Designation: D 2720 – 94 (Reapproved 2000)

Standard Practice for Calculation of Commercial Weight and Yield of Scoured Wool, Top, and Noil for Various Commercial Compositions[1]

This standard is issued under the fixed designation D 2720; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice includes, in Table 1, the commercial composition corresponding to different commercial designations for scoured wool, wool top, and wool noil, all of which contain, in addition to wool base, various percentages of moisture, material extractable with alcohol, and mineral matter.

1.2 This practice includes directions for the calculation of the commercial weight of wool corresponding to different commercial designations for several forms of wool, and for converting the commercial weight (mass) calculated on one basis to the commercial weight calculated on a different basis.

1.3 This practice also includes directions for calculating the yield, on various commercial designation bases, obtained by processing raw wool, and for converting the yield calculated on one commercial designation basis to the yield on another commercial designation basis.

NOTE 1—Because of trade practice the term "weight" is used in this practice instead of the technically correct term "mass".

1.4 *This standard does not purport to address all of the safety concerns, if any, 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. Referenced Documents

2.1 *ASTM Standards:*

D 123 Terminology Relating to Textiles[2]

D 584 Test Method for Wool Content of Raw Wool—Laboratory Scale[2]

D 1113 Test Method for Vegetable Matter and Other Alkali-Insoluble Impurities in Scoured Wool[2]

D 1574 Test Method for Extractable Matter in Wool[2]

D 1576 Test Method for Moisture in Wool by Oven-Drying[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *commercial composition, n— in wool*, the percentages by weight of wool base, moisture, and other nonwool-base components in wool to which a specific commercial designation is applied. (Compare *commercial weight*.)

TABLE 1 Commercial Composition of Commercially Designated Scoured Wool, Wool Top, and Wool Noil

	Percentage		
	Wool Base	Moisture	Other Components
ASTM Clean Wool Fiber Present[A]	86.0000	12.0000	2.0000
U.S. Customs Absolute Clean Content[B]	86.0000	12.0000	2.0000
IWTO Clean Wool Content[C]	83.5299	14.5299	1.9402
American Oil Combed Top[D,E]	82.4222	13.0435	4.5343
American Oil Combed Noil[D,E]	83.4113	12.0000	4.5887
American Dry Combed Top[D,E]	84.1454	13.0435	2.8111
American Dry Combed Noil[D,E]	85.1552	12.0000	2.8448
Bradford Oil Combed Top[D,E]	79.2980	15.9664	4.7356
Bradford Oil Combed Noil[D,E]	82.7760	12.2807	4.9433
Bradford Dry Combed Top[D,E]	82.6449	15.4334	1.9217
Bradford Dry Combed Noil[D,E]	85.7260	12.2807	1.9933
IWTO Noble Oil Combed Top[C]	79.2995	15.9664	4.7341
IWTO Noble Oil Combed Noil[C]	82.7775	12.2807	4.9418
IWTO Noble Dry Combed Top[C]	82.6469	15.4334	1.9197
IWTO Noble Dry Combed Noil[C]	85.7281	12.2807	1.9912
Schlumberger Oil Combed Top[C]	79.2995	15.9664	4.7341
Schlumberger Oil Combed Noil[C]	81.3503	13.7931	4.8566
Schlumberger Dry Combed Top[C]	82.6469	15.4334	1.9197
Schlumberger Dry Combed Noil[C]	84.2500	13.7931	1.9569

[A] ASTM Method D 584, Test for Wool Content of Raw Wool, Laboratory Scale.
[B] *Tariff Schedules of the United States of America* (1975), Schedule 3, Part 1, Subpart C, Headnote 1(c).
[C] *IWTO Core Test Regulations,* 1974, International Wool Textile Organization.
[D] *Circular No. 3267,* Nov. 10, 1954, Boston Wool Trade Assn.
[E] *Circular No. 4899,* Nov. 2, 1967, Boston Wool Trade Assn.

