

Translated English of Chinese Standard: FZT70006-2022

[www.ChineseStandard.net](http://www.ChineseStandard.net) → Buy True-PDF → Auto-delivery.

[Sales@ChineseStandard.net](mailto:Sales@ChineseStandard.net)

**FZ**

NATIONAL STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA

ICS 59.080.01

CCS W 60

**FZ/T 70006-2022**

Replacing FZ/T 70006-2004

---

**Stretch and recovery testing method for knitted fabrics**

针织物拉伸弹性回复率试验方法

**Issued on: April 8, 2022**

**Implemented on: October 1, 2022**

---

**Issued by: Ministry of Industry and Information Technology of PRC;  
Standards Press of China.**

## Table of Contents

|                                                                                                                                                                       |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Foreword .....                                                                                                                                                        | 3  |
| 1 Scope .....                                                                                                                                                         | 5  |
| 2 Normative references .....                                                                                                                                          | 5  |
| 3 Terms and definitions .....                                                                                                                                         | 5  |
| 4 Principles .....                                                                                                                                                    | 6  |
| 5 Standard atmosphere for conditioning and testing .....                                                                                                              | 6  |
| 6 Instruments and tools .....                                                                                                                                         | 6  |
| 7 Samples and specimens .....                                                                                                                                         | 8  |
| 8 Procedures .....                                                                                                                                                    | 9  |
| 9 Test report .....                                                                                                                                                   | 14 |
| Appendix A (Normative) Specimen cutting examples .....                                                                                                                | 16 |
| Appendix B (Informative) Constant elongation (rate), constant tension, number of repeated stretching, and relaxation time of constant rate of elongation method ..... | 18 |

# Stretch and recovery testing method for knitted fabrics

## 1 Scope

This document specifies the test method for determining the tensile elasticity deformation and plastic deformation of knitted fabrics using the constant elongation and the constant tension methods.

This document is applicable to various knitted fabrics, and for others, it can be a reference.

## 2 Normative references

The provisions of the following documents constitute the essential clauses of this document through normative references in this text. Among them, for referenced documents with dates, only the versions corresponding to the dates are applicable to this document; for referenced documents without dates, the latest versions (including all amendments) are applicable to this document.

GB/T 6529 Textiles - Standard atmospheres for conditioning and testing

GB/T 8170 Rules of rounding off for numerical values & expression and judgment of limiting values

## 3 Terms and definitions

The following terms and definitions apply to this document.

### 3.1 elasticity deformation

The recoverable deformation of the sample after the external force is removed, which is expressed by the tensile elastic recovery rate for knitted fabrics.

### 3.2 plastic deformation

The unrecoverable deformation of the sample after the external force is removed under specified conditions, which is expressed as the plastic deformation rate.

### 3.3 tension under constant elongation

The force corresponding to the stretching of a specimen to a specified elongation.

### **3.4 elongation under constant tension**

The elongation of a specimen when it is subjected to a specified tensile force.

### **3.5 pre-tension**

The force applied to straighten a specimen before stretching without causing it to be stretched.

## **4 Principles**

**4.1** Constant rate of elongation method: The specimen is stretched at a constant speed by using special instruments and equipment to be deformed in length. After the load is released, the tensile elastic recovery rate and plastic deformation rate are calculated based on the deformation.

**4.2** Delayed load stretching method: The specimen is stretched by using special instruments and equipment to be deformed in length, and the deformation state is maintained for a long time. After the load is released, the tensile elastic recovery rate is calculated based on the deformation.

## **5 Standard atmosphere for conditioning and testing**

**5.1** The standard atmosphere specified in GB/T 6529 shall be used for conditioning and testing.

**5.2** After pre-conditioning, the samples are placed in the conditioning atmosphere to allow them to absorb moisture in equilibrium. Cotton and blended fabrics should be conditioned for 24 hours, and pure chemical fabrics should be conditioned for 4 hours.

## **6 Instruments and tools**

**6.1** The testing instrument for the constant rate of elongation method shall meet the following requirements (using CRE type tensile tester):

- a) Clamping distance length: 100 mm $\pm$ 1 mm;
- b) The instrument shall be able to set the stretching speed within the range of 50 mm/min~300 mm/min with an accuracy of  $\pm$ 2%;
- c) The maximum error of strength indication shall not exceed 1%, and the maximum error of elongation indication shall not exceed 1%;
- d) The instrument shall be able to set the pre-tension;

specimen flat on the table and make a pair of marks at the center of one side of the ring specimen along the length direction of the specimen. The distance between the two marking lines is  $125\text{ mm}\pm 3\text{ mm}$ .

