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Testing methods for feathers

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Foreword

This Japanese Industrial Standard has been revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Down Products Corporative Association (JDFA)/Japanese Standards Association (JSA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS L 1903** : 2017), which has been technically revised.

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Testing methods for feathers

1 Scope

This Japanese Industrial Standard specifies testing methods for down and feather intended for filled manufactured articles.

2 Normative references

Part or all of the provisions of the following standards, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS G 3555 *Woven wire cloth*

JIS K 0102-1 *Testing methods for industrial water and industrial wastewater — Part 1 : Test methods for general physics and chemistries*

JIS K 0557 *Water used for industrial water and wastewater analysis*

JIS K 0970 *Piston pipettes*

JIS K 8001 *General rules for test methods of reagents*

JIS K 8103 *Diethyl ether (Reagent)*

JIS K 8247 *Potassium permanganate (Reagent)*

JIS K 8951 *Sulfuric acid (Reagent)*

JIS L 0105 *General principles of physical testing methods for textiles*

JIS L 0216 *Glossary of terms used in feathers*

JIS R 3503 *Glass apparatus for chemical analysis*

JIS R 3505 *Volumetric glassware*

JIS Z 8401 *Rounding of numbers*

3 Terms and definitions

For the purpose of this Standard, the following terms and definitions, and those given in **JIS L 0216** apply.

3.1

sample

down and feather taken according to a reasonable sampling plan and mixed uniformly

3.2

test sample

specified amount of down and feather taken at random from the sample and used di-

rectly for test

3.3

absolute dry mass

mass of a sample when the sample, left in a drier at a temperature of $105\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, has reached a state where the discrepancy between two successive mass measurements taken at intervals of 15 min or longer is 0.1 % or smaller

4 Test items

The test items shall be as follows.

The numbers in parentheses indicate the relevant test subclauses in this Standard.

- a) Composition (8.2)
- b) Filling power (8.3)
- c) Fat and oil content (8.4)
- d) Moisture regain (8.5)
- e) Turbidity (8.6)
- f) Oxygen number (8.7)

5 Test condition

Preparation of sample and measurement of filling power shall be carried out in a laboratory maintained under the standard condition specified in 5.1.1 of JIS L 0105. The alternative standard condition shall not be applied. The measurement of temperature and humidity shall be in accordance with 5.2 of JIS L 0105.

Where it is impracticable to maintain the laboratory under the specified standard condition, carry out the test under a condition as close as possible to the standard condition, and record the actually used temperature and humidity in the test report.

6 Preparation of sample

Sample used for the tests shall be obtained by extracting down and feather according to a reasonable sampling plan and mixing it uniformly. The sample shall then be placed in a conditioning container of stainless steel wire mesh (with a cover) specified in 8.3.2.1 b) so that air can be passed through easily without the down and feather scattering away, and left to stand in a laboratory under the standard condition until a constant mass has been attained. For the test of moisture regain, the collected sample shall be used without this conditioning.

7 Water used for the test

For the tests, water conforming to A3 or A4 specified in Clause 4 of JIS K 0557 shall be used.

8 Test methods

8.1 General

The tests for down and feather shall be carried out in accordance with the methods specified in 8.2 to 8.7.

Rounding of test results and measurement results shall be in accordance with Rule B of JIS Z 8401.

8.2 Composition

8.2.1 Apparatus

The apparatus used shall be as follows.

- Separating cabinet**, as shown in Figure 1, with a structure to prevent the test sample from scattering, and provided with a light source such as a fluorescent lamp inside it if the brightness inside is insufficient.
- Electronic balance**, capable of weighing to the nearest 0.2 mg.

