SLOVENSKI STANDARD
SIST ISO 1446:1995

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Surova kava - Določanje vsebnosti vlage (osnovna referenčna metoda)

Green coffee -- Determination of moisture content (Basic reference method)

Café vert -- Détermination de la teneur en eau (Méthode de référence fondamentale)

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67.140.20 Kava in kavni nadomestki Coffee and coffee substitutes

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INTERNATIONAL STANDARD 1446

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Green coffee — Determination of moisture content (Basic reference method)

Café vert — Détermination de la teneur en eau (Méthode de référence fondamentale)

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1446 was developed by Technical Committee ISO/TC 34, *Agricultural food products.*

It was submitted directly to the ISO Council, in accordance with clause 6.12.1 of the Directives for the technical work of ISO. It cancels and replaces ISO Recommendation R 1446-1970, which had been approved by the member bodies of the following countries :

Brazil	Iran	Romania
Chile	Israel	South Africa, Rep. of
Czechoslovakia	Netherlands	Spain
France	Norway	Turkey
Hungary	Poland	United Kingdom
India	Portugal	U.S.S.R.

The member bodies of the following countries had expressed disapproval of the document on technical grounds :

Colombia
U.S.A.

Printed in Switzerland

Green coffee — Determination of moisture content (Basic reference method)

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the basic reference method for the determination of the moisture content of green coffee.

NOTE — This method is designed to serve as a standard for the checking and perfecting of methods particularly suitable for the routine determination of the moisture content of green coffee (for example ISO 1447).

2 REFERENCES

ISO 1447, *Green coffee — Determination of moisture content (Routine method).*

ISO 4072, *Green coffee in bags — Sampling.*[1]

3 DEFINITION

moisture of green coffee : The loss in mass undergone by the coffee when it is brought to true equilibrium with an atmosphere having zero water vapour pressure, under conditions such that interfering reactions are avoided.

In the present state of knowledge, it is considered that this loss in mass corresponds to the actual moisture in green coffee.

The moisture content is expressed as a percentage by mass of the product as received.

4 PRINCIPLE

Determination of the loss in mass when the product (pre-dried in the case of beans which are too moist), previously ground without alteration of its moisture content, is brought into equilibrium with an anhydrous atmosphere at a temperature of 48 ± 2 °C, at a pressure of 2,0 ± 0,7 kPa.[2]

5 APPARATUS

5.1 Suction device permitting pressure to be reduced to 2,0 ± 0,7 kPa (for example, a water pump).

5.2 Grinder, made of material which does not absorb moisture, and which

— is easy to clean and has a minimum dead space;

— permits rapid and even grinding without producing appreciable heating and, as fas as possible, without contact with outside air;

— can be regulated so as to obtain a ground product of which more than 90 % of the particles have a diameter of less than 1 mm and more than 50 % have a diameter of less than 0,5 mm.

5.3 Metal dish,[3] non-corrodible, with a sufficiently tight-fitting lid, the effective surface area enabling the test portion to be distributed so as to give a mass per unit area of not more than 0,3 g/cm^2.

5.4 Glass or porcelain boat containing reagent-grade phosphorus(V) oxide (P_2O_5). The effective surface area should if possible be at least equal to that of the metal dish (5.3).

5.5 Drying tube,[4] of glass, in two parts, one of which, intended to receive the dish (5.3), is closed at one end, while the other, intended to receive the boat (5.4), carries a semi-capillary tube, with a stopcock, for evacuation purposes. The two parts are connected by a ground glass joint.

5.6 Electrically heated constant-temperature oven, or any other system enabling the part of the drying tube (5.5) containing the dish (5.3) to be brought to a temperature of 48 ± 2 °C.

5.7 Gas washing bottle containing reagent-grade sulphuric acid of density $\rho_{20} \geqslant 1{,}83$ g/ml.

5.8 Analytical balance.

1) At present at the stage of draft.