**7.6** The specimens shall be arranged in accordance with the method given in Appendix A. In general, method B (parallel method) shall be used for cutting. In arbitration, method A (step-shaped) cutting shall be used, and one side of the length direction shall be parallel to the longitudinal coil (or horizontal coil) of the sample.

## **8 Procedures**

### **8.1 Instrument calibration and preparation**

#### **8.1.1 Constant-rate of elongation method**

**8.1.1.1** Adjust the clamp gauge and check that the jaws are accurately aligned and parallel to ensure that the applied force does not cause angular deviation.

**8.1.1.2** Set up the test procedure according to the test requirements.

The stretching speed shall be selected within the range of  $50\text{ mm/min}\sim 300\text{ mm/min}$  according to the product standard or the agreement between the relevant parties. If the stretching speed is not specified, it can be set to  $300\text{ mm/min}$ . The stretching speed when applying pre-tension can be set at a speed that supports reading the elongation value accurately when applying pre-tension according to the specific situation of the test instrument, and it shall be stated in the test report.

The pre-tension can generally be set to  $0.1\text{ N}$ . For specimens that will elongate when a very small force is applied, the pre-tension should be set to  $0.05\text{ N}$ .

#### **8.1.2 Delayed load stretching method**

Check whether the stand is stable to ensure the smooth progress of the test.

### **8.2 Determination of tensile force and elongation (constant rate of elongation method)**

#### **8.2.1 Determination of tension under constant elongation**

Tighten both ends of the specimen in the length direction in the clamp flatly, start the instrument, apply pre-tension, and then stretch to the predetermined elongation value (see Appendix B). Hold for 1 minute, and the instrument automatically records the tensile force value. The test result is expressed as the average value of the test results of the three specimens, rounded to one decimal place according to GB/T 8170.

#### **8.2.2 Determination of elongation under constant tension**

$L_1$  -- The length of the specimen after pre-tensioning, in millimeters (mm).

### **8.3.1.2 Determination of elastic recovery rate and plastic deformation rate when repeatedly stretched under constant elongation (rate)**

Repeatedly stretch several times according to the operating procedure of 8.3.1.1 (see Appendix B), and automatically record the last specimen length. The test result is expressed as the average value of the test data of the three specimens, rounded to one decimal place according to GB/T 8170. Calculate according to formula (2) and formula (3).

### **8.3.2 Determination of elastic recovery rate of single-stretching under constant elongation (rate) (delayed load stretching method)**

**8.3.2.1** Lay the specimen flat, measure and record the length  $L_0$  between the two marking lines.

**8.3.2.2** Place the specimen on the upper hanger rod and then fix the hanger rod in the upper hanger, with the seam of the specimen parallel to the hanger rod.

**8.3.2.3** Slide the other end of the specimen onto the lower hanger rod and secure the hanger rod in the lower hanger.

**8.3.2.4** Hang the upper clothes hanger into the groove of the stand.

**8.3.2.5** After the specimen is stretched to the predetermined length, fix the hanger chain to the lower end of the stand with nuts or similar fasteners.

**8.3.2.6** The specimen is kept at the predetermined elongation for a set time. The time can be set to 2 hours or as agreed by both parties as required.

**8.3.2.7** After the set time, measure the length  $L_3'$  between the two marking lines, then loosen the hanger chain, remove the hanger and the specimen, and lay the specimen flat without external tension.

- a) After the specimen is laid flat for  $1 \text{ min} \pm 5 \text{ s}$ , measure the length  $L_5$  between the two marking lines with an accuracy of 1 mm.
- b) After the specimen is laid flat for  $1 \text{ h} \pm 5 \text{ min}$ , measure the length  $L_6$  between the two marking lines with an accuracy of 1 mm.
- c) Continue testing according to steps 8.3.2.1~8.3.2.7 until all specimens have been tested.
- d) The test result is expressed as the average value of the test data of three specimens, rounded to one decimal place according to GB/T 8170. Calculated according to formula (4) and formula (5).

the plastic deformation), in millimeters (mm);

$L_1$  -- The length of the specimen after pre-tensioning, in millimeters (mm).

