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National Standard

of the People's Republic of China

GB/T 8427-2008

Supersedes GB/T 8427-1998

Textiles — Tests for color fastness — Color fastness to artificial light: Xenon arc fading lamp test

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Issued by: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China;

Standardization Administration Committee.

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Foreword

This Standard revised and adopted ISO 105-B02: 1994, Corrigendum 1:1998, and Corrigendum 2:2000 by using redrafting method. Compared with ISO 105-B02:1994, the main changes in this Standard are as follows:

— CHANGE "… … reach the temperature conditions specified in 4.2" in c) of 4.2.1.1.1 TO "… … reach the temperature conditions specified in Chapter 6";

— CHANGE "a) and b) may occur in front of 7.2.2.3 or 7.2.2.4" in note 4 TO "b) and c) may occur in front of 7.2.2.3 or 7.2.2.4".

— ADD the Annex B "the air cooling type xenon arc lamp equipment used to determine the color fastness to light (flat plate type)". And the former annex serial number was postponed.

This Standard replaces GB/T 8427-1998 "Textiles — Tests for color fastness — Color fastness to artificial light: Xenon arc fading lamp test". Compared with GB/T 8427-1998, the main changes are as follows:

— CHANGE the "blue wool standard" TO "blue wool standard sample";

— CANCEL the reference of GB/T 8432-1987 "Humidity test control for color fastness to light", and ADD the contents in 4.1.3;

— ADD the reference for GB/T 6682 "Water for laboratory use — Specifications";

— CANCEL the reference of GB/730 "Blue wool standard for color fastness to light test" in 4.1.1, and CHANGE to the relevant requirements of ISO 105-B02:1994.

— CHANGE "… … reach the temperature conditions specified in 4.2" in c) of 4.2.1.1.1 TO "… … reach the temperature conditions specified in Chapter 6";

— ADD the 5.1.1, 5.1.2 and 5.1.3 in 5.1;

— COMBINE the former 7.2.1.2 and 7.2.1.5 into 7.2.2.2;

— CHANGE the former blue wool standard 3 in 7.2.2.3 TO blue wool standard sample 4, and CHANGE the clause No. TO 7.2.3.3;

— CHANGE the former blue wool standard 4 in 7.2.2.4 TO blue wool standard sample 6, and CHANGE the clause No. TO 7.2.3.4;

— CHANGE the former "… … continuously insolated till the last piece of blue wool standard … …" in 7.2.3 TO "… … continuously insolated till the blue wool standard sample at minimum allowable fastness … …", and CHANGE the

clause No. TO 7.2.4;

— ADD the Annex B "the air cooling type xenon arc lamp equipment are used to determine the color fastness to light (flat plate type)". And the former annex serial number was postponed;

— ADD the Annex E.

Annex A, Annex B and Annex C in this Standard are normative; Annex D and Annex E are informative.

This Standard was proposed by China National Textile and Apparel Council.

This Standard shall be under the jurisdiction of the Basic Standard Subcommittee of Technical Committee on Textiles of Standardization Administration of China (SAC/TC209/SC1).

Drafting organizations of this Standard: National Textile Quality Supervision Testing Center, Q-Lab Experimental Equipments Corporation (Shanghai representative office), Wenzhou Darong Textile Instrument Co., ltd, Shanghai Textile Industry Institute of Technical Supervision, and Shanghai Wool & Jute Textile Research Institute.

Main drafters of this Standard: Li Zhien, Zhang Heng, Hao Chengzhen, Li Chun, Zhang Qiping, Chen Xiaocheng, and Cao Xianhua.

The previous editions replaced by this Standard are:

— GB/T 8427-1987 and GB/T 8427-1998.

Textiles — Tests for color fastness — Color fastness to artificial light: Xenon arc fading lamp test

1 Scope

This Standard specifies a method intended for determining the resistance of the color of textiles of all kinds and in all forms to the action of an artificial light source representative of natural daylight (D_{65}). This Standard is also applicable to white (bleached or optically brightened) textiles.

This Standard allows the use of two different sets of blue wool standard samples. The results may not be identical.

NOTE 1: Annex D gives the general information on color fastness to light.

2 Normative reference

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 250 Textiles — Tests for color fastness — gray scale for assessing change in color (GB/T 250-2008, ISO 105-A02: 1993, IDT)

GB/T 6151 Textiles — Tests for color fastness — General principle of testing (GB/T 6151-1997, eqv ISO 105-A01: 1994)

GB/T 6682 Water for laboratory use — Specifications (GB/T 6682-1992, neq ISO 3696: 1987)

GB/T 8426 Textiles — Tests for color fastness — Color fastness to light: Daylight (GB/T 8426-1998, eqv ISO 105-B01: 1994)

GB/T 8431 Textiles — Tests for color fastness — Detection and assessment of photochromism (GB/T 8431-1998, eqv ISO 105-B 05: 1993)

FZ/T 01024 Ranking method for instrument of sample change color degree (GB/T 01024-1993, neq ISO 105-A05: 1992)

be perceived equal to gray scale Grade 4, then in the position shown in Figure 3, PLACE the final covering EF, the other coverings remaining in original position.

7.2.3.5 Continue to expose, until there occurs one of the following situations:

a) A color difference produced on blue wool standard sample 7 or L7 equal to the gray scale Grade 4;

b) A color difference produced on the most resistant specimen equal to gray scale Grade 3;

c) For white (bleached or optically brightened) textiles, a color difference produced on the most resistant specimen equal to gray scale Grade 4;

NOTE 4: a) and b) may occur before 7.2.3.3 or 7.2.3.4.