2) i.e. 20 ± 7 mbar, or approximately 10 to 29 mmHg.

3) See clause A.1 of the annex for a diagram (for guidance only) of a suitable metal dish.

4) See clause A.2 of the annex for a diagram (for guidance only) of a suitable drying tube.

6 PROCEDURE

6.1 Preparation of sample

Thoroughly mix the laboratory sample obtained as specified in ISO 4072, without modifying its moisture content.

6.1.1 *Preliminary evaluation of the moisture content of the sample*

Make an approximate determination of the moisture content, using either the routine method specified in ISO 1447 or a suitable rapid method.

6.1.2 *Analysis sample*

Rapidly take a sample of 3 to 4 g of green coffee. If this quantity contains a heavy impurity (nail, stone, piece of wood, etc.), discard it and take a further quantity from the laboratory sample.

Each of the quantities taken from the same laboratory sample, which form the analysis samples, shall be treated separately, including any pre-drying (6.1.3) and the grinding (6.1.4).

6.1.3 *Pre-drying*

If the preliminary evaluation (6.1.1) indicates a moisture content greater than 11 % (*m/m*), dry the analysis sample as follows before grinding, since it is difficult to grind coffee which is too moist, and losses of moisture during grinding are to be expected.

Place the analysis sample (6.1.2) in the metal dish (5.3), previously dried and tared, and weigh to the nearest 0,000 2 g.

Place the metal dish in that part of the drying tube (5.5) which does not include the stopcock. In the part including the stopcock, place the boat (5.4), filled with a layer of phosphorus(V) oxide approximately 10 mm thick, and fit together the two parts of the tube, having previously coated the ground glass joint with a suitable lubricant. Connect the tubing from the stopcock to the suction device (5.1) and reduce the pressure inside the apparatus to 2,0 ± 0,7 kPa (see 8.1). Close the stopcock, remove the suction device and place the part of the tube containing the metal dish into one of the openings of the oven (5.6), the part containing the boat remaining outside the oven.

After drying for 2 to 3 h, remove the tube from the oven and allow it to cool. Make sure that there is a sufficiently low pressure within the apparatus to prevent the ground glass joint from coming apart. Introduce into the tube (see 8.1) air previously dried by bubbling through the sulphuric acid contained in the gas washing bottle (5.7). Open the tube, remove the metal dish, fit its lid and weigh immediately to the nearest 0,000 2 g.

If the loss in mass shows that the moisture content of the analysis sample has been reduced to below 11 % (*m/m*), immediately carry out the grinding operation (6.1.4).

If the moisture content is still too high, renew the phosphorus(V) oxide contained in the boat and repeat the pre-drying operation described above until the moisture content of the analysis sample is approximately 8 to 10 % (*m/m*) (see 8.2).

6.1.4 *Grinding*

Place in the grinder (5.2) the analysis sample (6.1.2) or, if pre-drying has been necessary, the contents of the metal dish (6.1.3). Grind. *Immediately* afterwards take the test portion for the final drying.

6.2 Test portion

Place in the metal dish (5.3), previously dried and tared, virtually all the powder obtained by grinding (6.1.4), cover immediately and weigh to the nearest 0,000 2 g.

6.3 Determination

Proceed as indicated in the third paragraph of 6.1.3; renew the phosphorus(V) oxide as soon as it is no longer active (see 8.3).

After 80 to 100 h, weigh (proceeding as indicated in the fourth paragraph of 6.1.3).

Continue drying to constant mass (less than 0,000 5 g deviation between two weighings carried out at an interval of 48 h) (see 8.4).

6.4 Number of determinations

Carry out at least two determinations, each on a separate analysis sample (6.1.2).