3.1.2 *commercial designation, n— in wool*, a term applied to a lot of wool in a stated form, and having a specified commercial composition.

3.1.3 *commercial weight, n*—billed weight as determined by a generally accepted method or as agreed to by the purchaser and the seller.

3.1.3.1 *Discussion*—For shipments of commercially designated scoured wool, wool top, or wool noil, the generally accepted commercial weight is the weight of wool base contained in the shipment as determined by definite prescribed methods, plus the weights of moisture and other components corresponding to the commercial composition of the commercially designated material. Table 1 lists the common commercial designations for scoured wool, wool top, and wool noil, and their respective commercial compositions.

3.1.4 *oven-dried, adj*—the condition of a material that has been heated under prescribed conditions of temperature and

[1] This practice is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.13 on Wool and Wool Felt.
Current edition approved Dec. 15, 1994. Published February 1995. Originally published as D 2720 – 68 T. Last previous edition D 2720 – 90.
[2] *Annual Book of ASTM Standards,* Vol 07.01.

TABLE 2 Wool Yield Conversion Factors

NOTE 1—Factors in this table are those generally used by the wool trade in the United States of America to convert certain commercially designated estimated yields from one basis to another.

From To	U.S. Customs Clean Yield[A]	American Oil Combed Yield	American Dry Combed Yield	Bradford Oil Combed Yield[B]	Bradford Dry Combed Yield[B]
U.S. Customs Clean Yield[A]	...	1.0419	1.0206	1.0790	1.0361
American Oil Combed Yield	0.9598	...	0.9795	1.0356	0.9944
American Dry Combed Yield	0.9798	1.0209	...	1.0573	1.0152
Bradford Oil Combed Yield[B]	0.9267	0.9656	0.9458	...	0.9602
Bradford Dry Combed Yield[B]	0.9651	1.0056	0.9850	1.0414	...

[A] U.S. Customs Clean Yield = U.S. Customs Absolute Clean Content minus allowance for processing loss.

[B] These terms should not be confused with the similar commonly used terms "Bradford Oil Combed Top and Noil Yield'' and" Bradford Dry Combed Top and Noil Yield.'' The latter terms are based on estimated processing allowances and a ratio of top to noil that are different from those on which this table is based.

humidity until there is no further significant change in its mass.

3.1.4.1 *Discussion*—As the term "oven-dried" is used in this recommended practice, the prescribed conditions are heating to 105 ± 2°C in a forced-draft oven supplied with air from an atmosphere having a relative humidity of 65 ± 2 % at a temperature of 20 ± 2°C. A temperature of 20 ± 2°C is used in this recommended practice instead of 21.1 ± 1°C because international testing is frequently involved.

3.1.5 *vegetable matter base, n— in raw wool*, oven-dried scoured burrs, seeds, twigs, leaves, and grasses, free of mineral matter and alcohol-extractable matter.

3.1.6 *wool base, n*—oven-dried scoured wool free of alcohol-extractable matter, mineral matter, vegetable matter, and all impurities.

3.1.7 *yield, n—of wool*, the percentage of a designated commercial composition obtained by processing a lot of raw wool. (See also *commercial composition*.)

3.1.8 For the definition of wool and other textile terms used in this practice, refer to Terminology D 123.

4. Commercial Compositions of Commercially Designated Wool

4.1 *Significance and Use*—Commercial scoured wool, top, and clean noil contain, in addition to wool base, varying percentages of moisture, oil or fat, other solvent-extractable material, mineral matter, and perhaps other impurities. To establish a basis for commercial or legal weights for these commodities, various organizations representing interested groups use specific commercial designations, such as Clean Wool Fiber Present, for each of which a commercial composition is specified.

4.2 A number of commercial designations widely used in the wool trade are listed in Table 1 with their commercial compositions.

