



Standard Test Method for Grading Spun Yarns for Appearance¹

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INTRODUCTION

Cotton yarn appearance standards were first adopted in 1938 and revised in 1964, with Series III being revised again in 1975. The 1964 boards had different yarn sizes for the four-grade exhibits on each board. The 1975 Series III board used the same yarn number for each grade.

The appearance grade of yarn is based on the composite evaluation of several factors, such as unevenness, fuzziness, and neppiness. The differences in the yarn numbers in the 1964 standards along with the differences in other factors distort the comparison between grades and makes grading more difficult.

To overcome this shortcoming, in 1975 the Series III board was revised using the same size yarn for all four grades. After evaluating the improvements, it was decided to revise all of the series using a mid-range yarn number for each grade in the series, and narrow the range in the most active series. This was accomplished by adding a new board, Series VI. A near mid-range yarn number was selected to represent equal steps between adjacent grades for all the factors considered in yarn appearance grading. These yarns were produced with current commercial manufacturing equipment and practices.

Finally, to obtain better yarn definition and better reproducibility from set to set, it was decided to use offset photo printing.

Shortly after these new boards were published in 1979, it became apparent that in the Series II-79 Board the A and B grades were not clearly defined and appeared to be switched. This was corrected in the 1987 Series II Board.

In 1987 a world wide survey was conducted on how the Yarn Appearance Boards were being used. From responses it became apparent that the boards are being used for grading yarns other than 100 % cotton combed or carded yarns. Respondents were using the boards to grade yarn blends, ring spun yarns, open-end spun yarns and other spinning systems. The boards are used both for process quality control and customer acceptance.

In view of the above findings, it was decided to revise the method to include grading of all single spun yarns.

1. Scope

1.1 This test method covers the grading of singles spun yarns for appearance.

1.2 This test method does not apply to plied yarns.

1.3 *This standard does not purport to address the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*²

¹ This test method is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.58 on Yarn Test Methods, General.

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² The requirements for the appearance of cotton yarns are covered in Tolerances D2645, Roller-Drafted Yarns.

2. Referenced Documents

2.1 *ASTM Standards:*

D 123 Terminology Relating to Textiles³

D 2258 Practice for Sampling Yarn for Testing³

3. Terminology

3.1 *Definitions:*

3.1.1 *bunch, n*—a defect in a yarn characterized by a segment not over 6 mm ($\frac{1}{4}$ in.) in length that shows an abrupt increase in diameter caused by more fibers matted in this particular place.

3.1.2 *cover, n*—*in yarns*, the outside layer of fibers that form the surface of a yarn.

3.1.3 *fuzz, n*—untangled fiber ends that protrude from the surface of a yarn or fabric.

³ *Annual Book of ASTM Standards*, Vol 07.01.

3.1.3.1 *Discussion*—Fuzz should not be confused with “cover.”

3.1.4 *nep, n*—a tightly tangled knot-like mass of unorganized fibers. (Compare nap, pill.)

3.1.5 *slub, n*—an abruptly thickened place in a yarn. (*Syn.* lump, piecing, slough-off, slug. Compare cockles.)

3.1.6 *thick place, n*—a yarn defect characterized by a diameter greater than that of the adjoining segments and extending for 6 mm (¼ in.).

3.1.6.1 *Discussion*—The thick place is normally caused by a greater number of fibers per yarn cross section than usual.

3.1.7 *thin place, n*—a yarn defect characterized by a segment that is at least 25 % smaller in diameter than the average diameter of the yarn.

3.1.7.1 *Discussion*—A thin place may be of any length.

3.1.8 *yarn appearance, n*—the visual effect obtained by viewing a sample of yarn wound with a designated traverse on a black board of designated size.

3.1.9 For definitions of other textile terms used in this method, refer to Terminology D 123.

4. Description of Yarn Grades

4.1 *Grade A Yarn*—Grade A yarn may have no large neps which are over three times the normal diameter of the yarn and very few small ones. Grade A yarn must have good uniformity from inch to inch, and good cover without excessive fuzziness. No foreign matter may be present in Grade A yarn.

