
Cotton — Differential dyeing behavior

"This Ethiopian standard is based on D1464– 12 (Reapproved 2019), Standard Practice for differential dyeing behavior of cotton, pursuant to agreement with ASTM, International"

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Foreword

This Ethiopian Standard has been prepared under the direction of Technical Committee for Sizing and Finishing Material, Dye stuff and Pigments (TC 71) and published by the Ethiopian Standards Agency (ESA).

This Ethiopian Standard cancels and replaces ES 0139:2001 (Reaffirmed 2019) *Cotton-Differential dyeing behavior*.

In preparing this standard reference has been made to ASTM D1464-12 (Reapproved 2019), Standard Standard Practice for differential dyeing behavior of cotton.

Acknowledgment is made to the ASTM for the use of its said publication in preparing the standard.

DRAFT STANDARD

Cotton — Differential dyeing behavior

1 Scope

1.1 This Ethiopian Standard specifies a test for the characterization of certain dyeing behavior of cotton. The standard is applicable to raw cotton fibres, cotton yarns and fabrics.

2 Definition

For the purpose of this standard the following definition shall apply.

2.1

differential dyeing behavior

the tendency of cotton fibres to absorb and retain selectively varying proportions of different dyes from a binary dye bath.

3 Principle

Test pieces shall be dyed under specified condition in a bath containing a mixture of prescribed red and green dyes. The resultant colours shall be compared with those of cottons of known dyeing behavior.

4 Apparatus

The following apparatus shall be used :

- a) Balance, having a capacity of 1000 g and a sensitivity of 0.05 g ;
- b) Beakers, preferably of stainless steel, having capacities of 400, 1200, 2000, and 3000 ml ;
- c) Centrifuge, or clothes wringer;
- d) Cylinders, graduated, having capacities of 5, 10, 25, 50, 100 and 500 ml or burettes (automatic, screw-top, acid-bottle type preferred) ;
- e) Buchner filter funnel, coarse, fritted disk, 80 mm;
- f) Source of suction;
- g) Sewing machine or needle and thread;
- h) Stop watch; and
- i) Wiley mill, laboratory, intermediate model.

5 Reagents and material

The following reagents and material shall be used:

- a) Chlorantine fast green BLL, 10 g/litre;
- b) Diphenyl fast red 5 BL, 5 g/litre ;
- c) Sodium carboxymethyl cellulose, low viscosity;
- d) Sodium carboxymethyl cellulose solution (1 percent) – 1 g of sodium carboxymethyl cellulose dissolved in water and diluted to 1 liter;
- e) Sodium chloride solution (1 percent) – 1 g of reagent grade NaCl dissolved in 100 ml of water;
- f) Bleached gauze, such as cheesecloth, or gauze having a fabric count of 11 by 9.5 per centimeter.

6 Sampling

6.1 A lot sample and laboratory sample shall be taken as described in ES 148.

6.2 A test piece weighing 3 or 4 shall be taken from the sample and placed loosely in a closable bleached cotton gauze bag. Alternatively a group of such test pieces shall be taken and spread out slightly separated, between two pieces of cotton gauze. An area of about 100 by 100 mm shall be allowed for each test piece, and a seam shall be sewn around each test piece to form a compartment for it.

7 Conditioning

The test pieces shall not be preconditioned or conditioned; however if samples are obviously wet, they should be dried in the prevailing room atmosphere.

8 Procedure

8.1 The bagged test piece shall be weighed to obtain the air-dry mass of the total amount of cotton to be dyed.

8.2 A dye bath containing 2.4 ml of the red dye stock solution, 2.8 ml of the green stock solution, distilled water shall be prepared to make a total volume of 40 ml for each bagged test piece. The dye bath shall weigh 40 times the mass of the test piece and gauze.

8.3 The dye bath shall be heated to boiling, then the bagged test pieces shall be added without prewetting, and boiled for 15 min. The test pieces shall be kept submerged and stirred at approximately 3 min. intervals. After 15 min. at the boil, the test pieces shall be lifted above the bath and 2.5 ml of the sodium chloride stock solution shall be added, while stirring, for each gram of the total mass (test piece and gauze) and sufficient distilled water shall be added to maintain the 40 ml volume for each gram of the total mass. The test pieces shall be submerged in the boiling bath for a second 15 min. dyeing period; then the test pieces shall be lifted above the bath and for the second time 2.5 ml of the sodium chloride stock solution shall be added while stirring for each gram of the original total mass. The test pieces shall be replaced in the boiling dye bath for a final 15 min. The total dying period shall be 45 min.

8.4 The dyed test piece shall be lifted from the bath, squeezed, cooled, and washed with two changes of distilled water at room temperature in the proportion of 50 ml of water to 1 g of air-dry total mass. The excess water shall be squeezed out and the matted fibres shall be pulled apart while in the gauze bag. The bagged test piece shall be dipped (50 times the original total mass see clause 8.5 and 8.6) into vigorously boiling distilled water for 30 ± 1 s with vigorous stirring. The dipped test piece shall be lifted out to remove the excess water as rapidly as possible by squeezing in a clothes wringer or by centrifuging. The stripped dyed cotton shall be rinsed twice in water at room temperature to remove the unbound dye, and squeezed.

Each bagged test piece should be handled separately during this operation, but all should be treated in as nearly the same manner as possible to ensure uniform treatment and rapid uniform removal of the hot water.

8.5 The after-treatment with boiling water has a partial and selective stripping effect. The excess red dye shall be removed with a relatively small proportion of the green, dye, this grayness shall be eliminated causing more clearly defined colours, especially green.

8.6 The time of contact of the dyed material with boiling water shall be critical with respect to the final shade. Variations in after-treatment shall be largely responsible for difficulties in reproducing dyeings.

8.7 The dyed test pieces shall be removed from the bags of the sewed gauze for fluffing and allowed to dye in the prevailing room atmosphere.

8.8 The over-all colour shall be observed and the dyeings shall be ranked according to relative distributions of red and green fibres in the test pieces. They may range in colour from a pronounced red to a distinct-green.

8.9 If a more permanent record is desired, the test piece shall be cut nearly to a powder, using a wiley mill with 20-mesh screen. The cut cotton shall be dispersed in an adhesive consisting of a 1 percent solution of sodium carboxymethyl cellulose (1 g of cotton to 4 ml of solution). It shall be filtered by suction on an 80 mm coarse, fritted-disk funnel. Air pressure shall be applied to the stem of the funnel to remove the cotton, and dried as a smooth flat pad. A gummed label shall be placed on the rough upper side for identification. The smooth under-side shall be kept for colour inspection. The series shall be ranked according to colour, ranging from red to green, and the order shall be recorded.

9 Report

The following particulars shall be reported:

- a) The origin and history of the cotton, for example crop year, variety, place of growth,
- b) The ranking of the dyed test pieces in fiber form, and in pad form if determined, according to their colour and shades of colour from red to green. The level of the colour range shall be stated from colors of cottons of known dye behavior or fibre properties.

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- ❖ Develop Ethiopian standards and establish a system that enable to check whether goods and services are in compliance with the required standards,
- ❖ Facilitate the country's technology transfer through the use of standards,
- ❖ Develop national standards for local products and services so as to make them competitive in the international market.

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More Information?

Contact us at the following address.

The Head Office of ESA is at Addis Ababa.

☎ 011- 646 06 85, 011- 646 05 65

☎ 011-646 08 80

✉ 2310 Addis Ababa, Ethiopia

E-mail: info@ethiostandards.org,

Website: www.ethiostandards.org



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