5. Commercial Weight of Lots of Commercially Designated Wool

5.1 *Significance and Use*:

5.1.1 The observed composition of a lot of wool to which a named commercial designation is applied, such as a shipment of American Dry Combed Top, may and usually does differ from the commercial composition, in which case the observed weight of the lot is adjusted to secure the commercial weight.

5.1.2 The commercial compositions are used also in calculations to convert the commercial weight of a lot of wool having a named commercial designation (for example, American Oil Combed Top) to the equivalent commercial weight on a different commercial designation basis (for example, Bradford Dry Combed Top).

5.2 *Calculation of Commercial Weight*— To adjust the observed weight of a lot of wool to which a named commercial designation is applied to its commercial weight, determine the composition of the lot of wool at the time of weighing and use Eq 1:

$$W = O \times (b/B) \quad (1)$$

where:

W = commercial weight of the lot,
O = observed weight of the lot,
B = percentage of wool base specified in the applicable commercial composition (Table 1), and
b = observed wool base content, as a percentage of the observed weight of the lot.

5.3 *Conversion of Commercial Weights*— To convert the commercial weight of a lot of wool (5.2) from one commercial designation basis to another, use Eq 2:

$$W_2 = W_1 \times B_1/B_2 \quad (2)$$

where:

W_1, W_2 = commercial weights of a lot of wool on the bases of commercial designations 1 and 2, respectively, and
B_1, B_2 = percentages of wool base specified in the commercial compositions for commercial designations 1 and 2, respectively (Table 1).

Example 1—The commercial weight of a lot of Bradford Oil Combed Top is 16 249 lb. What is the equivalent commercial weight of the lot in terms of American Oil Combed Top?

Equivalent commercial weight of American Oil Combed Top, lb

= 16 249 × 79.2980/82.4222
= 15 633

6. Estimated Yield

6.1 *Significance and Use*:

6.1.1 The U.S. Customs duty on a lot of imported raw wool, and commercial transactions, are based on the total commercial weight of wool in one or more named commercially designated forms which is expected to be obtained when the lot of raw wool is processed in a specified manner. The expected yield is often estimated visually by experts. A growing practice is to

base the estimate on the observed content of wool base in the lot, with a specified allowance for that portion of the wool base content not expected to be recovered in one of the designated forms, and on specified proportions for the weights of wool base in the several forms of wool included in the estimate of yield.

6.1.2 For commercial purposes it is often necessary to convert an estimated yield from one commercial designation basis to another. Under certain conditions convenient conversion factors may be used for this purpose.

6.2 *Calculation of Estimated Yield*— To calculate, from the observed wool base content of a lot of raw wool, the estimated yield of wool in one or more forms to which commercial designations are applied, use Eq 3:

$$Y = (b - A)(f_1/B_1 + f_2/B_2 + \ldots) \times 100 \quad (3)$$

where:

Y = estimated yield of wool in named commercially designated forms, as a percentage of the observed weight of the raw wool,

b = observed wool base content, as a percentage of the observed weight of the raw wool,

A = specified allowance for the fraction of b that is not expected to be obtained in one of the forms included in the estimated yield,

$f_1, f_2, \ldots$ = specified fractions of (b − A) that are expected to be obtained in forms 1, 2, . . ., respectively, included in the yield,

$B_1, B_2, \ldots$ = percentages of wool base specified in the commercial compositions for commercial designations 1, 2, . . ., respectively (Table 1).

Example 2—A lot of raw wool has an observed wool base content of *b* %. What are its estimated American Oil Combed Yield (AOCY) and its U.S. Customs Clean Yield (USCCY), if the agreed allowance is *A* % in both cases and the agreed ratio of the weight of wool base in the form of top to the weight of wool base in the form of noil is 88 to 12?

$$\text{AOCY, \%} = 100(b - A)(0.88/82.4222 + 0.12/83.4113) = 1.21154(b - A)$$

$$\text{USCCY, \%} = 100(b - A)(1/86) = 1.16279(b - A)$$

Express the USCCY in terms of the AOCY

$$\text{USCCY, \%} = \text{AOCY, \%} \times 1.16279(b - A)/1.21154(b - A) = 0.9598 \times \text{AOCY, \%}$$

6.2.1 If *A* in Eq 3 is zero, the calculated value of *Y* is termed the Theoretical Commercial Yield, that is, the yield of commercially designated products that would be obtained if all the wool base were converted to those products without loss of wool base.