7 EXPRESSION OF RESULTS

7.1 Method of calculation and formulae

The moisture content of the sample as received, *P*, expressed as a percentage by mass, is given by the following formulae :

a) without pre-drying

$$P = (m_2 - m_3) \times \frac{100}{m_2}$$

b) with pre-drying

$$P = \left[(m_2 - m_3)\frac{m_1}{m_2} + m_0 - m_1 \right] \times \frac{100}{m_0}$$

$$= 100\left(1 - \frac{m_1 m_3}{m_0 m_2}\right)$$

where

m_0 is the initial mass, in grams, of the analysis sample before pre-drying (6.1.3);

m_1 is the mass, in grams, of the analysis sample after pre-drying (6.1.3);

m_2 is the mass, in grams, of the test portion of the ground product (whether pre-dried or not) (6.2);

m_3 is the mass, in grams, of the test portion after drying (6.3).

Take as the result the arithmetic mean of the two determinations, provided that the requirement concerning repeatability (see 7.2) is satisfied.

7.2 Repeatability

The difference between the results of two determinations carried out simultaneously or in rapid succession by the same analyst should not be greater than 0,2 g of moisture per 100 g of sample.

8 NOTES

8.1 When the pressure is being lowered or restored in the tube, the passage of air should be very gradual so as to avoid the movement of particles of powder (this may be achieved, for example, by the use of a semi-capillary tube).

8.2 The conditions of pre-drying are intended to bring the product more or less into hygrometric equilibrium with the atmosphere of a laboratory in which there is a temperature of 18 to 25 °C and a relative humidity of 50 to 80 %. Should the conditions be appreciably different from the above, it would be advisable to consider modifying the pre-drying.

8.3 Observe the phosphorus(V) oxide to make sure that it remains active; if it does not (formation of a skin, frosted appearance, etc.), replace it with fresh phosphorus(V) oxide.

8.4 Drying at 48 ± 2 °C to constant mass generally requires from 150 to 200 h.

8.5 The calculation may also be presented in the following manner :

8.5.1 *Pre-drying*

The loss in mass P_1 due to the elimination of part of the water during pre-drying (6.1.3), expressed in grams per 100 g of the sample as received, is given by the formula

$$P_1 = (m_0 - m_1) \times \frac{100}{m_0}$$

where

m_0 is the initial mass, in grams, of the analysis sample before pre-drying (6.1.3);

m_1 is the mass, in grams, of the analysis sample after pre-drying (6.1.3).

8.5.2 *Final drying*

The moisture loss P_2 during final drying (6.3), expressed in grams per 100 g of ground coffee, is given by the formula

$$P_2 = (m_2 - m_3) \times \frac{100}{m_2}$$

where

m_2 is the mass, in grams, of the test portion of the ground product (whether pre-dried or not) (6.2);

m_3 is the mass, in grams, of the test portion after drying (6.3).

8.5.3 *Moisture content without pre-drying*

The moisture content of the sample as received, P, expressed as a percentage by mass, is given by the formula

$$P = P_2$$

8.5.4 *Moisture content with pre-drying*

The moisture content of the sample as received, P, expressed as a percentage by mass, is given by the formula

$$P = P_1 + P_2 - \frac{P_1 P_2}{100}$$

9 TEST REPORT

The test report shall show the method used and the result obtained. It shall specify any intermediate results such as loss in mass during pre-drying and successive losses in mass during final drying. It shall also mention any operating conditions not specified in this International Standard, or regarded as optional, as well as any circumstances that may have influenced the result.

The report shall include all details required for complete identification of the sample.

ANNEX

SUITABLE DISH AND DRYING TUBE

A.1 DISH (5.3)

The dish shown in the diagram below has a flat bottom of effective surface 16 cm^2 and an internal height of 14 mm. It may be used with the drying tube shown in clause A.2. The 5 mm hole is to enable the dish to be withdrawn from the drying tube by means of a hook.

