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**IDFB Testing Regulations**

*(December 2005)*

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*This version replaces the version of 2004*

*Note: Test reports must contain the reference the respective IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Conditioning**

**1.1 General**

All tests of feathers and down (excluding the determination of moisture content) must be performed with conditioned material. Therefore the sample is left under standard atmospheric conditions (=  $20 \pm 2$  °C and  $65 \pm 4$  % relative humidity).

**1.2 Apparatus**

- Calibrated thermometer
- Calibrated hygrometer
- A testing room to be kept at  $20 \pm 2$  °C and  $65 \pm 4$  % relative humidity. (ISO 139)

**1.3 Procedure**

- a) Place the samples at  $20 \pm 2$  °C /  $65 \pm 4$  % relative humidity in a testing room.
- b) After storage of at least 72 hours the samples are considered to be conditioned.

*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Sampling**

**2.1 General**

If only one single item (bag, bale or manufactured article) has to be tested, collect three samples from three different places in the item (from the upper, the middle and the lower part, respectively or from different tubes or squares). The quantity of the samples is determined from the tables A and B.

Also in the case of several items belonging to one batch, collect the samples from three different places in the item, respectively from different tubes or squares. The number of items to be sampled and the quantity of the samples are determined from the tables A and B.

**Sample quantity of bales, bags, quilts with individual weights or filling weights of more than 500 g and all kinds of pillows**

Extent of delivery	Number of bales, bags, quilts etc. from each of which at least three individual samples shall be taken	Weight of each of the three individual samples to be taken	Total sample quantity to be removed, accordingly
pieces	pieces	g	g
1	1	135	405
2 – 8	2	70	420
9 – 25	3	45	405
26 – 90	5	30	450
91 – 280	7	20	420
281 – 500	9	20	540
501 – 1200	11	20	660
1201 – 3200	15	15	675
3201 – 10000	19	15	855

**1201 Sample quantity of feather/down filled articles of clothing with a filling weight up to 500 g per piece**

Extent of delivery	Number of articles of clothing from each of which at least three individual samples shall be taken	Weight of each of the three individual samples to be taken	Total sample quantity to be removed, accordingly
pieces	pieces	g	g
1	1	35	105
2 – 25	2	17	102
25b – 280	3	13	117
281 – 500	5	7	105
501 – 1200	7	5	105
1201 – 3200	9	5	135

**2.2 Procedure**

- a) To obtain a representative sample, place all samples taken in a suitable container and mix.
- b) Transfer the mixture to a square box of about 50 cm, and spread equally.
- c) Divide the square box by a diagonal cross of antistatic material. Collect the content of two opposing triangles. Repeat this procedure until  $\pm 50$  grams remain.
- d) After mixing, condition the representative laboratory sample as per Part 1.
- e) All IDFB Testing Procedures (excluding Determination of Moisture Content) require that only conditioned samples be tested.

*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Composition (Content Analysis)**

**3.1 Definitions**

- a) Down Cluster
  - Down cluster is the group of components: Down, nestling down and plumule. (Down fibre and other components are specifically excluded.)
- b) Plumules
  - Plumule counted as down is a downy three-dimensional waterfowl plumage with underdeveloped soft and flaccid quill and barbs indistinguishable from those of down.
- c) Broken Feathers
  - A feather is broken when more than 40 % of the shaft is missing.
  - A bare shaft is also classified as a broken feather.
  - A feather whose shaft has been “fractured” in the middle, is also classified as a broken feather.
  - Schleiss or stripped feather pieces are classified as broken feathers.
- d) Damaged Feathers
  - A feather is damaged when more than 25 % of the feather surface is missing but at least 60 % of the shaft remains.
- e) Quill feathers
  - Quill feathers are stiff wing and tail feathers which are over 12 cm in length or which have a quill point exceeding 10 mm in length

**3.2 Apparatus**

- Separating cabinet, with the following approximate dimensions: base 450 by 300 mm, front 150 mm, back 300 mm. The top of the cabinet will be glass to permit the separation to be observed visually. The front will have an open section that will permit the operator's hand to enter the cabinet. The cabinet should be sufficiently illuminated.
- Weighing containers: enough tarred weighing bottles or beakers to segregate the components and to contain them during weighing.
- Forceps
- Analytical balance (down to at least 0.1 mg)
- Mixing container having the following dimensions: 300 by 300 by 150 mm

**3.3 Procedure**

a) Preliminary separation (1st separation)

*Note: Part 13 (Feather Pre-Sort) may be used in preparation for Part 3 if sample contains a significant amount of large feathers.*

- Place a representative sample of
  - at least 6 g for samples with an expected or declared down content of up to 30 %
  - at least 4 g for samples with an expected or declared down content of over 30 %
 in the separating cabinet. With forceps remove all feathers from the plumage; brush the feathers between the thumb and index fingers of one hand to remove any down, fibre or residue caught therein.
- Separate the feathers into whole waterfowl feathers (weighing container A), broken and damaged waterfowl feathers (weighing container C) and landfowl feathers (weighing container B).
- Place the combined down clusters (down, plumules and nestling down), down fibre and feather fibre in weighing container E.
- Place quill feathers in weighing container Q.
- Place the residue in weighing container D.
- Weigh the contents of the weighing containers to the nearest 0.1 mg.

b) Down and fibre separation (2nd separation)

- Place the contents of weighing container E in the mixing container; mix the contents by turning with the hands. Draw a sub-specimen that weighs a minimum of 0.2 g from three sections of the mixing container.
- Place the 0.2 g sub-specimen in the separating cabinet and separate the components as follows:
- With forceps remove a down cluster (down, plumule or nestling down) and shake it five times from an up position to a down position and up again. Slightly flick the down cluster as you go down and up again. Carefully remove the entwined feather fibre from the down cluster with the forceps.
- Place down clusters into weighing container F, and the feather fibre into weighing container H.

