



Designation: D4524 – 20

## Standard Test Method for Composition of Plumage<sup>1</sup>

This standard is issued under the fixed designation D4524; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the quantitative determination of the components found in plumage. The test method is applicable for plumage found in bulk form or in finished consumer products.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>  
[D123 Terminology Relating to Textiles](#)  
[D7022 Terminology Relating to Apparel](#)

2.2 *Other Documents:*

[Fed Std. No. 148a–1964 Method 2: Determination of Composition Feather Filling Materials](#)<sup>3</sup>

[ABFLO: Quantitative Determination of Feather and Down in Plumage](#)<sup>4</sup>

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.61 on Apparel.

Current edition approved Feb. 1, 2020. Published March 2020. Originally approved in 1986. Last previous edition approved in 2012 as D4524 – 86 (2012). DOI: 10.1520/D4524-20.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from the General Services Administration Business Service Center, 1800 F Street, NW, Washington, DC 20407.

<sup>4</sup> Available from Association of Bedding and Law Officials, Texas Dept. of Health, 1100 W. 49th St., Austin, TX 78756.

[FTC Guides for the Feather and Down Products Industry, 1998](#)<sup>5</sup>

### 3. Terminology

3.1 For all terminology related to Apparel, see Terminology [D7022](#).

3.1.1 The following terms are relevant to this standard: plumage.

3.2 For the definitions of all other textile terms, refer to Terminology [D123](#).

### 4. Summary of Test Method

4.1 A representative sample of plumage is selected from the product being tested. The contents of the sample are identified and separated into component parts. Those component parts are measured and reported as a percentage of the whole.

### 5. Significance and Use

5.1 This test method may be used for acceptance testing of commercial shipments of bulk plumage. Acceptance tolerances of content must be established between the purchaser and seller of bulk shipments of plumage, which also must comply with state and federal agency regulations, as appropriate.

5.1.1 In case of a dispute arising from differences in reported test results when using Test Method D4524 for acceptance testing of commercial shipments, the purchaser and the supplier should conduct comparative tests to determine if there is a statistical bias between their laboratories. Competent statistical assistance is recommended for the investigation of bias. As a minimum, the two parties should take a group of test specimens that are as homogeneous as possible and that are from a lot of material of the type in question. The test specimens should then be randomly assigned in equal numbers to each laboratory for testing. The average results from the two laboratories should be compared using Student's *t*-test for unpaired data and an acceptable probability level chosen by the two parties before the testing is begun. If a bias is found, either its cause must be found and corrected or the purchaser and the supplier must agree to interpret test results in the light of the known bias.

<sup>5</sup> Available from the Federal Trade Commission, 600 Pennsylvania Ave. N.W., Washington, DC 20580.

5.2 This test method may also be applicable to the acceptance of consumer products that use plumage as a filling material. Such consumer products include pillows, comforters, sleeping bags, garments, furniture, and mattresses. Acceptance tolerances of content are established by distributors, importers, state or federal regulatory agencies. See 5.1.1.

6. Apparatus

6.1 *Separating Cabinet*—A box or cabinet for separating and identifying the components of plumage. The box should have the following approximate dimensions:

- Base—450 by 300 mm (18 by 12 in.) wide
- Front—150 mm (6 in.) high
- Back—300 mm (12 in.) high

The top of the box will be glass to permit the separation to be observed visually. The front of the box will have an open section that will permit the operator’s hands to enter the cabinet. Sufficient freedom of movement must be allowed so that the components can be examined and segregated. The cabinet should be equipped with a light to provide sufficient illumination of its interior. The interior cabinet color must be of dark color to provide contrast with the plumage. See Fig. 1.

6.2 *Weighing Containers*—Ten tared weighing bottles or beakers to segregate the components and contain them during weighing.

6.3 *Forceps*, suitable for picking up components of the plumage.

6.4 *Balance*, having a capability adequate for weighing specimens and containers with a sensitivity of 0.0001 g.

6.5 *Mixing Containers*—One large box or container approximately 500 by 500 by 500 mm that is used to hold the sample plumage to be analyzed. Another smaller mixing container approximately 300 by 300 by 150 mm. The interior of the mixing boxes shall be smooth to avoid plumage entrapment.