Dimensions in millimetres

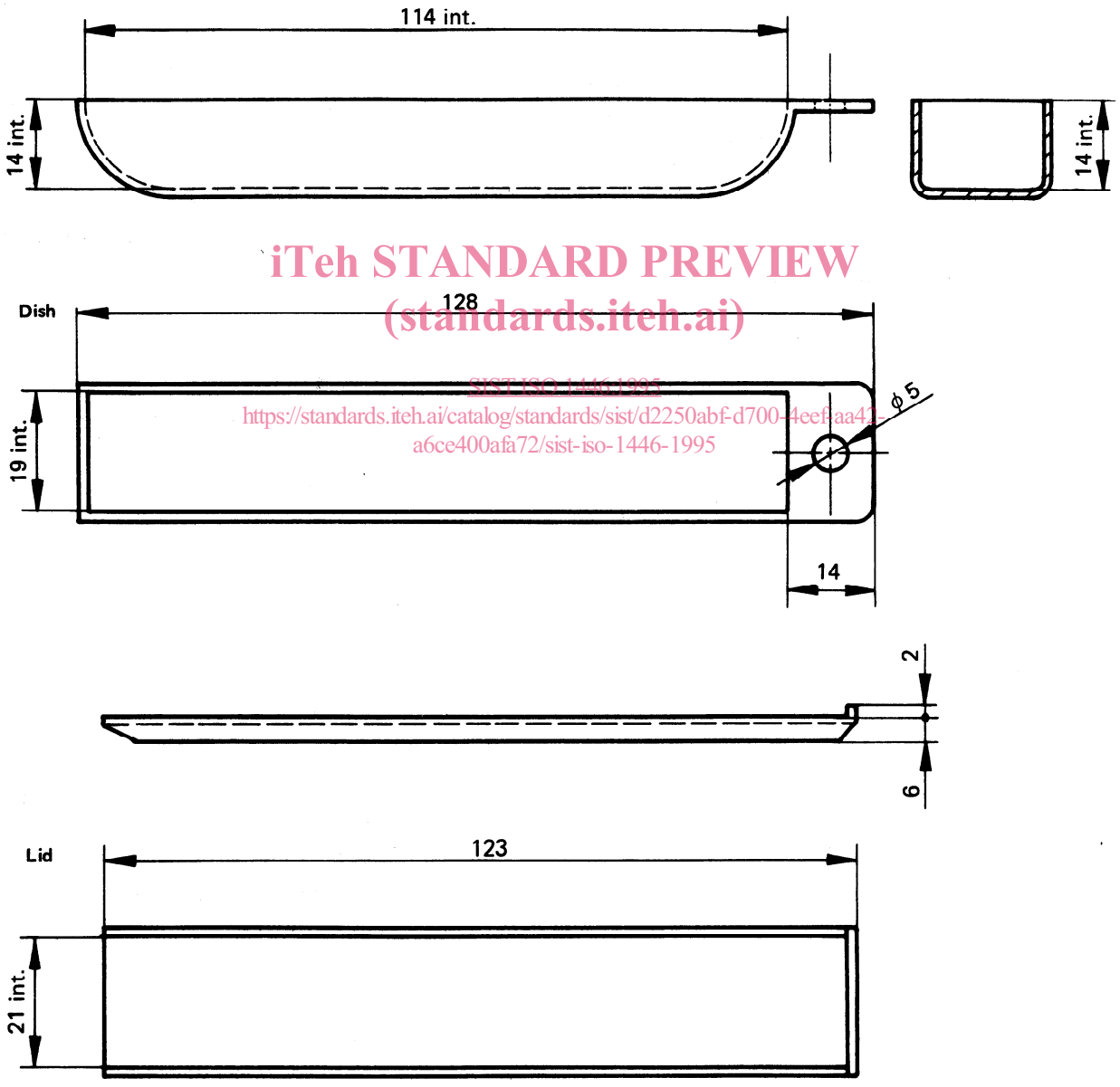

FIGURE 1 — **Diagram of suitable metal dish and lid (for guidance only)**