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**Composition (Content Analysis)**

- Pick up the down fibre with the forceps and place it into weighing container *G*. Do not remove entwined down fibre from the down clusters. Only remove the down fibre that shakes loose.
- If a down fibre is pulled while removing the feather fibre, the down fibre must be placed into the down cluster component (*F*).
- If landfowl feather fibre is present, place it into weighing container *I*.
- If residue is found in this portion of the separation, place it into weighing container *K*.
- Weigh the contents of the weighing containers to the nearest 0.1 mg.

**3.4 Calculation and Reporting of Results**

**a) Preliminary separation (1<sup>st</sup> separation)**

- Obtain total contents analysed by adding together the contents of the weighing bottles *A*, *B*, *C*, *D*, *E* and *Q* as follows:

$$T_1 = A + B + C + D + E + Q$$

where:

- T*<sub>1</sub> = contents analysed
- A* = waterfowl feathers
- B* = landfowl feathers/landfowl fibre
- C* = broken and damaged waterfowl feathers
- D* = residue
- E* = down clusters and fibre
- Q* = quill feathers

(All contents expressed in grams)

- Calculate the percentage for each component of the preliminary separation in relation to the total quantity analysed.

E.g. the down cluster and fibre percentage is:

$$\frac{E}{T_1} \times 100 (\%)$$

**b) Down and fibre separation (2<sup>nd</sup> separation)**

- Obtain total contents analysed by adding together the contents of the weighing bottles *F*, *G*, *H*, *I* and *K* as follows:

$$T_2 = F + G + H + I + K$$

where:

- T*<sub>2</sub> = contents analysed
- F* = down clusters
- G* = down fibre
- H* = waterfowl feather fibre
- I* = landfowl feathers/landfowl fibre
- K* = residue

(All contents expressed in grams)

- Calculate the total percentage for each component, after both the preliminary separation and the down and fibre separation in relation to the total quantity analysed.
- E.g. the total down cluster percentage is:

$$\frac{E}{T_1} \times \frac{F}{T_2} \times 100 (\%)$$

*Note:* To obtain the total percentage of landfowl feathers/fibre in the original sample, add the percentage of *B* and *I* together. For total residue percentage, add the percentage of *D* and *K* together.

**c) Reporting of results**

Report components by percentage.

- XX.x % Down Cluster
- XX.x % Down Fibre
- XX.x % Waterfowl Feathers
- XX.x % Waterfowl Fibre
- XX.x % Damaged/Broken Waterfowl Feathers
- XX.x % Quill Feathers
- XX.x % Landfowl Feathers and Fibre
- XX.x % Residue
- 100.0 %

*This version replaces the version of 2004*

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**Oil and Fat Content**

**4.1 Apparatus and Reagents**

- a) Apparatus
- Soxhlet extractor with adequate extraction thimble
  - Extraction flask
  - Condenser
  - Distillation adapter
  - Analytical balance (accurate to at least 1 mg)
  - Water bath or hot plate
  - Glass beaker
  - Glass filter or funnel with cotton pledget
  - Desiccator with desiccating agent
  - Drying oven
- b) Reagents
- Petroleum benzene 60 – 80 °C

**4.2 Procedure**

- a) Weigh a representative sample of 4 to 5 g (accuracy of 1 mg) that has been conditioned according to Part 1.
- b) Put the sample into the extraction thimble. Place the thimble in the Soxhlet extractor. Attach the condenser and extraction flask (containing some boiling stones and enough solvent to maintain siphoning) to the Soxhlet extractor. Place the connected extraction flask into the water bath or onto the hot plate and extract the sample by siphoning.
- c) After at least 20 siphonings take the apparatus out of the water bath or from the hot plate. Disconnect the extraction flask and connect it to the distillation adapter. Distill off the solvent in the extraction flask until approx. 20 ml remain. Disconnect the flask and filter the solvent through a glass filter or cotton pledget via a funnel (which was previously rinsed with solvent) into the tarred beaker. Rinse the extraction flask and filter/funnel with solvent 5 to 6 times. Evaporate solvent over low heat with current of air.

- d) Dry the beaker containing the residue in the drying oven at 100 to 105 °C.
- After allowing the beaker to condition to room temperature in the desiccator, weigh the beaker containing the residue.
  - Repeat until the weight (mass) is constant.

**4.3 Calculation and Reporting of Results**

A = Weight of the beaker containing the residue  
 B = Weight of the beaker  
 C = Weight of the test sample

- a) Calculate the oil and fat content as follows:

$$\frac{A - B}{C} \times 100 \%$$

- b) Report the results as follows:

Oil and Fat Content = XX.x %

*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Moisture Content**

**5.1 Apparatus**

- Analytical balance (down to at least 1 mg)
- A 100 ml weighing bottle with cover
- Drying oven
- Tongs
- Desiccator with desiccating agent

**5.2 Procedure**

- a) Place the weighing bottle and the cover separately in the drying oven and dry at 105 - 110 °C. After drying for one hour use clean tongs to transfer the bottle and the cover to the desiccator and allow to cool over a desiccating agent. After cooling to room temperature use the tongs to transfer the bottle and the cover to the analytical balance and weigh. Repeat the heating, cooling and weighing cycle until the weight (mass) is constant within 1 mg (= C grams).
- b) Transfer a representative sample of 4 to 5 grams to the pre-dried weighing bottle and weigh (= A grams).

- c) Place the uncovered bottle for two hours in the drying oven at a temperature of 105 - 110 °C. Cover the bottle and use the tongs to quickly transfer the bottle to the desiccator with desiccating agent. Weigh the covered bottle after cooling to room temperature. Repeat until the weight (mass) is constant within 1 mg (= B grams).

