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NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

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GB/T 3920-2024

Replacing GB/T 3920-2008

**Textiles - Tests for colour fastness - Colour fastness to
rubbing**

纺织品 色牢度试验 耐摩擦色牢度

(ISO 105-X12:2016, Textiles - Tests for colour fastness - Part X12: Colour fastness to
rubbing, MOD)

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Table of Contents

Foreword	3
1 Scope	7
2 Normative references	7
3 Terms and definitions	7
4 Principle	8
5 Equipment and materials	8
6 Reagents	9
7 Test sample	9
8 Procedure	9
9 Assessment	11
10 Test report	11
Bibliography	12

Foreword

This document was drafted in accordance with the rules provided in GB/T 1.1-2020 *Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents*.

This document replaces GB/T 3920-2008 *Textiles - Tests for colour fastness - Colour fastness to rubbing*. Compared with GB/T 3920-2008, except for structural adjustment and editorial changes, the main technical changes are as follows:

- Add the tolerance of the rectangular rubbing head size [see 5.1a)];
- Add the description of “with the long side parallel to the warp direction” (see 5.2);
- Change “Note” to clause content, and change the specification of aluminum oxide water-resistant fine sandpaper to “particle size of P600” (see 5.3; 4.3 of the 2008 edition);
- Add “balance” in “equipment and materials” (see 5.5);
- Add a chapter on “Reagents” and supplement the requirements for test water (see Chapter 6);
- For another method of cutting the samples, change it to “make the length direction of the sample at 45° to the warp and weft directions of the fabric” (see 7.1; 5.1 of the 2008 edition);
- Add the description of “With consultation among the relevant parties, conditioning may also be carried out in the optional standard atmosphere specified in GB/T 6529, which shall be stated in the test report. Place each sample and rubbing cloth on a sieve or perforated rack for conditioning.” (see 7.3);
- Add the description of “Prepare two groups of samples, one for dry rubbing test and the other for wet rubbing test.” (see 8.1);
- Change the description of the test steps for wet rubbing color fastness (see 8.3; 6.3 of the 2008 edition);
- Change “water content” to “level of soak”, and add the calculation formula for level of soak (see 8.3; 6.3 of the 2008 edition);
- Move the description of “Remove any excess fibers from the surface of the rubbing cloth that may affect the rating.” to the assessment part (see 9.1; 6.2 of the 2008 edition);

Textiles - Tests for colour fastness - Colour fastness to rubbing

1 Scope

This document describes the test methods for colour fastness to rubbing of various types of textiles.

This document applies to dyed or printed yarns, fabrics and textile products made from all types of fibers, including textile carpets and other velvet fabrics.

This document includes two tests, one using a dry rubbing cloth and the other using a wet rubbing cloth.

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 251, Textiles - Tests for colour fastness - Grey scale for assessing staining (GB/T 251-2008, ISO 105-A03:1993, IDT)

GB/T 6151-2016, Textiles - Tests for colour fastness - General principle of testing (GB/T 6151-2016, ISO 105-A01:2010, MOD)

GB/T 6529, Textiles - Standard atmospheres for conditioning and testing (GB/T 6529-2008, ISO 139:2005, MOD)

GB/T 6682, Water for analytical laboratory use - Specification and test methods (GB/T 6682-2008, ISO 3696:1987, MOD)

GB/T 33729, Textiles - Tests for colour fastness - Cotton rubbing cloth (GB/T 33729-2017, ISO 105-F09:2009, MOD)

3 Terms and definitions

No terms and definitions need to be defined in this document.

4 Principle

Rub the textile sample with a dry rubbing cloth and a wet rubbing cloth respectively, and use the gray scale for staining to assess the staining degree of the rubbing cloth. The testing machine for colour fastness to rubbing provides two combination test conditions through two optional sizes of rubbing heads: one for velvet fabrics; the other for other fabrics with solid colors or large-area printing.

5 Equipment and materials

5.1 Testing machine for colour fastness to rubbing, with a rubbing head of two optional sizes for reciprocating linear rubbing motion; other instruments that can obtain the same test results may also be used for this test.

