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

GB/T 20654-2025

Replacing GB/T 20654-2006, GB/T 20655-2006

**Protective clothing - Mechanical properties - Test method for
the determination of the resistance to puncture and dynamic
tearing of materials**

防护服装 机械性能 材料抗刺穿及动态撕裂性的试验方法
(English Translation)

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Table of Contents

Preface
1 Scope
2 Normative References
3 Terms and Definitions
4 Requirements for using this document
5 Puncture resistance test method
6 Dynamic tear resistance test method
Reference

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document replaces GB/T 20654-2006 "Test Methods for Puncture Resistance and Dynamic Tear Resistance of Mechanical Properties Materials for Protective Clothing".

GB/T 20655-2006 "Determination of Mechanical Properties and Puncture Resistance of Protective Clothing", along with GB/T 20654-2006 and GB/T 20655-Compared to 2006, aside from structural adjustments and editorial changes, the main technical changes are as follows.

- a) The term and definition of "resistance to dynamic tearing" have been added (see 3.2);
- b) The requirements for the puncture resistance test apparatus have been changed (see 5.2.1, 5.1.1 of GB/T 20655-2006);
- c) Numerical rounding of experimental results has been added (see 5.5);
- d) A method for evaluating the measurement uncertainty (U_m) of the test results has been added (see 6.12.2);
- e) The terms and definitions for "sample holder" and "tear blade" have been removed (see 2.1 and 2.2 of GB/T 20654-2006).

This document is modified to adopt ISO 13995:2000, "Mechanical properties of protective clothing materials - Test methods for puncture resistance and dynamic tear resistance".

And ISO 13996:1999 "Mechanical properties of protective clothing - determination of

puncture resistance".

Compared with ISO 13995:2000 and ISO 13996:1999, this document has undergone the following structural adjustments.

---Chapter 5 corresponds to Chapters 4, 5, 6, and 7 of ISO 13996:1999, with section 5.1 corresponding to ISO 13996.

Chapter 4, 5.2-5.4 of ISO 13999 corresponds to Chapter 5, 5.5 of ISO 13996:1999.

Chapter 6, section 5.6 corresponds to Chapter 7 of ISO 13996:1999;

---Chapter 6 corresponds to Chapter 4 in ISO 13995:2000;

---Table 4 shows the average tear lengths of various materials, corresponding to Table A.1 in ISO 13995:2000.

The technical differences between this document and ISO 13995:2000 and ISO 13996:1999, and the reasons therefor, are as follows.

- a) A definition for the term "resistance to dynamic tearing" has been added (see 3.2) to clarify the tearing process under dynamic impact conditions and eliminate ambiguity;
- b) The technical requirements for the puncture resistance test apparatus have been changed (see 5.2.1, 5.1.1 of ISO 13996:1999) to clarify the measurement of force and deformation.

The required level of accuracy;

- c) Numerical rounding of test results has been added (see 5.5) to clarify the standardized requirements for result presentation;
- d) A method for evaluating the measurement uncertainty (U_m) of test results has been added (see 6.12.2) to quantify the uncertainty of test results;
- e) The definitions of the terms "sample holder" and "tear blade" have been removed (see 2.1 and 2.2 of ISO 13995:2000), as they fall under 6.6.

Sections 6.7 and 6.8 are described separately.

The following editorial changes have been made to this document.

---To align with existing standards, the standard name has been changed to "Test for Puncture Resistance and Dynamic Tear Resistance of Mechanical Properties Materials for Protective Clothing".

Test Methods;

---Informative Annex A of ISO 13995:2000, "Introduction to puncture and dynamic tear tests of materials and clothing", has been deleted.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the Ministry of Emergency Management of the People's Republic of China.

This document is under the jurisdiction of the National Technical Committee on Standardization of Personal Protective Equipment (SAC/TC112).

1 Scope

This document describes the test methods for the puncture resistance and dynamic tear resistance of protective clothing materials.

This document applies to the mechanical property testing of protective clothing materials for puncture resistance and dynamic tear resistance.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

GB/T 8170 Rules for rounding off numerical values and the representation and determination of limiting values GB/T 16825.1 Inspection and calibration of static uniaxial testing machines for metallic materials - Part 1: Tensile and/or compressive testing machines Inspection and calibration of force measurement systems (GB/T 16825.1-2022, ISO 7500-1:2018, IDT) GB/T 24133 Standard environment for conditioning and testing of rubber or plastic coated fabrics (GB/T 24133-2009, ISO 2231.

1989, IDT)

3 Terms and Definitions

The following terms and definitions apply to this document.

puncture resistance

The maximum force required to make the test nail penetrate the test sample at a certain speed.

Note: The unit is Newton (N).

The ability of a material to resist tear propagation caused by puncture under specified

dynamic impact conditions.

Note: The degree of tearing of the material and the required impact energy are used to quantify and characterize it through specific tests.

4 Requirements for using this document

When this document is cited as a test method in a product standard, it should include at least the following content.

- a) This document is cited normatively.
- b) Sample description. sample source, sample size, sample preparation and pretreatment.
- c) Additional details, or differences from the methods described in this document.

---Special clamping and stretching methods for specimens;

---Impact energy and velocity used in the experiment;

---Positioning relative to the specified axis of the specimen during impact;