**5.3 Calculation and Reporting of Results**

- A = Weight of the weighing bottle with undried sample  
B = Weight of the weighing bottle with dried sample  
C = Weight of the weighing bottle

- a) Calculate the moisture content as follows:

$$\frac{A - B}{A - C} \times 100 \%$$

- b) Report the results as follows:

Moisture Content = XX.x %

*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Acidity (pH Value)**

**6.1 Apparatus and Reagents**

**a) Apparatus**

- Analytical balance (down to at least 10 mg)
- Scissors
- Potentiometric pH apparatus with glass and calomel electrodes
- Glass stoppered 250 ml Erlenmeyer flask
- 100 ml beaker
- Glass rod flattened at the end
- Plastic gloves

**b) Reagents**

- Distilled water (grade water 3 according to ISO 3696:1987)
- Potassium acid phthalate buffer (0.05 molal solution), pH 4.0 at 25 °C
- Sodium borate buffer (0.01 molal solution), pH 9.18 at 25 °C

**6.2 Procedure**

- Using scissors cut approximately 5 g of the feathers and down into pieces of approximately 1.5 mm. Wear plastic gloves to avoid contact between the sample and the human hand.
- Select the test specimen of  $1 \pm 0.01$  g from the conditioned cut sample and place it in a 250 ml Erlenmeyer flask with 5 ml of boiled, distilled water. Macerate the material with the glass rod until all material is wet. Add 65 ml of boiled distilled water. Stopper the flask and allow to stand for 3 hours at room temperature occasionally shaking mechanically or by hand.
- Without removing the material adjust the temperature of the water to  $25 \pm 1$  °C and transfer to the 100 ml beaker.
- Determine the pH value potentiometrically at a temperature of  $25 \pm 1$  °C.
- Prior to determining the pH value of the test solutions according to section 6.2 (b), prepare and standardise the potentiometer for operating by the use of the appropriate buffer solution.

**6.3 Calculation and Reporting of Results**

Report the pH value of the sample to the nearest 0.1 pH unit:

$$\text{pH} = \text{X.x}$$

*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Oxygen Number**

**7.1. General**

The preparation of the aqueous extract is the most critical step! The shaking time and speed and placement of the jar are also critical. Any variance from these specifications will likely give a different result.

**7.2 Reagents and Equipment**

**a) Reagents**

- Distilled water (grade 3 water according to ISO 3696:1987)
- 3 mol/l Sulphuric Acid (6 N or 25 % H<sub>2</sub>SO<sub>4</sub>)
- 0.02 mol/l Potassium Permanganate (N/10 or 0.1 N KMnO<sub>4</sub>)

**b) Equipment**

- Analytical Balance (accuracy to 0.1 mg)
- 2000 ml round plastic jar with watertight lid (for shaking)
- 2000 ml glass or plastic beaker
- 400 ml glass beaker
- Horizontal shaking machine with 150 shakes per minute and a shaking width of 40 mm)
- Glass filter according to EN 1162, pore size P-160 (according to ISO 4793)
- Full pipette 100 ml class A (ISO 648)
- Graduated pipette 5ml (ISO 835-3)
- Micro-burette with divisions of 0.02 ml (Eppendorf Pipette)
- Stopwatch
- Magnetic stirrer

**7.3 Sample Preparation**

- a) Place one representative sample of 10 g (± 0.1 g) in the 2000 ml plastic jar.
- b) Add 1 litre distilled water of quality 3.
- c) After attaching the watertight lid, shake the material 10-15 times (or more) by hand to make sure that the plumage begins to absorb water.

- d) Place the jar in a horizontal position on the shaking machine. The shaking motion of the jar is from lid to bottom. The jar is shaken at room temperature for 30 minutes. The shaking speed is 150 shakes (one shake = one round trip) per minute and the shaking distance is 40 mm.
- e) Filter the resulting liquid (aqueous extract, suspension) through the glass filter into a 2000 ml beaker. Do not squeeze or wring excess liquid from the down and feathers!
- f) Prepare two separate samples in the same way (a-e)

**7.4 Measurement**

- a) Pour 100 ml of liquid into a 400 ml beaker
- b) Add 3 ml of the 3 mol/l sulphuric acid to the beaker of liquid.
- c) Place the beaker of liquid on the magnetic stirrer and titrate with potassium permanganate. Add potassium permanganate at the rate of 0.02 ml until a faint pink colour persists in the liquid for 60 seconds.
- d) Repeat the procedure (a-c) for the second sample
- e) Also complete a blank test with water.

**7.5 Calculation and Reporting of Results**

- a) Calculate results as follows:

A = quantity in ml of potassium permanganate used in the test samples (average)

B = quantity in ml of potassium permanganate used in the blank test

$$\text{Oxygen Number} = 80 \times (A - B)$$

Calculate the arithmetical mean (rounded to 0.1) of the two measurements.

- b) Report results as follows:

$$\text{Oxygen number} = \text{XX}.x$$



*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Chloride Content**

**This test method has been cancelled.**

*This version replaces the version of 2004*

**Deterioration**

**This test method has been cancelled.**

*This version replaces the version of 2004*

**Volume Measurement (Fill Power) – with Tumble Dry Conditioning**

**10-A.1 Description of the Filling Power Meter  
"IDFB-FP"**

Measuring container:	diameter	288 mm
	height	500 mm
	filling amount	30 g ( $\pm$ 0.1 g)
Weight plate:	diameter	284 mm
	material	PMMA
	suspension	flexible
	loading weight	94.25 g
	pressure	0.149 g/cm <sup>2</sup>
	sinking speed	0.54 m/min

Beginning of the measuring process:	< 0.3 m/min
Loosening the sample:	blowing-in air
	air volume 30 l
	blowing time 5 sec

**10-A.2 Tumble Dry Conditioning**

- a) Before conditioning as per Part 1, condition samples for fill power with the tumble dry conditioning method as follows.
  - Tumble dryer capable of controlling the temperature for 30 minutes (50° - 70°C.)
  - A small cotton bag that can be sewn shut or tightly zippered (50cm x 60cm).
 

