



Standard Specifications for Fineness of Wool or Mohair and Assignment of Grade¹

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1. Scope

1.1 These specifications cover the classification, by fineness grade, of wool or mohair that is in the grease, pulled, washed, or scoured state, or in the form of card sliver.

1.2 These specifications are applicable also to assignment of grade for wool or mohair in spun materials or products processed beyond carding on the woolen system but not on the worsted system which involves a combing process.

NOTE 1—For fineness specifications for wool top, mohair top, and alpaca, refer to Specifications D 3992² and D 2252.³

2. Referenced Documents

2.1 ASTM Standards:

- D 123 Terminology Relating to Textiles³
- D 2130 Test Method for Diameter of Wool and Other Animal Fibers by Microprojection³
- D 2252 Specification for Fineness of Types of Alpaca³
- D 3992 Specification for Fineness of Wool Top or Mohair Top and Assignments of Grade²

2.2 Federal Standards:

- Official Standards of the United States for Grades of Wool, Section 31.0⁴
- Measurement Method for Determining Grade of Wool, Section 31.204⁴
- Official Standards of the United States for Grades of Grease Mohair, Section 32.1⁵
- Measurement Method for Determining Grade of Grease Mohair, Section 32.204⁵

NOTE 2—A discussion on the development of grease mohair standards can be found in the literature.^{6,7}

¹ These specifications are under the jurisdiction of ASTM Committee D-13 on Textiles and are the direct responsibility of Subcommittee D13.13 on Wool and Wool Felt.

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² *Annual Book of ASTM Standards*, Vol 07.02.

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

⁴ *Federal Register*, Vol 30, No. 161, Aug. 20, 1965, pp 10829-10833.

⁵ *Federal Register*, Vol 36, No. 129, July 3, 1971, pp 12681-12685.

⁶ Keller, H. R., Ray, H. D., Lineberry, C. T., and Pohle, E. M., "Fineness Relationship of Grease Mohair, Card Sliver, and Top," *Textile Research Journal*, Vol 42, No. 2, February 1971.

3. Terminology

3.1 Definitions:

3.1.1 *average fiber, diameter, n*—in wool and other animal fibers, the average width of a group of fibers when measured on a projected image.

3.1.2 *fineness, n*—of textile fibers, a relative measure of size, diameter, linear density or mass per unit length expressed in a variety of units.

3.1.2.1 *Discussion*—The fineness of wool and other animal fibers is expressed as the average fiber width or average fiber diameter in micrometres (μm).

3.1.3 *grade, n*—in wool and mohair, a numerical designation used in classifying wool and mohair in their raw, semi-processed, and processed forms based on average fiber diameter and variation of fiber diameter.

3.1.3.1 *Discussion*—This specification expresses the variation in fiber diameter by means of the standard deviation of the fiber diameter measurements.

3.1.3.2 The term "grade" should not be confused with the terms "quality" and "type." "Quality" is a term that includes not only fineness but also characteristics such as length, crimp, strength, elasticity, luster, tactile hand, and color, all of which affect the spinnability of the fiber and the properties of the resulting yarn and fabric. The Bradford designations, for which no standards exist, use a scale similar to that for grade designations (for example: 64s, 56s, and so forth) and refer to quality and not solely to fineness. "Type" is a term designating a particular combination of characteristics applicable to a specific use or descriptive of geographical origin, breed of sheep, or preparation for market.

3.1.4 *mohair, n*—the hair of the Angora goat, *Capra* species.

3.1.5 *wool, n*—the fibrous covering of the sheep, *Ovis* species.

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

4. Requirements

4.1 The grade of wool shall conform to the requirements of Table 1.

⁷ ASTM Research Report No. D13-1012. A copy is available from ASTM Headquarters, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

TABLE 1 Specifications for Grades of Wool^A

Grade	Range for Average Fiber Diameter, μm	Standard Deviation, max, μm
Finer than 80s	under 17.70	3.59
80s	17.70 to 19.14	4.09
70s	19.15 to 20.59	4.59
64s	20.60 to 22.04	5.19
62s	22.05 to 23.49	5.89
60s	23.50 to 24.94	6.49
58s	24.95 to 26.39	7.09
56s	26.40 to 27.84	7.59
54s	27.85 to 29.29	8.19
50s	29.30 to 30.99	8.69
48s	31.00 to 32.69	9.09
46s	32.70 to 34.39	9.59
44s	34.40 to 36.19	10.09
40s	36.20 to 38.09	10.69
36s	38.10 to 40.20	11.19
Coarser than 36s	over 40.20	

^A The specifications in this table conform to the Official Standards of the United States for Grades of Wool as promulgated by the U.S. Department of Agriculture, effective Jan. 1, 1966.