7.2.4 Method 3

This method is applicable for checking conformity with a performance specification, it is permissible to expose the specimens with two blue wool standard samples only: that is one blue wool standard sample specified as minimum allowable fastness and one blue wool standard samples below it. CONTINUE exposure, until the separate areas of blue wool standard sample specified as minimum allowable fastness equal to the color difference between gray scale Grade 4 (first stage) and Grade 3 (second stage). For white (bleached or optically brightened) textiles, CONTINUE exposure until the separate areas of blue wool standard sample specified as minimum allowable fastness equal to the gray scale Grade 4.

7.2.5 Method 4

This method is applicable for checking conformity with an agreed-upon reference sample, it is permissible to expose the specimens with the reference sample only. CONTINUE exposure until the color difference produced on the reference sample equal to that between gray scale Grade 4 and/or gray scale Grade 3. For white (bleached or optically brightened) textiles, CONTINUE exposure until the color difference produced on the reference sample equal to gray scale Grade 4.

7.2.6 Method 5

This method is applicable for checking conformity to agreed-upon radiant energy levels, it is permissible to expose the specimens alone, or with blue wool standard samples. EXPOSE the specimens with the blue wool standard sample, until reach the specified amount of radiant energy, then removed with blue wool standard sample. EVALUATE according to 8.9.

r/min) and 0.117s^{-1}(7 r/min) around the vertical lamp unit, which is located centrally with respect to the specimen rack. After each revolution of the rack the specimen holders may be turned about their longitudinal axis or maintained facing the xenon arc lamp depending on the type of equipment used.

A.1.5 A ventilating system provides a varying volume of air through the test chamber and over the specimens. The black standard temperature or the temperature of the air are automatically controlled by varying the volume of warm air circulated from the test chamber mixed with cooler room air. In some types of apparatus, it is possible to adjust the fan speed to keep constant the difference between the black standard temperature and the temperature of the air. The test chamber is air-conditioned by adding moisture to the air using an ultrasonic humidification device or by means of water atomized by an aerosol device and fed into the air stream. The relative humidity in the test chamber is measured and controlled using either a capacitative sensor or a contact hygrometer.

A.1.6 Apparatus for use in this Standard is equipped with timing units for controlling the length of exposure. Some types of apparatus are additionally equipped with a radiometer (broadband UV: 300nm to 400nm) designed to switch off the apparatus as soon as a given radiant exposure has been achieved.

A.1.7 A monitoring/controlling radiometer mounted on the test specimen area can be used in this Standard. The radiometer with a broad bandpass filter restricting measurement to the ultraviolet spectral region between 300nm and 400nm has been used satisfactorily. Filter radiometers capable of integrating irradiance with respect to time are satisfactory.

For radiometers designed to automatically maintain a constant level of irradiance, exposures of equal time should provide equivalent radiant exposure, which may be calculated by the following formula:

$$H=E3.6t$$

Where

H — The radiant exposure in kilojoules per square meter (kJ/m^2);

E — The irradiance in watts per square meter (or joules per square meter and second) [W/m^2 or ($J/m^2 \cdot s$)];

T — The time in hours (h);

3.6 — A conversion factor.

Single filter radiometers equipped with a presettable countdown integrator calibrated in kJ/m^2, designed for use with the exposure apparatus, can be used to terminate the test when the specimens have received the required level of radiant exposure.

degrees of fading are defined by reference to a collection of “gray scale” reference color difference (gray scale Grade 5 equals no color difference; gray scale Grade 1 equals large color change). Thus the use of the gray scale can determine the fading extents, and the use of blue wool standard samples can assess the grade of the color fastness.

But this general principle of assessing on the basis of moderate and severe fading is complicated. Actually, some patterns on exposure undergo a slight change very rapidly, but do not change further for a long time. These slight changes are seldom observed under normal conditions of use. But in certain cases, these slight changes become important, as the following example shows: A retailer has a length of curtain fabric in his window, and on it is a cardboard ticket indicating the price. After a few days, the ticket is removed and careful examination reveals the place where it has been resting because the surrounding cloth has changed shade slightly on exposure to light. Some of this curtain material is exposed so as to produce a moderate degree of fading and it is found that blue wool standard sample 7 has faded to the same extent. So the general color fastness of the fabric is Grade 7.

The important factor about this slight change in color can only be detected when there is a sharp boundary between the exposed and unexposed areas, and these conditions rarely occur during normal use. The magnitude of this slight change in color would be indicated as an additional assessment in brackets. If a rating for a cloth is Grade 7(2), which indicates a slight initial change equivalent to the first perceptible fade of blue wool standard sample 2. Otherwise a high color fastness of Grade 7.

D.5 There is a kind of unusual color change, that is photochromism which is also need to be catered for. This effect is shown when a dye changes color rapidly on exposure to strong light, but on removal to a dark place, the original color returns more or less completely. The extent of photochromism is determined by the special test described in GB/T 8431, and is shown in the rating by a number following the letter P within brackets; for example, Grade 6(P2) means a photochromic effect equal to a gray scale Grade 2, but permanent fading equal to that of blue wool standard sample 6.

D.6 Finally, there are many specimens have entire change in hue after prolonged exposure, for example, a yellow may change into brown, or a purple may change into blue. In the past there have been many arguments as to whether such patterns could be said to have faded or not. The technique used in GB/T 8426 to GB/T 8430 is unambiguous on this point: whether it is fading of color or change in hue, the color difference of exposed cloth is assessed visually, any kind of change is included in the assessments. For example, when studying two green patterns which, on exposure, change in appearance is similar with color fading of blue wool standard sample 5, but one becomes increasingly pale while the other becomes first a greenish blue and finally a pure blue. The former would be rated "5" and the latter "5 bluer". In this case, the method used in GB/T 8426 to GB/T 8430 tries to present as complete a picture of the behavior of a pattern on exposure as is possible without making it excessively complicate.

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