Warp	10 tex (Nm 100 / Ne 60)
Weft	10 tex (Nm 100 / Ne 60)
Warp	50/cm
Weft	50/cm
Plain weave	1/1
Mass per m <sup>2</sup> :	about 100 – 110 g
  - A slightly damp cloth (about 100cm x 50cm)
 

Material:	cotton
Plain weave:	Huckaback
Mass per piece:	about 110 – 130 g (dry)
- b) Place 50 g down and feathers in the cotton bag.
- c) Always add the damp cloth to the tumble dryer.
- d) Tumble dry for 30 minutes at 50° – 70°C.
- e) Remove down and feathers from bag.
- f) Condition sample as per Part 1 of the IDFB Testing Regulations.

**10-A.3 Procedure**

**a) Antistatic treatment of measuring cylinder**

To reduce the chance of static it is necessary to wash the measuring cylinder a minimum of once per day, and at least after every 30 individual measurements.

Wash the cylinder with a soft cotton cloth using an anionic active detergent diluted to the normal concentration. Rinse out the container twice with clear water and dry it completely.

Clean in a similar way the weight plate.

**b) Loosening**

Fill the measuring container with a **30g** sample. After filling, loosen the material in the container by using the blower. The loosening/blowing process takes a set time of 5 seconds.

In all cases, blow the material twice before the first test and once before each of the subsequent four tests.

**c) Measuring**

After pressing the starting button, the weight plate moves downward with the pre-set speed.

As soon as the weight plate touches the material in the container and the lowering speed falls below 0.3 m/min due to the counteracting force of the filling, the load time (= 1 minute) begins. The value is displayed continuously. The value determined after a load time of 1 minute is then used for the printout.

Measure the sample five times.

*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Volume Measurement (Fill Power) – with Tumble Dry Conditioning**

**10-A.4 Calculating and Reporting Results**

Calculate the arithmetic mean of the 5 measurements.

Report the result as follows:

$$\text{Fill Power} = \text{XXX mm}$$

On the basis of this, the fill power value can also be calculated and reported as follows:

XXX litre/kg (or)

XXX cm<sup>3</sup>/g (or)

XXX cu.in/oz.

**Note:**

*For measurement of cubic inches per ounce please fill IDFB cylinder with 30g of down. (**Not** with 1 oz).*

**Note:**

*The report must contain the conditioning method used, which is normally:*

*“Tumble Dry Conditioning as per  
Part 10-A.2 of IDFB Testing Regulations”*

*If other conditioning methods are used they must be noted on the report:*

- *Box Conditioning only (or)*
- *Alternative Conditioning Method (specify)*

*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Volume Measurement (Fill Power) – with Steam Conditioning**

**10-B.1 Description of the Filling Power Meter  
"IDFB-FP"**

Measuring container:	diameter	288 mm
	height	500 mm
	filling amount	30 g ( $\pm$ 0.1 g)
Weight plate:	diameter	284 mm
	material	PMMA
	suspension	flexible
	loading weight	94.25 g
	pressure	0.149 g/cm <sup>2</sup>
	sinking speed	0.54 m/min
Beginning of the measuring process:		< 0.3 m/min
Loosening the sample:	blowing in air	
	air volume	30 l
	blowing time	5 sec

**10-B.2 Steam Conditioning**

Before conditioning as per Part 1, condition the samples for fill power with the steam conditioning method as follows.

- a) Equipment
  - Portable Steam Machine (Steam Cleaner that provides medium pressure steam)
    - Pressure: 40-50 PSI (3-3.5 bar)
    - Heater: 1400-1800 watt
    - (Example: Kärcher 1201)
  - Hair Dryer (Approximately 1500 watt)
  - Fill Power Conditioning Box.
- b) Place a well-mixed representative sample of 35g down and feathers in the fill power conditioning box. Down should be loose – not clumped or matted.
- c) Use the portable steam machine to blow steam into the conditioning box for 40 seconds (10 seconds on each side of the box).
- d) Use the hair dryer to completely dry down and feathers (at least 2 minutes).
- e) Condition sample for 72 hours in a fill power conditioning box in a climate testing room as per Part 1 of the IDFB Testing Regulations.

**10-B.3 Procedure**

**a) Antistatic Treatment of Measuring Cylinder**

To reduce the chance of static it is necessary to wash the measuring cylinder a minimum of once per day, and at least after every 30 individual measurements.

Wash the cylinder with a soft cotton cloth using an anionic active detergent diluted to the normal concentration. Rinse out the container twice with clear water and dry it completely.

Clean in a similar way the weight plate.

**c) Loosening**

Fill the measuring container with a **30g** sample. After filling, loosen the material in the container by using the blower. The loosening/blowing process takes a set time of 5 seconds.

In all cases, blow the material twice before the first test and once before each of the subsequent four tests.

**c) Measuring**

After pressing the starting button, the weight plate moves downward with the pre-set speed.

As soon as the weight plate touches the material in the container and the lowering speed falls below 0.3 m/min due to the counteracting force of the filling, the load time (= 1 minute) begins. The value is displayed continuously. The value determined after a load time of 1 minute is then used for the printout.

Measure the sample five times.

*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Volume Measurement (Fill Power) – with Steam Conditioning**

**10-B.4 Calculating and Reporting Results**

Calculate the arithmetic mean of the 5 measurements.

Report the result as follows:

Fill Power = XXX mm

On the basis of this, the fill power value can also be calculated and reported as follows:

XXX litre/kg (or)

XXX cm<sup>3</sup>/g (or)

XXX cu.in/oz.

