

ICS 59.060.20

CCS W50



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

GB/T 43015-2023

**Synthetic fibre - Test method for shrinkage in hot air of staple
fibres**

合成纤维 短纤维干热收缩率试验方法

Issued on: September 7, 2023

Implemented on: April 1, 2024

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

Foreword...	3
1 Scope...	4
2 Normative references...	4
3 Terms and definitions...	4
4 Principle...	4
5 Instruments and equipment...	4
6 Test preparation...	5
7 Test steps...	6
8 Calculation of results...	7
9 Precision...	8

1 Scope

GB/T 43015-2023 measures how much a synthetic staple fibre shrinks when heated in dry air. The number matters far downstream of the fibre itself. Staple fibres are spun into yarns and made into fabrics that will meet heat again - in dyeing, in heat setting, in pressing, in a domestic tumble dryer - and if the shrinkage of the fibre was not what the process assumed, the fabric changes dimension, a blend of two fibres with different shrinkages puckers, and a nonwoven distorts. Producers also use the value deliberately: differential shrinkage between fibres is how bulk is created in a yarn. This document describes a test method for determining the shrinkage in hot air of synthetic staple fibres, specifying the conditions under which the specimen is exposed and measured so that results from different laboratories can be compared. It applies to synthetic staple fibres, and may be used as a reference for composite short fibres and other fibres. Under ICS 59.060.20 and CCS W50, it is written for chemical fibre producers, spinners and fabric manufacturers, and for the testing laboratories that certify fibre against a purchase specification.

This document describes a test method for shrinkage in hot air of synthetic staple fibers. This document applies to synthetic staple fibers. It also applies, as reference, to composite short fibers and other fibers.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest

version (including all amendments) is applicable to this document.

GB/T 4146 (all parts), Textiles - Man-made fibres

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

GB/T 9994, Conventional moisture regains of textile materials

GB/T 14334, Sampling method for man-made staple fibres

3 Terms and definitions

For the purposes of this document, the terms and definitions given in GB/T 4146 (all parts) apply.

4 Principle

The fibers shall be subjected to dry hot air treatment under specified conditions. According to the length change of the fiber before and after dry heat treatment, calculate the shrinkage in hot air to characterize the thermal stability of the fiber.

5 Instruments and equipment

5.1 Single fiber heat shrinkage measuring instrument: length measurement is accurate to 0.01 mm. fiber at the root of the spring clamp of the sample cylinder; clamp it; place the fibers in a natural vertical state; arrange the number of pieces required to complete the test in order. In order to ensure the accuracy of later test data, the number of samples should be 35. For the suspended samples, make sure that the clamp mouth of the tension clamp is about 1 mm above the lower mark line of the sample cylinder; at the same time, ensure that the test length before heat treatment is

21.0 mm. At this time, the inverted V-shaped opening of the lower part of the tension clamp can be stuck in the middle of the limiting device.

7.3 After the sample preparation is completed, adjust the position knob so that the sample is in a loose state.

7.4 Slowly put the sample cylinder into the equipment detection window; adjust the position knob so that the fiber is in a vertical state under the pre-tensioned force; slowly turn the test chamber turntable; check the status of each fiber sample. If any abnormalities are found, make timely adjustments, and finally follow the instrument requirements to position the sample cylinder.

7.5 Close the hatch cover and measure the length. The measured length L_{i0} before heat treatment is accurate to

0.01 mm.

7.6 The length measurement is completed before heat treatment. After the equipment stops rotating, open the test hatch cover and adjust the position knob to ensure that the fiber is completely loose.

7.7 Slowly transfer the sample cylinder and place it into an electrothermal blowing dry box with the blowing device turned on and the temperature reaching the set value for heat treatment. Start timing when the temperature returns to the specified temperature. After reaching the specified heat treatment time, immediately take out the sample cylinder and balance it under atmospheric conditions for humidity control for 30 minutes. Measure the length again. Measure the length L_{i1} after heat treatment, accurate to

0.01 mm.

8 Calculation of results

Express the test results as average shrinkage in hot air. Calculate the average shrinkage in hot air according to Formula (1) and Formula (2). Where: S_i - shrinkage in hot air of each fiber, %; L_{i0} - the length of each fiber before heat treatment, in millimeters (mm); L_{i1} - the length of each fiber after heat treatment, in millimeters (mm); $\bar{S}$ - average shrinkage in hot air, %; n - number of test pieces. The shrinkage in hot air is calculated to two decimal places and rounded to one decimal place.

10 Test report

The test report shall at least include the following:

- a) indicating that the method in this document is used for the test; if there are any changes, details shall be stated;
- b) description of the test: including sample type, product specifications, production batch number and date, etc.;
- c) humidification treatment conditions of the sample, etc.;
- e) test environment, date and test personnel, etc.;