Color

The color of the ballistic resistance of body armor vest shall be police uniform blue.

5.4 Material properties of protective cover of ballistic panel

5.4.1 The protective cover of the ballistic panel is black, which shall be light-proof and waterproof; the edge sealing shall be uniform.

5.4.2 The material of the protective cover of the ballistic panel shall have anti-seepage performance. The hydrostatic pressure resistance shall be greater than or equal to 18 kPa.

5.5 Protected area

The actual projected protective area of the ballistic resistance of body armor shall be greater than or equal to 0.25 m^2, as shown in Figure 4a). For body armors, which have a protection level above level 4, if a ballistic insert plate is used, it shall be placed outside the ballistic panel; the effective ballistic size of the ballistic insert plate is 250 mm × 300 mm; the chamfering of the four corners is less than or equal to 25 mm, as

Record the test data. Determine whether the results meet the requirements of 5.6.

6.8 Environmental adaptability test

6.8.1 Put the ballistic resistance of body armor into the incubator at -20 °C ± 2 °C for 4 hours. Then carry out the shooting test. The ballistic performance test shall be completed within 15 minutes. Record the test data. Judge whether the result meets the requirements of 5.6.

6.8.2 Put the ballistic resistance of body armor into the incubator, at a temperature of 55 °C ± 2 °C for 4 hours. Then carry out the shooting test. It shall complete the ballistic performance test, within 15 minutes. Record the test data. Judge whether the result meets the requirements of 5.6.

6.8.3 Put the ballistic resistance of body armor into a damp heat chamber. Keep it for 240 h, at a temperature of 70 °C ± 2 °C and a relative humidity of 80%. Then place it at room temperature for 24 h, before performing a ballistic performance test, to determine whether the result meets the requirements of 5.6.

7 Inspection rules

7.1 Inspection classification

Product inspection is divided into type inspection and quality consistency inspection.

7.2 Type inspection

7.2.1 In case of any of the following situations, type inspection shall be carried out:

a) When the design or production of new product is type finalized;

b) When there are major changes in materials, structures, production processes;

c) When the product is produced for the first time OR when the production is resumed after one year of suspension;

d) When the periodic inspection is required, after accumulating a certain amount of production;

e) When the competent authority proposes type inspection requirements.

7.2.2 The test items, requirements, test methods of type inspection shall be carried out according to the provisions in Table 3.

7.3 Quality consistency inspection

During the quality consistency inspection, first check the consistency of the structure

be carried out by referring to the safety performance evaluation method of the ballistic resistance of body armor in Appendix C.

8.6 When selecting ballistic resistance of body armor, users of ballistic resistance of body armor shall fully consider the quality and comfort of ballistic resistance of body armor, under the conditions specified in this standard, so as to increase the wearing rate of ballistic resistance of body armor.

9 Packaging, transportation, storage

9.1 Packaging

9.1.1 There shall be product name, manufacturer name, product code, implemented standard number, product quantity, production date, batch number, packaging box size, gross weight, signs such as "Avoid moisture", on the outer packaging box. The color of the word is black; the font is bold; the font size is appropriate; the handwriting shall be clear and neat.

9.1.2 The packaging box is made of double corrugated cardboard AND must be subject to the moisture-proof treatment.

9.1.3 Each ballistic resistance of body armor product has a special packaging bag; there must be a certificate of conformity, insurance policy, instruction manual, etc. in the bag.

9.2 Transportation

It shall be tightly covered during transportation; avoid exposure to rain, moisture, exposure, or mixing with corrosive items during transportation.

9.3 Storage

The product shall be stored in a ventilated, dry, light-proof warehouse, which shall be more than 250 mm above the ground. It shall not be stored together with corrosive items.

Appendix C

(Informative)

Safety performance evaluation method of ballistic resistance of body armor

C.1 Test of ballistic limit V50

Carry out the ballistic limit V50 test on the ballistic panel. The test method shall be in accordance with the provisions in Appendix D.

C.2 Determination of the minimum perforation velocity V_{min}

C.2.1 Based on the lowest value of the perforation velocity in the ballistic limit V50 test, taking the velocity drop of 10 m/s as an interval, to carry out the ballistic capability of the ballistic panel. A total of 3 consecutive velocity drop intervals are tested; shoot 5 bullets at each velocity drop interval. The layout of the bullet strike points is the same as that in Figure B.4 -- Schematic diagram of strike point positions for shooting test.

C.2.2 If there is no perforation in three consecutive velocity drop intervals, take this benchmark as the minimum value of perforation velocity V_{min}. If there is perforation in a certain velocity drop interval, take this perforation velocity as a reference; take the velocity drop of 10 m/s as an interval, to carry out the ballistic capacity test of a ballistic panel again. Totally 3 velocity drop intervals are tested; shoot 6 bullets on each velocity drop interval. The strike point layout is same as that in Figure B.4 -- Schematic diagram of strike point positions for shooting test. If there is no perforation in consecutive 3 velocity drop intervals, take this benchmark value as the minimum perforation value V_{min}.

C.2.3 If the perforation occurs again, take the perforation velocity as the benchmark, to repeat the test process, until the perforation no longer occurs in the 3 velocity drop intervals. Take this benchmark as the minimum perforation velocity V_{min}.

C.3 V0 calculation

C.3.1 According to the calculation formula $V_{min} = V50 - 3\mu$ of minimum value of perforation velocity V_{min}, ballistic limit V50, standard deviation μ, it can be concluded that:

$$\mu = \frac{V\,50 - V_{min}}{3}$$

C.3.2 According to the ballistic limit V50 and the standard deviation μ, the following formula can be used to calculate the value of V0:

D.3.5 The shooting test of ballistic panels, which have different protection levels, shall be carried out, according to the provisions in Table 2.

D.3.6 Adjustment of the test device: The velocity measuring point is 3 m away from the muzzle, at a shooting distance of 5 m.

D.3.7 Test procedure of V50 bullet velocity

D.3.7.1 During the process, it shall not move the position of the test barrel. It can only move the position of the overall backing material fixture. The angle of incidence shall be kept at 0°.

D.3.7.2 When making the first shot, select the V50 projectile velocity, which is (20 ~ 30) m/s higher than the corresponding ballistic level of the specimen to be tested, for the first shot. Then check the backing material to determine whether the specimen is penetrated.

D.3.7.3 In follow-up shooting, if the first shot penetrates, it shall reduce the amount of ammunition fired for the second shot AND reduce the bullet speed by (15 ~ 30) m/s; meanwhile change the shooting position, so that the second shot can form a stop. If the first shot is stop, it shall increase the amount of ammunition fired AND increase the bullet speed by (15 ~ 30) m/s, to make the second shot after movement, to form a perforation.

D.3.7.4 Repeatedly adjust the shooting state, until the test piece has 5 shots (at least 3 shots) of penetrating bullet velocity and 5 shots (at least 3 shots) of stopping bullet velocity. The difference between the lowest penetrating projectile velocity and the highest blocking projectile velocity is less than 38 m/s.

The shot-to-shot distance is greater than 51 mm, the shot-to-edge distance is greater than 75 mm, meanwhile the adjacent strike points are not in the same warp (weft) direction.

If material shrinkage occurs during the test, the material can be smoothed, before subsequent testing.

D.4 Calculation of V50 bullet velocity

D.4.1 Theoretical calculation

D.4.1.1 Calculation of mean

$$\overline{V} = \frac{1}{n}\sum_{i=1}^{n} V_i$$

Where:

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