

SVENSK STANDARD

SS-EN ISO 712:2009

Fastställt/Approved: 2009-11-30
Publicerad/Published: 2010-01-15
Utgåva/Edition: 1
Språk/Language: engelska/English
ICS: 67.060

Cereals and cereal products – Determination of moisture content – Reference method (ISO 712:2009)

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 712

November 2009

ICS 67.060

English Version

**Cereals and cereal products - Determination of moisture content
- Reference method (ISO 712:2009)**

Céréales et produits céréaliers - Détermination de la teneur
en eau - Méthode de référence (ISO 712:2009)

Getreide und Getreideerzeugnisse - Bestimmung des
Feuchtegehaltes - Referenzverfahren (ISO 712:2009)

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Foreword

This document (EN ISO 712:2009) has been prepared by Technical Committee ISO/TC 34 "Food products" in collaboration with Technical Committee CEN/TC 338 "Cereal and cereal products" the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2010, and conflicting national standards shall be withdrawn at the latest by May 2010.

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Cereals and cereal products — Determination of moisture content — Reference method

1 Scope

This International Standard specifies a routine reference method for the determination of the moisture content of cereals and cereal products.

This International Standard applies to: wheat, rice (paddy, husked and milled), barley, millet (*Panicum miliaceum*), rye, oats, triticale, sorghum in the form of grains, milled grains, semolina or flour.

The method is not applicable to maize and pulses.

NOTE For moisture content determination in maize, see ISO 6540^[5]; and for pulses, see ISO 24557^[7].

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

moisture content

mass loss undergone by a product under the conditions specified in this International Standard

NOTE Moisture content is expressed as a percentage.

3 Principle

If necessary, a laboratory sample is ground, after conditioning, if required. A test portion is dried at a temperature between 130 °C and 133 °C, under conditions which enable a result to be obtained which corresponds to that obtained by the absolute method described in Annex B.

4 Apparatus

4.1 Analytical balance, capable of weighing to an accuracy of $\pm 0,001$ g.

4.2 Grinding mill, having the following characteristics:

- a) made of material which does not absorb moisture;
- b) easy to clean and having as little dead space as possible;
- c) enabling grinding to be carried out rapidly and uniformly, without appreciable development of heat (difference of temperatures before and after grinding smaller than or equal to 5 °C);

NOTE A grinding mill fitted with a cooling device can comply with this requirement.

- d) tightness to air to avoid water exchange between sample and external air;
- e) adjustable so as to obtain particles of the dimensions indicated in Table 1.

4.3 Metal dish, non-corrodible under the test conditions, or **glass dish**, with a lid and having an 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/cm².

4.4 Constant-temperature oven, electrically heated, controlled in such a way that, during normal working, the temperature of the air and of the shelves carrying the test portions is maintained within the range 130 °C to 133 °C in the vicinity of the test portions.

The oven shall have a heat capacity such that, when initially adjusted to a temperature of 131 °C, it can regain this temperature in less than 30 min after insertion of the maximum number of test portions that can be dried simultaneously.

The effectiveness of the ventilation shall be determined using durum wheat semolina, of maximum particle size of 1 mm, as the test material. The ventilation shall be such that, after insertion of the maximum number of test portions that the oven can accommodate, and drying at a temperature of 130 °C to 133 °C, the results, after heating the same test portions for 2 h and then for a further 1 h, do not differ by more than 0,15 g of moisture per 100 g of sample.

4.5 Desiccator, containing an effective desiccant.

5 Sampling

Sampling is not part of the method specified in this International Standard. A recommended sampling method is given in ISO 24333^[6].

A representative sample, in an airtight packaging, should have been sent to the laboratory. It should not have been damaged or changed during transport or storage.

6 Preparation of the test sample

6.1 Products not requiring grinding

Products having particle size characteristics indicated in Table 1 do not need to be ground before the determination.

Mix the laboratory sample thoroughly before taking the test portion (7.2).

Table 1 — Particle size characteristics of products not requiring grinding

Particle size characteristics mm	Proportion %
≤ 1,7 (1,8) ^a	100
> 1,0 (1,0) ^b	≤ 10
< 0,5 (0,56) ^a	≥ 50

^a Nominal size of openings, ISO 3310-1^[1], that *does not retain* this particle size.
^b Nominal size of openings, ISO 3310-1^[1], that *retains* this particle size.

6.2 Products requiring grinding

6.2.1 General

If the products do not have the particle size characteristics mentioned in Table 1, they shall be ground either without preconditioning (6.2.2) or with preconditioning (6.2.3), as required.

6.2.2 Grinding without preconditioning

For products that are not likely to undergo variations in moisture content during grinding (in general, products with a moisture content between 9 % and 15 %), grind without preconditioning.

NOTE The range of moisture contents given for conditioning products before grinding corresponds approximately in the laboratory to a temperature of 20 °C and a relative humidity of 40 % to 70 %.

Adjust the grinding mill (4.2) to obtain particles of the dimensions indicated in Table 1.

Then, quickly grind a quantity of the laboratory sample according to the apparatus used and at least slightly greater than that required for the test portion (about 5 g), and immediately proceed in accordance with 7.2.

6.2.3 Grinding with preconditioning

Products which are likely to undergo changes in moisture content during the course of grinding (in general, products with a moisture content greater than 15 % or less than 9 %) shall be preconditioned so as to bring their moisture content to between 9 % and 15 % before grinding.

If the moisture content is more than 15 % (the most frequent case), weigh, to the nearest 0,001 g, a sufficient quantity of the laboratory sample to provide a test portion slightly greater than 5 g (see 6.2.2). Record the mass of the test portion before preconditioning and dish as m'_2 . Pre-dry in accordance with 7.3, except that the time of heating in the oven (4.4) shall be 7 min to 10 min and the product shall be cooled to laboratory temperature with the dish (4.3) uncovered and without a desiccator, for at least 2 h.

NOTE It is possible that these times are not be suitable for all products, e.g. paddy rice.

For products having moisture contents of less than 9 %, weigh, to the nearest 0,001 g, a sufficient quantity of the laboratory sample to provide a test portion slightly greater than 5 g (see 6.2.2). Record the mass of the test portion before preconditioning and dish as m'_2 . Place in a suitable atmosphere (generally that of the laboratory) and leave until a moisture content within the limits indicated above is obtained.

After conditioning, weigh the sample to the nearest 0,001 g. Record the mass of the test portion after preconditioning and dish as m'_3 . Grind immediately, adjusting the grinder so as to obtain particles of the dimensions indicated in Table 1, and immediately proceed in accordance with 6.2.2.

7 Procedure

7.1 Number of determinations

Carry out separate determinations on two test portions taken from the laboratory sample in accordance with 7.2 and 7.3. If the absolute difference between the two values obtained is greater than the repeatability limit given in Clause 9, repeat the determination until requirements are satisfied.

7.2 Test portion

Rapidly weigh, to the nearest 0,001 g, a quantity of $5 \text{ g} \pm 1 \text{ g}$ of the laboratory sample (6.2.2 or 6.2.3) in the dish (4.3). Record the mass of the undried test portion and dish as m'_0 . Previously dry and tare the dish, together with its lid, and record the mass, m_d , to the nearest 0,001 g.