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COMMITTEE FOR TRADE, INDUSTRY AND  
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Working Party on Standardization of  
Perishable Produce and Quality Development

Specialized Section on Standardization of  
Dry and Dried Produce (Fruit)  
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Item 5 (a) of the provisional agenda

**REVISION OF THE STANDARD LAYOUT FOR DRY AND DRIED PRODUCE**

**ANNEX II : DETERMINATION OF THE MOISTURE CONTENT**

Transmitted by Spain

**Note by the secretariat:** The delegation of Spain has prepared revised documents for the annexes to the standard layout based on the discussions at the last session and comments received.

## ANNEX II

### DETERMINATION OF THE MOISTURE CONTENT FOR DRY FRUIT

#### METHOD 1 - LABORATORY REFERENCE METHOD

##### 1. Scope and application

This reference method serves to determine the moisture and volatile matter content for both inshell and shelled dry fruits (kernels).

##### 2. Reference

This method is based on the method prescribed by ISO: ISO 665-1977 Oilseeds - Determination of moisture and volatile matter content.

##### 3. Definition

Moisture content and volatile matter content for dry fruit: loss in mass measured under the operating conditions specified in ISO 665-1997 for oilseeds of medium size (see point 6.1.3 of ISO 665-1997). *The moisture content is expressed as percentage by mass (grams per 100 grams).*

##### 4. Principle

Determination of the moisture and volatile matter content of a test portion by drying at  $103 \pm 2^\circ \text{C}$  in an oven at atmospheric pressure, until practically constant mass is reached.

##### 5. Apparatus (see ISO 665-1997 for more details)

5.1 Analytical balance *sensitive to 1 mg.*

5.2 Mechanical mill (*and ceramic mortar with pestle, for shells*)

5.3 Mechanical or hand grater

**5.4 *Glass, porcelain or non-corrosive metal containers, provided with well-fitting lids, allowing the test portion to be spread with no more than 5 mm height.***

5.5 Electric oven with thermostatic control capable of being regulated between 101 and 105° C in normal operation.

5.6 Desiccator containing an effective desiccant

## 6. Procedure

Follow the operating conditions as specified in ISO 665-1997 for oilseeds of medium size (point 6 and 6.1.3 of ISO 665-1997), but with the following specific modifications, concerning the preparation of the test sample:

### 6.a Determination of the moisture and volatile matter content of kernels:

*Homogenize the laboratory sample and take approximately 50 g of kernels as a test sample. For inshell dry fruits, take approximately 100 g and remove the shells using a nutcracker or hammer, using the rest as a test sample (the cuticle or spermoderm of the kernel is included in the test sample).*

*Grind the test sample until the size of the particles obtained is no greater than 3 mm. During the grinding operation, care should be taken to avoid the production of a paste (oily flour), the overheating of the sample and the consequent loss of moisture content (for example, if using a mechanical food chopper, by successive very short grinding and grating operations).*

*Spread evenly over the base of the vessel 5 to 10 g of the grated product as a test portion, replace the lid, and weigh the whole vessel. Carry out two determinations on the same test sample.*

### 6.b Determination of moisture and volatile matter content on whole dry fruits (shell plus kernel):

*Homogenize the laboratory sample and take approximately 100 g of dry fruits as a test sample. Remove the shells using a nutcracker or hammer, and separate shells and kernels.*

*Grind the kernel portion as indicated in 6.a, and crush and grind the shell portion separately in a mortar and/or mechanical mill, until the size of the particles obtained is no greater than 3 mm. Mix and homogenize the two portions. <sup>1</sup>*

*Spread evenly over the base of the vessel 5 to 10 g of the mixed product as a test portion, replace the lid, and weigh the whole vessel. Carry out two determinations on the same test sample.*

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<sup>1</sup> *The precedent operations can be omitted by the use of appropriate mechanical mills (as Rass Mill apparatus or similar) with allow to grind the whole dry fruit together (shell plus kernel) without overheating the product.*

## 7. Expression of results and test report

Follow all the instructions as specified in ISO 665-1997 (point 7 and 9) for method of calculation and formulae, for repeatability, and for test report, without any modification. 2

### METHOD 2: RAPID METHOD

#### 1. Principle

Determination of the moisture content using a measuring apparatus based on the principle of loss of mass by heating. The apparatus should include an halogen or infra-red lamp and a built-in analytical balance, calibrated according to the laboratory method.

#### 2. Apparatus

- 2.1 Mechanical mill or food chopper.
- 2.2 Mechanical or hand grater
- 2.3 Halogen or infra-red lamp with built-in analytical balance sensitive to 1 mg.

#### 3. Procedure

##### 3.1 Preparation of sample

Follow the same instructions as given for the laboratory reference method (points 6.a and 6.b), unless indicated otherwise by the instructions for use of the apparatus, particularly with regard to the diameter of the fragments.

##### 3.2 Determination of moisture content

Carry out the determination on two test portions of approximately 5 to 10 g each, unless indicated otherwise by the instructions for use of the apparatus.

Spread the test portion over the base of the test receptacle, thoroughly cleaned in advance, and note the weight of the test portion to within 1 mg.

Follow the procedure indicated in the instructions for use of the apparatus for the product to be tested, in particular with regard to the adjusting of temperatures, the duration of the test and the recording of the weight readings.

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#### 2 *The main points specified are as follows:*

- *moisture and volatile matter content is expressed as a percentage of mass (g per 100 g of sample)*
- *the result is the arithmetic mean of the two determinations*
- *the result has to be reported to one decimal place*
- *repeatability: the difference between the two determinations should not exceed 0.2 g per 100 g of sample*
- *reproducibility: ISO 665-1997 doesn't specify any condition of reproducibility*

**4. Expression of results**

4.1 Result

The result should be the arithmetic mean of the two determinations, provided that the conditions of repeatability (4.2) are satisfied. Report the result to one decimal place.

4.2 Repeatability

The difference in absolute value between the respective results of the two determinations performed simultaneously or one immediately after the other by the same operator, under the same conditions on identical test material, must not exceed 0.2%.

**5. Test report**

The test report must state the method used and the results obtained. The report must contain all information necessary for the full identification of the sample.