Unit: mm

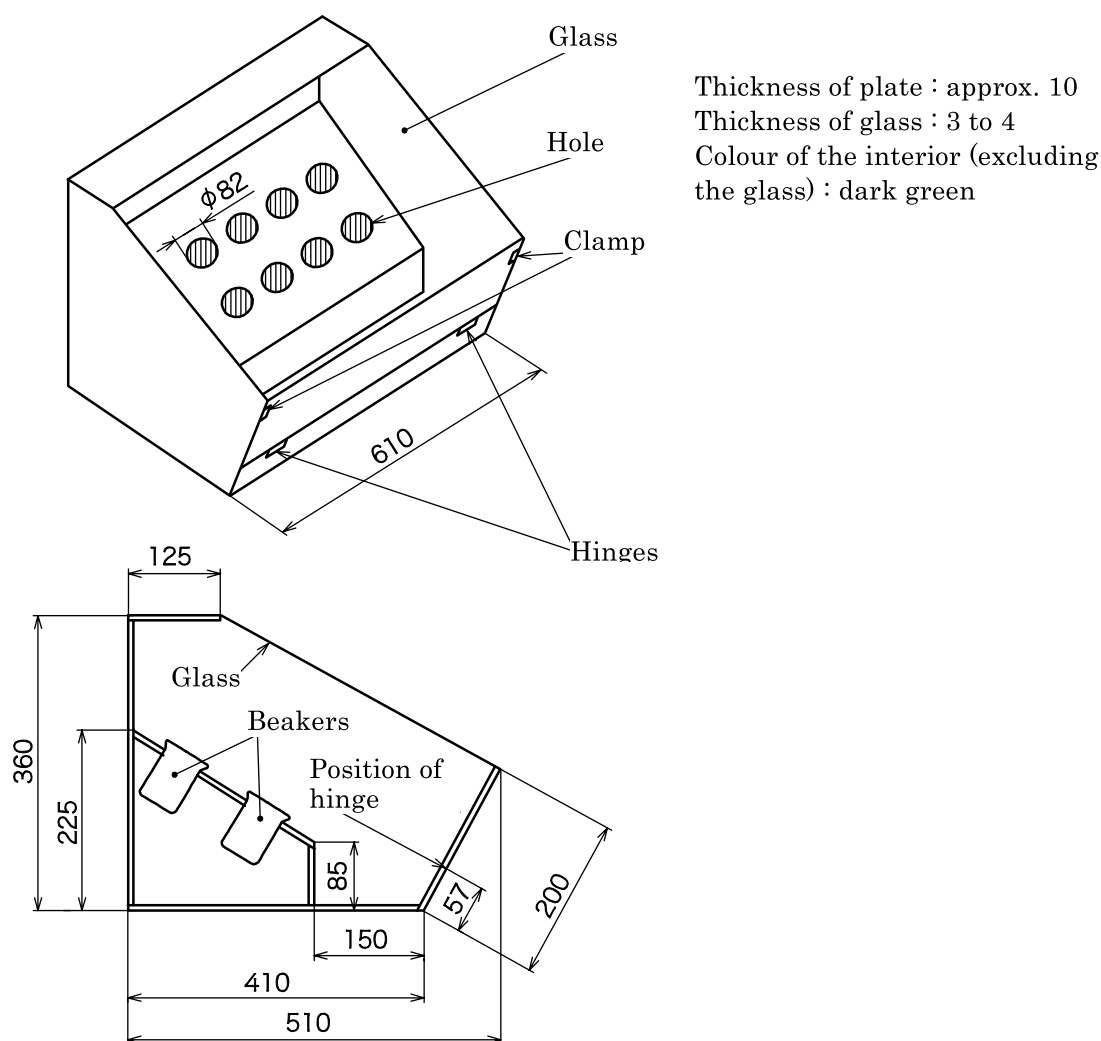


Figure 1 Example of separating cabinet

8.2.2 Classification of components

The composition of down and feather consists of eight classes of components as shown in Table 1 (see A.1).