**Note:**

*For measurement of cubic inches per ounce please fill IDFB cylinder with 30g of down. (**Not** with 1 oz).*

**Note:**

*The report must contain the type conditioning method used which is normally:*

*“Steam Conditioning as per  
Part 10-B.2 of IDFB Testing Regulations”*

*If other conditioning methods are used they must be noted on the report:*

- *Box Conditioning only (or)*
- *Alternative Conditioning Method (specify)*

*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

International Down and Feather Bureau	IDFB Testing Regulations	Part 11-A Version December 2005 Page 1 of 1
<b>Turbidity (with Automated NTU Meter)</b>		
<p><b>11-A.1 General</b></p> <p>The preparation of the aqueous extract is the most critical step! The shaking time and speed and placement of the jar are also critical. Any variance from these specifications will likely give a different result.</p> <p><b>11-A.2 Equipment and Reagents</b></p> <ul style="list-style-type: none"> <li>• Calibration standard solution</li> <li>• Analytical Balance (accuracy to 0.1 mg)</li> <li>• 2000 ml round plastic jar with watertight lid for shaking)</li> <li>• 2000 ml glass or plastic beaker</li> <li>• 400 ml glass beaker</li> <li>• Horizontal shaking machine with 150 shakes per minute and a shaking width of 40 mm</li> <li>• Glass filter according to EN 1162, pore size P-160 (according to ISO 4793)</li> <li>• Stopwatch</li> <li>• Automated nephelometric turbidity meter (NTU meter)*</li> </ul> <p>*e.g. LaMotte 2020 NTU Meter</p> <p><b>11-A.3 Sample Preparation</b></p> <ol style="list-style-type: none"> <li>a) Place one representative sample of 10 g (<math>\pm</math> 0.1 g) in the 2000 ml plastic jar.</li> <li>b) Add 1 litre distilled water of quality 3.</li> <li>c) After attaching the watertight lid, shake the material by hand 10-15 times (or more) to make sure that the plumage begins to absorb water.</li> <li>d) Place the jar in a horizontal position on the shaking machine. The shaking motion of the jar is from lid to bottom. Shake the jar at room temperature for 30 minutes. The shaking speed is 150 shakes (one shake = one round trip) per minute and the shaking distance is 40 mm.</li> </ol>	<ol style="list-style-type: none"> <li>e) Filter the resulting liquid (aqueous extract, suspension) through the glass filter into a 2000 ml beaker. Do not squeeze or wring excess liquid from the down and feathers!</li> <li>f) Prepare two samples in the same way (a – e)</li> </ol> <p><b>11-A.4 Procedure for Measurement</b></p> <ol style="list-style-type: none"> <li>a) Fill vial of the turbidity meter with the liquid.</li> <li>b) Shake the vial for 2 –3 seconds..</li> <li>c) Place the vial in the NTU meter.</li> <li>d) After five seconds measure the NTU value in the vial three separate times (do not remove vial or wait between measurements!).</li> <li>e) Record the three measurements</li> <li>f) Repeat a – e for two additional vials of liquid. (A total of nine measurements for the sample is recorded.)</li> <li>g) Repeat the entire test a – f for the second sample prepared in section 11-A.3.</li> </ol> <p>(Record a total of 18 measurements for the two separately prepared samples.</p> <p><b>11-A.5 Calculation and Reporting of Results</b></p> <p>Calculate the arithmetical mean of all 18 recorded values to two decimal places.</p> <p>Report the result as follows:</p> <p style="text-align: center;">Turbidity = XX.xx NTU</p>	
<i>This version replaces the version of 2004</i>		
<i>Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.</i>		

**Determination of Turbidity (with Glass Turbidity Tube)**

**11-B.1 General**

The preparation of the aqueous extract is the most critical step! The shaking time and speed and placement of the jar are also critical. Any variance from these specifications will likely give a different result.

**11-B.2 Equipment and Reagents**

- Calibration standard solution
- Analytical Balance (accuracy to 0.1 mg)
- 2000 ml round plastic jar with watertight lid for shaking)
- 2000 ml glass or plastic beaker
- 400 ml glass beaker
- Horizontal shaking machine with 150 shakes per minute and a shaking width of 40 mm
- Glass filter according to EN 1162, pore size P-160 (according to ISO 4793)
- Stopwatch
- Turbidity tube (glass cylinder), height about 550 mm
- Light source (daylight or artificial light with 600 – 1000 Lux)
- Chip with double cross marking

**11-B.3 Sample Preparation**

- a) Place one representative sample of 10 g ( $\pm$  0.1 g) in the 2000 ml plastic jar.
- b) Add 1 litre distilled water of quality 3.
- d) After attaching the watertight lid, shake the material by hand 10-15 times (or more) to make sure that the plumage begins to absorb water.
- d) Place the jar in a horizontal position on the shaking machine. The shaking motion of the jar is from lid to bottom. Shake the jar at room temperature for 30 minutes. The shaking speed is 150 shakes (one shake = one round trip) per minute and the shaking distance is 40 mm.

- e) Filter the resulting liquid (aqueous extract, suspension) through the glass filter into a 2000 ml beaker. Do not squeeze or wring excess liquid from the down and feathers!
- f) Prepare two samples in the same way (a – e)

**11-B.4 Procedure for Measurement**

- a) Place the double cross chip on the bottom of the glass cylinder (tube).
- b) Fill the cylinder with the liquid.
- c) After 60 seconds gradually lower the liquid in the cylinder until the double cross is visible through the liquid (according to stage 2 of the five-stage scale).
- d) Record the height of the liquid in mm as “H<sub>1</sub>”.
- e) Add liquid to the cylinder to raise the height of the liquid by at least 20 mm.
- f) Gradually lower the liquid until the double cross is again visible through the liquid (according to stage 2).
- g) Record the height of the liquid in mm as “H<sub>2</sub>”.
- h) Repeat the entire test a – g for the 2<sup>nd</sup> sample prepared in section 11-B.3.

