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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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Protective clothing - Repellent shield clothing

防护服装 防虫防护服

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1 Scope

This standard lays down the technical requirements, the test methods, the marking and instructions for use, and the packaging, transport and storage requirements for repellent shield clothing.

It applies to protective clothing with an insect-repelling effect, worn by people working in environments where mosquitoes, ants and other insects are a nuisance.

2 Normative references

The documents listed below cannot be dispensed with for the application of this document. For dated references only the edition corresponding to that date applies; for undated references the latest edition, including any amendments, applies.

GB/T 2912.1 Textiles - Determination of formaldehyde - Part 1: Free and hydrolysed formaldehyde (water extraction method); GB/T 3917.3 Textiles - Tear properties of fabrics - Part 3: Determination of tear force of trapezoid-shaped test specimens; GB/T 3920 Textiles - Tests for colour fastness - Colour fastness to rubbing; GB/T 3921 Textiles - Tests for colour fastness - Colour fastness to washing with soap; GB/T 3922 Textiles - Testing method for colour fastness to perspiration; GB/T 3923.1 Textiles - Tensile properties of fabrics - Part 1: Determination of maximum force and elongation at maximum force using the strip method; GB/T 5453 Textiles - Determination of the permeability of fabrics to air; GB/T 7573 Textiles - Determination of pH of aqueous extract; GB/T 8629-2001 Textiles - Domestic washing and drying procedures for textile testing; GB/T 8630 Textiles - Determination of dimensional change in washing and drying; GB/T 12704.1 Textiles - Test method for water-vapour transmission of fabrics - Part 1: Desiccant method; GB/T 12903 Personal protective equipment - Terminology; GB/T 13640 Sizing system for industrial protective clothing; GB/T 13917.1-2009 Laboratory efficacy test and evaluation of pesticides for sanitary use - Part 1: Sprays; GB/T 13917.9-2009 Laboratory efficacy test and evaluation of pesticides for sanitary use - Part 9: Repellents; GB 18401 National general safety technical code for textile products; FZ/T 81007-2003 Single and padded garments.

3 Terms and definitions

The terms and definitions given in GB/T 12903 and the following ones apply to this document. The English equivalents printed alongside the Chinese terms are reported here as they stand in the document.

3.1 driven rate: the percentage by which the number of test insects landing on the tested fabric within the stated test time is reduced with respect to the number landing on the ordinary fabric of the control sample.

3.2 biting rate: the ratio of the number of test insects that land on the tested fabric and bite within the stated test time to the number of test insects landing on the tested fabric.

3.3 beating rate: the ratio of the number of test insects that lose their activity through the action of the insect-repellent fabric within the stated test time to the total number of test insects.

4 Technical requirements

4.1.1 Fabric - safety and hygiene requirement. The fabric of the repellent clothing is not to contain toxic or harmful substances, so that irritation and sensitisation of the skin are prevented.

4.1.2 Insect-repelling performance of the fabric. The insect-repelling performance of the fabric of the repellent clothing is to meet the requirements of Table 1. Table 1 has four columns: the item, the performance limit before any washing treatment, the performance limit after 30 washings, and the test method, which is 5.2 for all three items. The driven rate against mosquitoes and ants, as a percentage, is not less than 90 before washing and not less than 60 after 30 washings. The biting rate for mosquitoes and ants, as a percentage, is 0 before washing and not more than 30 after 30 washings. The one-hour beating rate against mosquitoes and ants, as a percentage, is not less than 90 before washing and not less than 60 after 30 washings.

4.1.3 Physical and chemical properties of the fabric. These are to meet the requirements of Table 2, which has three columns: the item, the performance limit and the test method. Breaking force, in newtons, not less than 300, tested per 5.3. Tearing force, in newtons, not less than 25, tested per 5.4. Water-vapour transmission, in grams per square metre per day, not less than 7 000, tested per 5.5. Air permeability, in millimetres per second, not less than 100, tested per 5.6. Dimensional change on washing, as a percentage, from plus 2.5 to minus 2.5 in both the warp and the weft direction, tested per 5.7. Colour fastness to washing with soap, in grades, not less than 4, tested per 5.8. Colour fastness to perspiration, in grades, not less than grade 3 to 4, tested per 5.9. Colour fastness to dry rubbing, in grades, not less than grade 3 to 4, tested per 5.10.

4.2.1.1 Finished garment - style and structure. The style and structure of the repellent clothing are to shield the trunk and the four limbs well; a hood covering the face may be fitted on the head where needed, provided that it does not affect vision.

4.2.1.2 The collar and the cuffs of the upper garment, the hem and the trouser legs of the lower garment are to be able to be tightened when the garment is worn.

4.2.1.3 The garment is to suit the movement of the limbs during work and is not to be easily hooked or entangled; the size chosen may be suitably wide.

4.2.2 Size designation. The sizes of the repellent clothing are set with reference to GB/T 13640.

4.2.3.1 Appearance. All the parts are to lie flat and to be clean.

4.2.3.2 The bonded parts are to show no debonding, no penetration of adhesive and no wrinkling.

4.2.4 Sewing. The stitch density, the sewing requirements and the permissible deviations of

the dimensions of the main parts of the finished garment are to comply with FZ/T 81007, and in particular with 3.9.2 to 3.9.14 and with 3.10 of FZ/T 81007-2003.

4.2.5 Physical and chemical properties of the finished garment. These are to meet the requirements of Table 3, which has three columns: the item, the performance limit and the basis of the test. Dimensional change on washing, as a percentage, complying with 3.12.1 of FZ/T 81007-2003, tested per 5.7. Formaldehyde content, in milligrams per kilogram, complying with the requirements of GB 18401, tested per 5.11. pH value, complying with the requirements of GB 18401, tested per 5.12.

5 Test methods

5.1 All the samples to be tested are taken from the finished garment.

5.2 The repellent clothing is tested before and after the durable washing with the repellent. The driven rate and the biting rate for mosquitoes and ants and the one-hour beating rate against mosquitoes and ants are determined. Where the repellent of the clothing has been replaced by a test fabric, the test is carried out on that fabric. The washing of the repellent clothing is carried out in accordance with Annex A. The test methods referred to are those of 4.3 of GB/T 13917.9-2009 and of 4.3 of GB/T 13917.1-2009. The driven rate is calculated with formula (1), the biting rate with formula (2) and the one-hour beating rate with formula (3).

The legend printed under formula (1) is: the driven rate; the number of test insects landing on the tested fabric; and the number of test insects landing on the ordinary fabric of the control sample. The legend printed under formula (2) begins with the biting rate and continues beyond the pages examined, so the remaining symbols of formulae (2) and (3) are not reported here.