- a) For velvet fabrics (including textile carpets): the rubbing surface of the rubbing head is rectangular and the size is $(19.0 \pm 0.2) \text{ mm} \times (25.4 \pm 0.2) \text{ mm}$. The rubbing head shall apply a vertical downward pressure of $(9 \pm 0.2) \text{ N}$, and the linear reciprocating stroke shall be $(104 \pm 3) \text{ mm}$.

Note: When testing velvet fabrics using a rubbing head with a diameter of $(16 \pm 0.1) \text{ mm}$, it may be difficult when assessing the degree of staining of the rubbing cloth. This is because the rubbing cloth will produce severe staining around the circular rubbing area, i.e., a halo. When testing velvet fabrics, the use of the rubbing head described in 5.1a) will eliminate the halo phenomenon. For fabrics with a long pile, it may be difficult to assess staining even with a rectangular rubbing head.

- b) For other textiles: The rubbing head consists of a cylinder with a diameter of $(16 \pm 0.1) \text{ mm}$, the vertical pressure applied downward is $(9 \pm 0.2) \text{ N}$, and the linear reciprocating stroke is $(104 \pm 3) \text{ mm}$.

5.2 Cotton rubbing cloth, in accordance with the provisions of GB/T 33729, cut into squares with a side length of $(50 \pm 2) \text{ mm}$ for use in the rubbing head of 5.1b); cut into rectangles with a size of $(25 \pm 2) \text{ mm} \times (100 \pm 2) \text{ mm}$ for use in the rubbing head of 5.1a), with the long side parallel to the warp direction.

5.3 Water-resistant fine sandpaper, or metal mesh with stainless steel wire diameter of 1 mm and mesh width of about 20 mm.

Attention should be paid to the characteristics of the metal mesh or sandpaper used, as it may leave marks on the test sample when the textile sample is placed on it, resulting in erroneous ratings. For textile fabrics, sandpaper is preferred for testing. For reference, aluminum oxide water-resistant fine sandpaper with a particle size of P600 can be used.

5.4 Gray scale for assessing staining, in accordance with the requirements of GB/T 251.

Use a clamping device to fix the sample on the tester platform so that the length direction of the sample is consistent with the running direction of the rubbing head. Place a piece of metal mesh or sandpaper between the tester platform and the sample to help reduce movement of the sample during rubbing. Test the samples prepared in Chapter 7 according to the procedures specified in 8.2 and 8.3.

When testing textiles with multiple colours, care should be taken to position the samples so that all colours are rubbed if the apparatus described in 5.1b) is used. If the color area is large enough, multiple samples can be prepared and the individual colors can be assessed separately; if the color area is small and clustered together, the rotary color fastness rubbing meter described in GB/T 29865 shall be used for the test.

Prepare two groups of samples, one for dry rubbing test and the other for wet rubbing test.

8.2 Dry rubbing

Fix the conditioned rubbing cloth (see 5.2 and 7.3) evenly on the rubbing head so that the warp direction of the rubbing cloth is consistent with the running direction of the rubbing head. The running speed is 1 reciprocating rubbing cycle per second, with a total of 10 rubbing cycles. The rubbing stroke on the dry sample is (104 ± 3) mm and the vertical downward pressure applied is (9 ± 0.2) N (see 5.1). Remove the rubbing cloth and perform conditioning according to 7.3.

8.3 Wet rubbing

Weigh the mass of the conditioned rubbing cloth; soak it completely in grade-3 water; take it out and remove excess water; then weigh the mass of the rubbing cloth again. Calculate the level of soak of the rubbing cloth according to Formula (1) to reach 95% ~ 100%. Then, fix the rubbing cloth (see 5.2 and 7.3) evenly on the rubbing head so that the warp direction of the rubbing cloth is consistent with the running direction of the rubbing head. The running speed is 1 reciprocating rubbing cycle per second, with a total of 10 rubbing cycles. The rubbing stroke on the dry sample is (104 ± 3) mm and the vertical downward pressure applied is (9 ± 0.2) N (5.1). Remove the rubbing cloth; let it dry naturally; condition it according to 7.3.

$$W = \frac{m_1 - m_0}{m_0} \times 100 \quad \dots\dots\dots (1)$$

Where:

W – level of soak of the rubbing cloth, %

m_0 – mass of the rubbing cloth after conditioning, in grams (g);

m_1 – mass of the rubbing cloth after being immersed in water, in grams (g).

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