**11-A.5 Calculation and Reporting of Results**

Calculate the arithmetical mean of all recorded values to the nearest integer.

Report the result as follows:

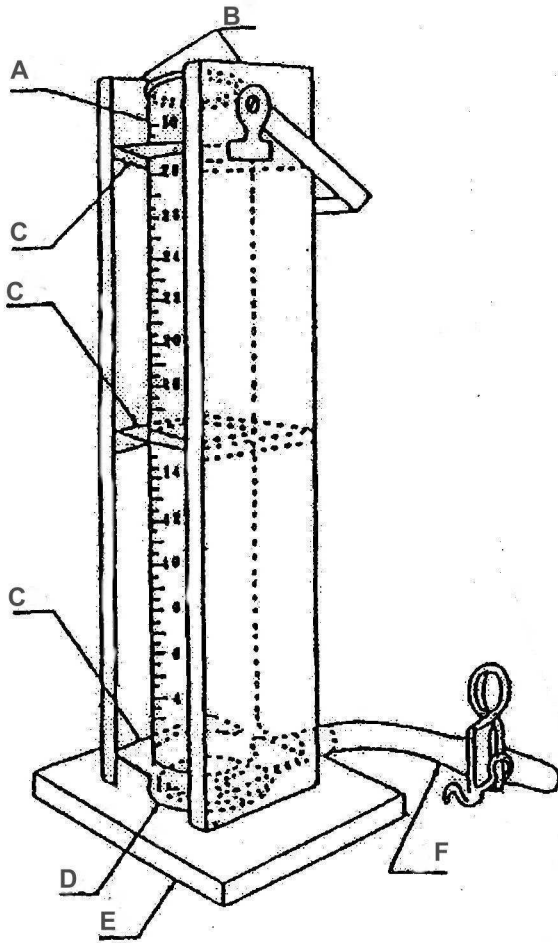
$$\text{Turbidity} = \text{XXX mm}$$

*This version replaces the version of 2004*

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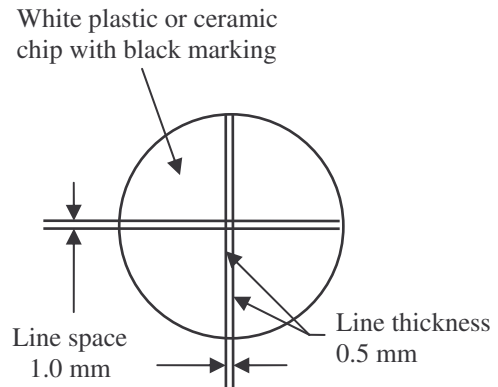
Determination of Turbidity (with Glass Turbidity Tube)

Fig. 1  
Construction example of a glass tube turbidity meter



- A = Cylinder
- B = Black shield plate
- C = Supporting frames
- D = Double cross plate
- E = Platform

Fig. 2  
Double cross plate



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**Feather and Down Specie**

**12.1 Definitions**

- a) **Goose** plumage has small nodes which generally begin in the middle area of the barbule. The distance between nodes of a goose is 2 times or more than the distance between nodes of a duck.
- b) **Duck** has 1 - 6 nodes (often 3 nodes) near the tip of the barbule. These nodes are relatively large. The distance between nodes of a duck is very short. Prongs are often found beyond the most distant duck node. Prongs are not used in specie identification.
- c) **Landfowl** has a series of evenly spaced slight nodes or swellings which give the barbule the appearance of bamboo. The protrusions or nodes of land fowl extend nearly the entire distance of the barbule.

**12.2 Equipment**

- Microfiche or microscope (min. 70x)
- Glass slides (if microscope is used)
- Analytical balance (accuracy to 0.1 mg)
- Forceps
- 4 Laboratory Beakers (150 - 200 ml), marked "Goose", "Duck", "Landfowl" and "Unidentified"

**12.3 Sample Preparation**

- a) Condition the plumage as per IDFB procedure. (see Part 1).
- b) Determine the composition/content analysis. (see Part 3)
- c) **Down:** Weigh a representative sample of at least **0.1 g** down clusters (down, plumules and nestling down).
- d) **Feathers:** Weigh a representative sample of at least **1.0 g** feathers including damaged/broken feathers.
- e) If only a specie test is required (i.e. the content analysis/component test is not completed), separate a large enough sample into down and feathers to provide 0.1 g down clusters and 1.0 g feathers.

**12.4 Determination of Down Specie**

- a) Take each down cluster by the forceps and remove any remaining fibers.
- b) Place 3 - 9 down clusters between the microfiche viewing trays. (or) Place 1 - 2 down clusters between the microscope glass slides.
- c) Determine from visual evaluation of the nodes whether the down cluster is goose, duck or not identifiable. The down cluster is placed in the appropriate glass beaker.
- d) After identification of **all** down clusters weigh the contents of each beaker.
- e) If necessary, repeat the test with a second sample of 0.1 g down clusters according to steps (a - d).
- f) If a second test is completed, add together the weights of both tests prior to completing the percentage calculation.

**12.5 Determination of Feather Specie**

- a) The procedure for determination of feather specie is identical to the procedure for down except that 1.0 g of feathers are tested.
- b) If the total weight of feathers resulting from the content analysis/composition test is less than 1.0g, it is acceptable to use this lesser amount.
- c) Small neck feathers and other immature feathers (less than 15 mm long) are often impossible to identify. If specie cannot be determined on at least 20 such feathers after microscopic evaluation, place the entire portion of small feathers (less than 15 mm) in the "Unidentified" beaker.
- d) In cases where the sample contains less than 10% feathers, a feather specie test is not necessary (unless required by the buyer specification or government regulation.)