### 8.3.3.2 Determination of elastic recovery rate and plastic deformation rate after repeated stretching under constant tension

According to the operating procedure of 8.3.3.1, after repeated stretching several times (see Appendix B), the last length of the specimen is automatically recorded. The measurement result is expressed as the average value of the test data of the three specimens, rounded to one decimal place according to GB/T 8170. Calculate according to formula (6) and formula (7).

### 8.3.4 Determination of elastic recovery rate of single-stretching under constant tension (delayed load stretching method)

**8.3.4.1** Place the specimen in the tensile test equipment according to 8.3.2.1~8.3.2.5.

**8.3.4.2** Attach the weight required for the test to the lower hanger chain.

**8.3.4.3** The specimen is kept in a stretched state under the weight of the weight. The time can be set to 2 hours or as agreed by both parties as required.

**8.3.4.4** After the set time, measure the length  $L_4'$  between the marking lines, then loosen the weight, remove the hanger and the specimen, and lay the specimen flat without external tension.

- a) After the specimen is laid flat for  $1 \text{ min} \pm 5 \text{ s}$ , measure the length  $L_5$  between the marking lines with an accuracy of 1 mm.
- b) After the specimen is laid flat for  $1 \text{ h} \pm 5 \text{ min}$ , measure the length  $L_6$  between the marking lines with an accuracy of 1 mm.
- c) Continue testing according to steps 8.3.4.1~8.3.4.4 until each specimen has been tested.
- d) The test result is expressed as the average value of the test data of three specimens, rounded to one decimal place according to GB/T 8170. Calculated according to formula (8) and formula (9).

$$R_{1 \text{ min}} = \frac{L_4' - L_5}{L_4' - L_0} \times 100\% \quad \dots\dots\dots (8)$$

$$R_{1 \text{ h}} = \frac{L_4' - L_6}{L_4' - L_0} \times 100\% \quad \dots\dots\dots (9)$$

where:

$R_{1\min}$  -- Recovery rate after being laid flat for  $1\min\pm 5\text{ s}$  after the test;

$R_{1\text{h}}$  -- Recovery rate after being laid flat for  $1\text{ h}\pm 5\text{ min}$  after the test;

$L_4'$  -- The total length between the marking lines under constant load conditions, in millimeters (mm);

$L_5$  -- The length between the marking lines after recovery for  $1\min\pm 5\text{ s}$ , in millimeters (mm);

$L_0$  -- The initial length between the marking lines, in millimeters (mm);

$L_6$  -- The length between the marking lines after recovery for  $1\text{ h}\pm 5\text{ min}$ , in millimeters (mm).

#### 8.4 Determination of stress relaxation rate (constant rate of elongation method)

Hold for a predetermined time according to the operating procedure in 8.2.1 (see Appendix B), and automatically record the tensile force value. The test result is expressed as the average value of the test data of the three specimens, rounded to one decimal place according to GB/T 8170. Calculate according to formula (10).

$$\text{Stress relaxation rate} = \frac{T_0 - T_1}{T_0} \times 100\% \quad \dots\dots\dots (10)$$

where:

$T_0$  -- The force value when the specimen is stretched to the predetermined elongation, in Newton (N);

$T_1$  -- The force value after the specimen is placed for a predetermined time, in Newton (N).

## 9 Test report

The test report shall include the following information:

- a) This document number;
- b) Sample name, number and specifications;
- c) Type, state and quantity of specimens;
- d) Conditioning and testing atmosphere used;
- e) Model of the instrument used;



**This is an excerpt of the PDF (Some pages are marked off intentionally)**

**Full-copy PDF can be purchased from 1 of 2 websites:**

1. <https://www.ChineseStandard.us>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Select your country (currency), for example: USA (USD); Germany (Euro).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Tax invoice can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with download links).

2. <https://www.ChineseStandard.net>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Add to cart. Only accept USD (other currencies - <https://www.ChineseStandard.us>).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with PDFs attached, invoice and download links).

Translated by: Field Test Asia Pte. Ltd. (Incorporated & taxed in Singapore. Tax ID: 201302277C)

About Us (Goodwill, Policies, Fair Trading...): <https://www.chinesestandard.net/AboutUs.aspx>

Contact: Wayne Zheng, [Sales@ChineseStandard.net](mailto:Sales@ChineseStandard.net)

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

**----- The End -----**