6.3 *Factors for Conversion of Estimated Yields*:

6.3.1 The values of f_1 in Eq 3 are specified constants in each commercial yield designation. The allowance, *A*, in Eq 3 is a variable and not necessarily the same for a given lot of raw wool in all commercial yield designations. When the same value for *A* for a given lot of raw wool is specified in a group or class of commercial yield designations, a factor can be used to convert the yield at one commercial designation in the group to the yield at another commercial designation in the group, as shown in Eq 4:

$$\text{Yield (new designation)} = \text{factor x yield (starting designation)} \quad (4)$$

6.3.2 Factors for use in Eq 4 are calculated using Eq 5:

$$\text{factor} = \frac{(f_{1.N}/B_{1.N} + f_{2.N}/B_{2.N} + \ldots)}{(f_{1.S}/B_{1.S} + f_{2.S}/B_{2.S} + \ldots)} \quad (5)$$

where the general meaning of $f_1, f_2, \ldots$ and $B_1, B_2 \ldots$ are as specified in 6.2 except that the second part of each subscript indicates whether the value is for the new or starting commercial designation.

6.3.3 The commercial designations for estimated yield and the factors for their interconversion that are commonly used by the wool trade in the United States of America are those recommended by the Boston Wool Trade Association.[3,4] These commercial designations and conversion factors are shown in Table 2. They were calculated using Eq 5 under the following specified conditions:

6.3.3.1 The value for *f* for top is 0.88; for noil, 0.12; for U.S. Customs Clean Yield, 1.0.

6.3.3.2 The values of the B_1 are those tabulated in Table 1 for the respective commercial designations.

6.3.3.3 The allowance, *A*, for each of the commercial designations listed in Table 2 is that calculated using Eq 6 (Note 2):

$$A = 0.005\, b + 0.6\, v \quad (6)$$

where:

A = allowance, not to exceed 0.15b, as a percentage of the observed weight of the raw wool,

b = observed wool base content as a percentage of the observed weight of the raw wool, and

v = observed vegetable-matter base that was present in the lot of raw wool, as a percentage of the observed weight of the raw wool.

Example 3—A lot of greasy wool has a U.S. Customs Clean Yield of 10 000 lb. Verify and use the factor in Table 2 for estimating the equivalent Bradford Oil Combed Yield.

$$\text{Factor} = \frac{(0.88/79.2980) + (0.12/82.7760)}{1/86} = 1.0790 \quad (7)$$

$$\text{Yield (Bradford Oil Combed)} = 1.0790 \times 10\,000 = 10\,790 \text{ lb} \quad (8)$$

NOTE 2—Eq 6 is the equivalent of the one prescribed by law[5] for the allowance in calculating U.S. Customs Clean Yield. A different allowance for estimating combing yields (to which other commercial designations are applied) is specified by the International Wool Textile Organization.[6]

7. Keywords

7.1 commercial mass; wool; yield

[3] Circular No. 3267, Nov. 10, 1954, Boston Wool Trade Assn.

[4] Circular No. 4899, Nov. 2, 1967, Boston Wool Trade Assn., 263 Summer St., Room 407, Boston, MA 02210.

[5] *Tariff Schedules of the United States of America* (1975), Schedule 3, Part 1, Subpart C, Headnote 1(*c*).

[6] *IWTO Core Test Regulations* (1974), International Wool Textile Organization, International Wool Secretariat, Ilkley, West Yorkshire, U.K., LS298PB.