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**Feather and Down Specie**

**12.6 Initial calculations**

**a) Initial calculation of down species**

Goose down	xx %
Duck down	xx %
Unidentified down	<u>xx %</u>
	100 %

**b) Initial calculation of feather species**

Goose feathers	xx %
Duck feathers	xx %
Landfowl feather*	xx %
Unidentified feathers	<u>xx %</u>
	100 %

\* (Use only landfowl found in the specie microscope/microfiche analysis. Do NOT include landfowl found in the content analysis/composition test – this will be added in the final report calculation).

**12.7 Re-classification of unidentified portion**

Normally the unidentified portion is re-classified together with the goose portion.

In some cases (after review of the initial calculations), the unidentified portion may be re-classified as other than goose. (This must be noted on reporting of results!)

In the case where the majority of identified portion is duck it is appropriate to re-classify the unidentified as duck or in the ratio of identified goose or duck (see example below).

In the case where the majority of down or feathers are not identifiable, three possible solutions exist:

- Re-classify unidentified as goose.
- Report unidentified without re-classification.
- Re-classify unidentified in the ratio of identified goose or duck.

**Example of re-classifying unidentified in goose/duck Ratio for Down Portion**

GD = Goose Down %

DD = Duck Down %

UD = Unidentified Down %

$$GD = GD + UD \times \left( \frac{GD}{GD + DD} \right)$$

**12.8 Final calculations and reporting of results**

**a) Format of Specie Report**

(If a content analysis test was not completed, the results are reported using only the "initial calculations")

If a content analysis test was completed the results should be reported as follows:

Goose.	xx %
Duck	xx %
Landfowl	xx %
Unidentified	<u>xx %</u> (only if not re-classified)
	100 %

**b) Values needed from the content analysis test**

The following values are needed from the content analysis test (see part 3).

- Down %
- Down Fibre %
- Feather Fibre %
- Landfowl (from content) %
- Residue %
- Waterfowl Feathers %
- Damaged Feathers %
- Quill Feathers %
- (Sum of the landfowl feather/fibres % from both the 1<sup>st</sup> and 2<sup>nd</sup> separations)
- (Sum of residue % from both the 1<sup>st</sup> and 2<sup>nd</sup> separations)

Calculations from content analysis data:

$$D\% = \text{down}\% + \text{down fiber}\% / (100 - \text{residue}\%)$$

$$F\% = \left. \begin{array}{l} \text{waterfowl feather \%} \\ + \text{feather fiber \%} \\ + \text{damaged feather \%} \\ + \text{quill feather \%} \end{array} \right\} / (100 - \text{residue}\%)$$

$$L\% = \text{landfowl \%} / (100 - \text{residue}\%)$$

**c) Details of specie report calculations**

$$\text{Goose \%} = \frac{\text{goose down}\% \times D\%}{100} + \frac{\text{goose feather}\% \times F\%}{100}$$

$$\text{Duck \%} = \frac{\text{duck down}\% \times D\%}{100} + \frac{\text{duck feather}\% \times F\%}{100}$$

$$\text{Unidentified \%} = \frac{\text{unidentified down \%} \times D\%}{100} + \frac{\text{unidentified feather \%} \times F\%}{100}$$

$$\text{Landfowl \%} = \frac{L\% + \text{landfowl \% (from specie test*)} \times F\%}{100}$$

\* (Normally, landfowl is determined in the content analysis test (L%). If additional landfowl is found in the specie test, this will be added to L%.

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**Feather Pre-Sort**

**13.1 General**

Content testing of 6g feathers (as required in IDFB Testing Regulations - Part 3) is not a large enough sample size for raw feathers or washed unsorted bulk. This test method has two purposes:

1. Pre-sort of large feathers in preparation for a Content Analysis (IDFB Test Regulation - Part 3)
2. Stand-alone simplified test for feather samples.

**13.2 Equipment**

- Large round or square sorting tray (About 60-80 cm diameter or 60-80 cm square)
- 2000 ml glass or plastic beakers (weighing containers for large feathers)
- 400 ml glass beakers (weighing containers for small components)
- Tweezers
- Ruler at least 15 cm long
- Analytical balance (accurate to 0.0001 g)

**13.3 Sample Preparation**

- a) Take a representative sample of at least 30g. (up to 100g if very large feathers.)
- b) Weigh and record sample beginning weight.
- c) (Optional) Determine a minimum feather length ("X" cm) for the pre-sort, e.g. 8cm

**13.4 Procedure**

- a) Place the sample in the sorting tray
  - b) Separate the sample using fingers and/or tweezers into the following components:
    - P1 = Quill Feathers
    - P2 = Waterfowl Feathers > "X" cm (Optional)
    - P3 = Broken & Damaged Waterfowl Feathers \*\*
    - P4 = Landfowl & Broken/Damaged Landfowl \*\*
    - P5 = Residue
    - P6 = Remaining Material (includes Waterfowl Feathers, "X" cm, Down Clusters, Down Fibres and Feather Fibres)
- \*\* Note: If a content analysis (IDFB Testing Regulations Part 3) is to be completed, broken/damaged feathers and landfowl feathers can be separated later.)