7. Sampling

7.1 *Lot Sample*—As a lot sample for acceptance testing, select at random the number of bales, bags, or other shipping containers as directed in an applicable material specification or other agreement between the purchaser and the supplier. In the absence of such an agreement, randomly select 30 % of the shipping containers. From each of the shipping containers selected, remove a sample sufficient in mass to obtain a total lot sample of 300 g. Consider the shipping containers to be the primary sampling units. (See Note 1).

NOTE 1—An adequate specification or other agreement between the purchaser and the supplier requires taking into account the variability between and within shipping containers to provide a sampling plan with a meaningful producer’s risk, consumer’s risk, acceptable quality level, and limiting quality level.

7.2 *Laboratory Sample*—As a laboratory sample for acceptance testing, randomly take portions of plumage from each lot sample submitted weighing at least 10 g each from the upper, middle, and lower portion of the sample submitted, drawing each sample from the middle of the submitted sample. Combine the three portions from the lot sample into a composite sample and use it as a test specimen for that sample submitted.

8. Procedure

8.1 *Specimen Reduction:*

8.1.1 Place the sample plumage in the larger mixing container and mix well by turning the plumage with the hands. Do not stir the sample with a stick.

8.1.2 Draw the specimen to be analyzed from three sections of the mixing container (top, middle, and bottom) to weigh approximately 4 g.

8.2 *Preliminary Separation:*

8.2.1 Place the test specimen in the separating cabinet and begin the separation into plumage components.

8.2.2 With the forceps, remove all feathers from the plumage. Brush the feathers between the thumb and index fingers of one hand to remove any down, fiber, or residue caught therein.

8.2.3 Separate the feathers into whole waterfowl feathers (Container A), damaged waterfowl feathers (Container C), and landfowl feathers (Container B) and place each into an individual tared weighing container.

8.2.4 Place the down cluster, plumules, down fiber, and feather fiber that are all combined in the fourth tared weighing container (Container E).

8.2.5 Place the quill feathers in a fifth tared weighing container (Container Q).

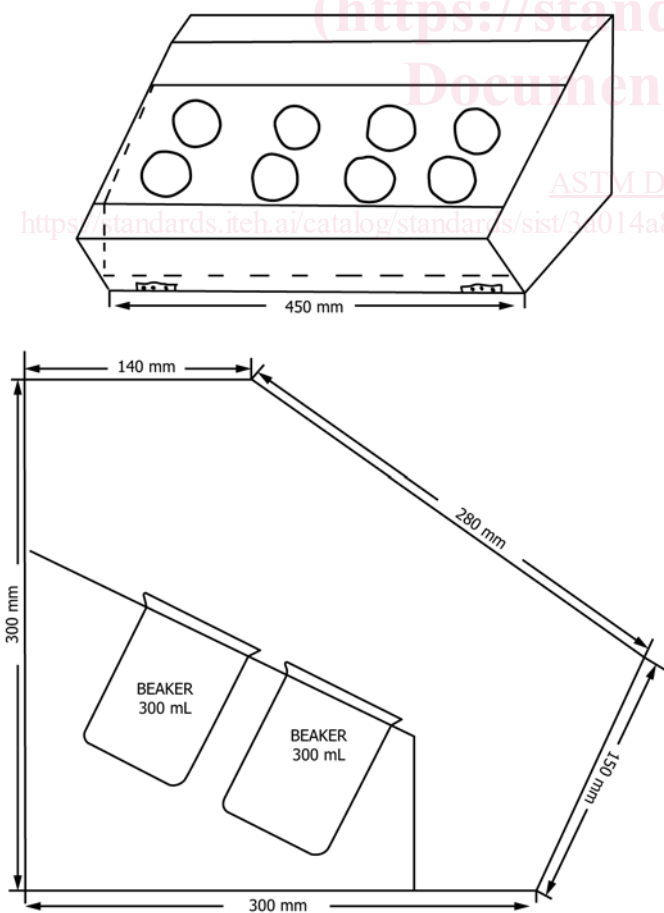


FIG. 1 Down and Feather Separating Cabinet