4.2 The grade of mohair shall conform to the requirements of Table 2.

5. Significance and Use

5.1 These specifications are considered satisfactory for classifying wool or mohair by grade and provide a basis for acceptance of commercial shipments.

5.2 Grade determined by visual examination is a common trade practice. In case of doubt or dispute, comparison of the measured average fiber diameter and fiber diameter standard deviation with the respective specification shall be used as the referee procedure for assigning grade.

5.3 This specification is not intended for application to mixed lots, that is, lots of wool or mohair consisting of fleeces of different grades that are to be segregated into smaller more homogeneous lots before use.

6. Test Method

6.1 Test the material as directed in Test Method D 2130. Measure at least the minimum number of fibers needed to attain confidence limits of the mean within $\pm 0.4 \mu\text{m}$ at a probability level of 95 % (see Annex A1 of Test Method D 2130).

TABLE 2 Specifications for Grades of Mohair^A

Grade	Range for Average Fiber Diameter, μm	Standard Deviation, max, μm
Finer than 40s	under 23.01	7.2
40s	23.01 to 25.00	7.6
36s	25.01 to 27.00	8.0
32s	27.01 to 29.00	8.4
30s	29.01 to 31.00	8.8
28s	31.01 to 33.00	9.2
26s	33.01 to 35.00	9.6
24s	35.01 to 37.00	10.0
22s	37.01 to 39.00	10.5
20s	39.01 to 41.00	11.0
18s	41.01 to 43.00	11.5
Coarser than 18s	over 43.01	

^A The specifications in this table conform to the Official Standards of the United States for Grades of Grease Mohair as promulgated by the U.S. Department of Agriculture, effective Aug. 1, 1971.

6.1.1 In case of dispute the microprojector procedure, Test Method D 2130, is specified as the referee method.

7. Assignment of Grade

7.1 Compare the observed average fiber diameter and standard deviation in fiber diameter, determined as directed in Section 6, with the specifications for the various grades for the material being tested.

7.1.1 *Wool*—Assign the grade that corresponds to the average fiber diameter and maximum standard deviation requirements specified in Table 1. If the observed standard deviation exceeds the maximum specified for the grade to which the observed average fiber diameter corresponds, assign to the wool the next coarser grade. Assignment of grade is illustrated by the following examples:

7.1.1.1 *Example 1*—Average fiber diameter, 27.25 μm ; standard deviation, 6.72 μm ; assigned grade, 56s.

7.1.1.2 *Example 2*—Average fiber diameter, 27.25 μm ; standard deviation, 7.80 μm ; assigned grade, 54s.

7.1.1.3 *Example 3*—Average fiber diameter, 27.25 μm ; standard deviation, 8.50 μm ; assigned grade, 54s.

7.1.2 *Mohair*—Assign the grade that corresponds to the average fiber diameter and maximum standard deviation requirements specified in Table 2. If the observed standard deviation exceeds the maximum specified for the grade to which the observed average fiber diameter corresponds, assign to the mohair a dual grade designation, the second designation being one grade coarser than the grade to which the average fiber diameter corresponds. Assignment of grade is illustrated by the following examples:

7.1.2.1 *Example 1*—Average fiber diameter, 28.50 μm ; standard deviation, 8.1 μm ; grade designation, 32s.

7.1.2.2 *Example 2*—Average fiber diameter, 28.50 μm ; standard deviation, 8.6 μm ; grade designation, 32/30s.

7.2 *Interpretation of Results*—The true average fiber diameter of a lot of wool or mohair can be determined only by measurement of every fiber in the lot. Since this is not practicable, reliance is placed on the result obtained through the measurement of a sample. The likelihood that the observed average fiber diameter correctly identifies the grade increases as the average approaches the midpoint of the fineness range of the grade concerned, and decreases as the average approaches either limit of such range. The probability of the correctness of the grade designation of a lot may be increased by increasing the number of fibers measured.

8. Conformance

8.1 When the purchaser and the supplier have agreed upon specific requirements for fineness, wool or mohair that fails to meet those requirements may be rejected. Rejection should be reported to the supplier in writing. In case of disagreement with the results of the tests, the supplier may make claim for a retest.

9. Keywords

9.1 animal fibers (except wool); number grade; wool; yarn

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