- c) Weigh the contents of the weighing containers to the nearest 0.1 mg

Option 1 If no further testing is to be done report results as per Part 13.6 – Option 1

Option 2 Take a 6g sample from P6 (remaining material). Complete only first separation in IDFB Testing Regulations Part 3. Calculate & report results as per Part 13.6. – Option 2

Option 3 Take a 6g sample from P6 (remaining material). Complete 1<sup>st</sup> and 2<sup>nd</sup> separation in IDFB Testing Regulations Part 3. Calculate & report results as per Part 13.6. – Option 3

**13.5 Initial Calculations**

- a) Calculate the total weight of the sorted components  
 $T1 = P1 + P2 + P3 + P4 + P5 + P6$  or (P6a-P6e)
- b) Calculate the percentage of each component  
 (For example: Residue (P5%) =  $P1/T1$  )

**13.6 Calculation and Reporting of Results**

The data can be reported in one of 3 ways

*Option 1 Report the initial calculations only*

*Option 2 Combine the pre-sort with values of the 1<sup>st</sup> separation of Content Analysis (see IDFB Testing Regulations Part 3.4a)*

*Option 3 Combine the pre-sort with values of the 1<sup>st</sup> & 2<sup>nd</sup> separation of the Content Analysis (see IDFB Testing Regulations Part 3.4a,b)*

*(Details see Page 2 of this Testing Regulation)*

*This version replaces the version of 2004*

*Note: The test report must contain the reference to this part of the IDFB Testing Regulations and/or any modifications to the terms of these regulations.*

**Feather Pre-Sort**

**Option 1 Report the initial calculations only**

Quill Feathers	XX.x %	P1 %
Waterfowl Feathers >"X" cm	XX.x %	P2 %
Broken/Damaged Feathers	XX.x %	P3 %
Landfowl Feathers	XX.x %	P4 %
Residue	XX.x %	P5 %
Waterfowl Feathers (including down clusters & fibres)	XX.x %	P6 %

**Option 2 Combine the pre-sort with values of the 1<sup>st</sup> separation of Content Analysis (Part 3.4a)**

- Complete 1<sup>st</sup> separation of Content Analysis (as per Part 3).
- Multiply each value in 1<sup>st</sup> separation by P6% (see above)
- The report will look as follows:

Quill Feathers	XX.x %	P1 % + (Q% * P6%)
Waterfowl Feathers >"X"cm	XX.x %	P2 %
Waterfowl Feathers, "X"cm	XX.x %	A% * P6%
Broken/Damaged Feathers	XX.x %	P3 % + (C% * P6%)
Landfowl Feathers/Fibres	XX.x %	P4 % + (B% * P6%)
Residue	XX.x %	P5 % + (D% * P6%)
Down Clusters & Fibres	XX.x %	E% * P6%

Note: A,B,C,D,E & Q are values from IDFB Test Regulation - Part 3.4a (1<sup>st</sup> Separation)

**Option 3 Combine the pre-sort with values of the 1<sup>st</sup> & 2<sup>nd</sup> separation of the Content Analysis (Part 3.4a,b)**

- Complete the entire Content .Analysis.
- Multiply each value in 3.4c by P6%.
- The report will look as follows:

Quill Feathers	XX.x %	P1%+ (quill feathers% * P6%)
Waterfowl Feather >"X"cm	XX.x %	P2%
Waterfowl Feathers, ≤"X"cm	XX.x %	watefowl feathers% * P6%
Broken & Damaged Feathers	XX.x %	P3% + (broken/damaged feathers % * P6% )
Landfowl Feathers/Fibres	XX.x %	P4% + (landfowl!% * P6%)
Residue	XX.x %	P5% + (residue% * P6%)
Down cluster	XX.x %	down cluster% * P6%
Down fibre	XX.x %	down fibre% * P6%
Feather Fiber	XX.x %	feather fibre% * P6%

Note: Quill feathers %, waterfowl feathers %, broken/damaged feathers %, landfowl %, residue%, down cluster%, down fibre % and feather fibre % are values from IDFB Test Regulation - Part 3.4c (Reporting of Results)

*This version replaces the version of 2004*

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**Average Feather Length**

**14.1 General**

This test method standardizes the determination of average feather length in feather material. The report is a statistical chart of the feathers grouped by length.

**14.2 Equipment**

- (15) 400 ml Glass Beakers or other containers marked: 1cm, 2cm, 3cm ..... 15+cm
- Tweezers
- Ruler at least 15 cm long

**14.3 Sample Preparation**

- a) Use at least 3 grams of clean feathers from the 1st separation of the composition test (See IDFB Testing Regulations - Part 3)
- b): If a content analysis is not completed - use at least 3 grams of feathers which have been cleaned of down and fibers.

**14.4 Procedure**

- a) Measure each feather (rounded to the nearest cm).
- b) Place each feather in a beaker which corresponds to the length of the feather.
- c) Count and record the number of feathers in each beaker.

**14.5 Calculating and Report of Results**

- a) Calculate **% feathers** for each cm group

Where  $F_1$  = Number of 1cm Feathers, etc.

$$\frac{F_1}{\sum (F_1, F_2, \dots F_N)} \times 100\% \quad \text{etc.}$$

- b) Calculate the **average feather length** as determined by **feather count**.

Where  $F_x$  = Number of x cm Feathers  
 $L_x$  = Length of the x cm Group

$$\frac{\sum (F_1 * L_1, F_2 * L_2, \dots F_N * L_N)}{\sum (F_1, F_2, \dots F_N)}$$

- c) **Reporting of Results**

Use the following format to report results.  
 (Example of Report)

**FEATHERS GROUPED BY LENGTH**

<u>Length,</u>	<u>Count,</u>	<u>% of Count,</u>	<u>Cumulative %</u>
1cm	96	21%	21%
2cm	68	15%	36%
3cm	56	12%	48%
4cm	69	15%	63%
5cm	80	17%	80%
6cm	61	13%	93%
7cm	17	4%	97%
8cm	5	1%	98%
9cm	6	1%	99%
10cm	2	1%	100%
11cm	1	0%	100%
12cm	1	0%	100%
13cm	0	0	n/a
14cm	0	0	n/a
15+cm	0	0	n/a
<b>Total</b>	<b>462</b>	<b>100%</b>	

**Average Feather Length = 3.7cm**  
 (as determined by Feather Count )

*This version replaces the version of 2004*

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