Table 1 Classification of components

Component	Examples of matters contained in each component	Applicable photograph in Figure A.1
Down	Down	a)
	Down with three or more barbs	b)
	Plumule	c)
	Nestling down	d)
Small feather	Feather less than 65 mm in length	e)
	Nestling feather	f)
	Feather with flat plane barbs	g)
	Filo plumes	h)
Large feather	Feather 65 mm or longer in length	i)
Damaged feather	Damaged feather	j)
Landfowl feather	Chicken feather, etc.	k)
Down fibre	Down fibre	l)
	Landfowl fibre	m)
Feather fibre	Feather fibre	n)
Residual matter	Components other than the above such as trash and foreign matter	o) and p)

8.2.3 Test procedure

Obtain two test samples, each about 3 g, from the sample prepared as per Clause 6 and test each of them according to the following procedure. Supplementary instructions for separation of test samples are provided in A.2.

- a) For first separation, separate the test sample into small feathers, large feathers, damaged feathers, landfowl feathers and residual matter, as well as into down, down fibres and feather fibres, and place each of them in separate beakers installed in the separating cabinet. In the above procedure, using forceps, pinch the feathers (small feathers, large feathers, damaged feathers or landfowl feathers) at the quill point and gently brush the feathers between the thumb and index finger of one hand to remove any down, down fibres or feather fibres caught inside the feathers. Join these removed down, down fibres and feather fibres to the respective beakers for down, down fibres and feather fibres in the separating cabinet.

If it is difficult to separate the residual matter that is stuck to the down, down fibres or feather fibres, do not tear it apart, but put the down, down fibres and feather fibres together with the residual matter into the respective beakers for down, down fibres and feather fibres.

- b) Weigh the mass of each separated component with an electronic balance.

- W_a : mass of small feathers after the first separation (mg)
 W_b : mass of large feathers after the first separation (mg)
 W_c : mass of damaged feathers after the first separation (mg)
 W_d : mass of landfowl feathers after the first separation (mg)
 W_m : mass of down, down fibres and feather fibres after the first separation (mg)
 W_n : mass of residual matter after the first separation (mg)

- c) For second separation, mix uniformly the down, down fibres and feather fibres which have been separated by the first separation, and randomly take portions of this mixture from the top, middle and bottom sections of the mixing container to obtain a test sample of approximately 0.2 g.

If the total of the separated down, down fibres and feather fibres is less than 0.2 g, use the whole collected amount as the test sample of second separation.

- d) Using forceps, pinch the down feathers from the test sample obtained in c) one by one, and swing up and down four or five times to shake off the down fibres, carefully pull out feather fibres stuck or entwined in the down one by one, and put them in respective beakers. If fine small feathers ¹⁾ or residual matter which could not be separated in the first separation are found, put them in respective beakers.

Note ¹⁾ "Fine small feathers" include filo plumes and small feathers up to 5 mm caught in the down.

- e) Weigh the mass of each separated component with an electronic balance.

- W_x : mass of down after the second separation (mg)
 W_{y1} : mass of down fibres after the second separation (mg)
 W_{y2} : mass of feather fibres after the second separation (mg)
 W_{y3} : mass of small feathers after the second separation (mg)
 W_z : mass of residual matter after the second separation (mg)

- f) Calculate the composition of respective components of two test samples according to the following formulae, and report the average of the results of two test samples to one decimal place. If there is a 3 % or more discrepancy between the down composition values (%) of two test samples, obtain two more test samples, test them according to a) to d), calculate the compositions, and report the average of the results of four test samples.

$$X_a = \frac{W_m}{W_a + W_b + W_c + W_d + W_m + W_n} \times \frac{W_{y3}}{W_x + W_{y1} + W_{y2} + W_{y3} + W_z} \times 100$$

$$+ \frac{W_a}{W_a + W_b + W_c + W_d + W_m + W_n} \times 100$$

$$X_b = \frac{W_b}{W_a + W_b + W_c + W_d + W_m + W_n} \times 100$$