4.2 *Grade B Yarn*—Grade B Yarn may have no large neps, but may have a few small ones. Grade B yarn may have no more than three small pieces of foreign matter per board or specimen providing they do not form slubs. Grade B yarn may be slightly more irregular and may have slightly more fuzz than a Grade A yarn.

4.3 *Grade C Yarn*—Grade C yarn may have more neps, and larger ones as well as more fuzziness and a greater amount of foreign matter than Grade B yarn. The contrast between the thick and thin places and the normal diameter of the yarn may be greater than in Grade B yarn resulting in an over-all rougher appearance.

4.4 *Grade D Yarn*—Grade D yarn may have some slubs that are more than three times the average diameter of the yarn. Grade D yarn may have more neps, neps of a larger size, more thick and thin places, more fuzz and more foreign matter than Grade C yarn. When slubs or large neps are present, Grade D yarn may have fewer neps than Grade C yarn. Grade D yarn may have an over-all rougher appearance than Grade C yarn.

4.5 *Yarn Below Grade D*—Yarn below Grade D may have more defects and an overall rougher appearance than Grade D yarn.

NOTE 1—The permitted number of defects for any grade should always be determined by comparison with the official “ASTM Spun Yarn Appearance Standards” photographs.

5. Summary of Test Method

5.1 Yarn specimens, wound on black boards, are compared with photographs of specimens representing the appearance grades. The grade is based on fuzziness, neppiness, unevenness, and visible foreign matter.

TABLE 1 Requirements for Preparations of Specimens

Series	Range of Yarn Numbers		Count ^A	Wraps ^B	
	Single Cotton Count	Tex		per in.	per cm
1	1 to 12	590 to 50 +	8	20	8
2	12 + to 24	50 to 25 +	18	22	9
3	24 + to 36	25 to 16 +	30	26	10
4	36 + to 50	16 to 12 +	42	32	13
5	50 + to 75	12 to 8 +	60	38	15
6	75 + to 135	8 to 4 +	100	48	19

^A Actual single yarn count used on boards.

^B The specified number of wraps is subject to a tolerance of ± 10 %.

6. Significance and Use

6.1 This method is considered satisfactory for acceptance grading of commercial shipments because it has been used extensively in the trade for this purpose.

6.1.1 In case of dispute, the statistical bias, if any, between the laboratory of the purchaser and the laboratory of the supplier should be determined with each comparison being based on testing randomized specimens from one sample of material.

6.2 The appearance of a woven or knitted fabric depends to a large extent on the smoothness, cleanliness, and general appearance of the yarns from which the fabric is manufactured. Instruments are available for the measurement of unevenness and for counting neps and other imperfections in yarn, but the values obtained from such tests are not easily integrated into an over-all expression for actual fabric appearance. Yarn appearance grading affords additional information which the manufacturer of woven or knitted goods may, through experience, correlate with the appearance to be expected in fabrics made from the yarns.

7. Apparatus

7.1 *Spun Yarn Appearance Standards*⁴—A series of photographic standards representing Grades A, B, C, and D in six ranges of yarn numbers. Grade A is the highest and the others are progressively lower. The range of yarn numbers to be graded by each series is listed in Table 1. The standards are illustrated in Fig. 1.

7.2 *Yarn Grading Cabinet*⁵—A cabinet with storage space for the appearance standards, a shelf or rack on which one panel of standards and the specimen to be graded can be displayed, and lights mounted on brackets to illuminate the specimen and standards at the proper angle. A picture of the yarn appearance grading cabinet being used by a grader is shown in Fig. 2.

7.2.1 The lights on the cabinet shall consist of two units focused on the standard when in the grading position from a location about 300 mm (12 in.) in front with one unit slightly above and one unit slightly below the standards. Each unit shall be equipped with two 150-W daylight incandescent bulbs

⁴ Available from the ASTM Headquarters. Request adjunct No. as follows:

ADJD225501 (Series 1-79)	ADJD225504 (Series 4-79)
ADJD225502 (Series 2-79)	ADJD225505 (Series 5-79)
ADJD225503 (Series 3-79)	ADJD225506 (Series 6-79)

⁵ Prints of detailed drawings of a suitable cabinet are available from ASTM Headquarters. Request Adjunct No. ADJD2255.