

UNECE STANDARD DF-17
concerning the marketing and commercial
quality control of

CASHEW KERNELS
moving in international trade
between and to UNECE member countries

I. DEFINITION OF PRODUCE

This standard applies to cashew kernels obtained by heating, shelling and peeling the true fruits of the cashew tree (*Anacardium occidentale Linneaus*). It does not apply to cashew kernels for further processing.¹

- (a) Whole: whole kernels of characteristic shape.² The presence of a small hole at the proximal end of the kernel or a central split or crack is not considered a defect.
- (b) Broken: Kernels where one eighth or more of the original kernel is broken off. Designations of broken as follows:
 - (i) Butts: Kernels of not less than 3/8th of a whole kernel which have been broken crosswise but the cotyledons are still naturally attached.
 - (ii) Splits: Kernels split lengthwise naturally.
 - (iii) Pieces: Kernels which have broken into more than two pieces.

II. PROVISIONS CONCERNING QUALITY

The purpose of the standard is to define the quality requirements of cashew kernels at the export control stage after preparation and packaging.

A. Minimum requirements

- (i) In all classes subject to the special provisions for each class, and the tolerances allowed, the cashew kernels must be:
 - sound; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded;
 - sufficiently developed;

¹ *Oil frying or roasting are not considered to be 'further processing' where cashew kernels are intended for direct consumption.*

² *Kernels with no more than one eighth of the kernel broken off can also be considered as whole.*

- clean, practically free from any visible foreign matter;
- free from insects or mites whatever their stage of development;
- free from visible damage by insects, mites or other parasites;
- free from mould;
- free of any rancidity;
- free from adhering testa or shell liquid;
- free of foreign smell and/or taste.

The condition of the cashew kernels must be such as to enable them:

- to withstand transport and handling; and
- to arrive in satisfactory condition at the place of destination.

(ii) **Moisture content**

Cashew kernels shall have a moisture content of not greater than 5%.³

B. Classification

Cashew kernels are classified in three classes defined below.⁴

(i) **"Extra" class**

Cashew kernels in this class must be of superior quality. They must be characteristic of the variety and/or commercial type. Their colour should be white, pale ivory, pale ash-grey or light yellow and should be uniform.

They must be practically free from defects with the exception of very slight superficial defects provided that these do not affect the general appearance of the produce, the quality, the keeping quality or its presentation in the package.

(ii) **Class I**

Cashew kernels in this class must be of good quality. They must be characteristic of the variety and/or commercial type. Their colour may be of light brown, light ivory, yellow, light ash-grey or deep ivory as a result of overheating.

(iii) **Class II**

This class includes cashew kernels which do not qualify for inclusion in the higher classes, but which satisfy the minimum requirements specified above. Immature and speckled kernels are permitted provided they do not affect the characteristic shape of the kernel. Their colour may be light or deep brown, amber, light or deep blue. The kernels may be discoloured and black spotted.

³ *The moisture content is determined by the method described in Annex I to this document.*

⁴ *Optional designations for each class are described in Annex II to this document.*

III. PROVISIONS CONCERNING SIZING

Kernels are classified by style as follows:

- (a) Whole: Sizing is compulsory in "extra class", but optional for "class I" and "class II". Designation of sizes of whole kernels are as follows:

Size Designation	Number of kernels per Kg
150	265-325
180	326-395
210	395-465
240	485-530
280	575-620
320	660-706
400	707-880
450	881-990
500	990-1100

- (b) Broken:

Designations of sizes of pieces are as follows:

Designation	Characteristic
Large pieces:	not passing through a sieve of aperture 4.75mm
Small pieces: ⁵	passing through a sieve of aperture 4.75mm but not passing through a sieve of aperture 2.80mm.

⁵ *These pieces may also be designated "Medium Brazilian Pieces".*

Very Small Pieces: ^{6 7} passing through a sieve of aperture 2.80mm but not passing through a sieve of aperture 2.36mm.

"Baby bits" or "granules": Plemules and fragments of kernels passing through a sieve of aperture 2.80mm but not passing through a sieve of aperture 1.70mm.

IV. PROVISIONS CONCERNING TOLERANCES

Tolerances in respect of quality and size shall be allowed in each package for produce not satisfying the requirements of the class indicated.

A. Quality tolerances

Permitted defects ^a	Tolerances allowed per cent by weight of kernels		
	Extra	Class I	Class II
Total tolerances	8	11	14
Superficial damage	1	2	5
Immature or shrivelled (deformed)	1	2	5
Coloured kernels of next lower grade (NLG)	5	7.5	- ^a
Speckled or spotted (black or brown)	0.5	0.5	- ^b
Presence of testa	1	1	5
Insect damage	0.5	0.5	1
Mouldy, rancid or rotten	0.0	0.5 ^c	1 ^c
Foreign matter	0.05	0.05	0.05

^a The definition of the defects are listed in Annex III to this document.

^b No limit (see Classification for Class II).

^c For broken, rancidity is to be determined as free fatty acid and/or peroxide value. The maximum tolerated for free fatty acid is 1% (expressed as oleic acid) and for peroxide, the maximum tolerated is 5 meq/kg (milliequivalents of oxygen per kilogram), both on the basis of extracted oil.

B. Mineral Impurities

⁶ These pieces may also be designated "Small Brazilian Pieces".

⁷ This sizing is optional.

Acid insoluble ash must not exceed 1g/kg

C. Size tolerances

For "whole" kernels that have been size graded, the quantity of kernels of next lower size grade (NLSG) shall not exceed 5% by weight for "extra class", and 7.5% by weight for "class I" and "class II" at the time of packing. For all "whole" kernels, whether or not size graded, the quantity of brokens or pieces for "extra class", "class I" and "class II" shall not exceed 5% by weight at the time of packing.

For "butts" and "splits" the quantity of pieces present for "extra class", "class I" and "class II" shall not exceed 5% by weight at the time of packing.

For "pieces" grades, the quantity of pieces of the next lower pieces size designation for "extra class" shall not exceed 5% by weight of "extra class", and for "class I", and "class II" by 7.5% by weight.

V. PROVISIONS CONCERNING PRESENTATION

A. Uniformity

The contents of each package (or lot for each package presented in bulk) must be uniform and contain cashew kernels of the same origin, quality and size (if sized).

The visible part of the contents of the package (or lot for each package presented in bulk) must be representative of the entire contents. For "extra" class and "class I", the kernels must be of the same variety and/or commercial type.

B. Packaging

Cashew kernels must be packed in such a way as to protect the produce properly, usually in hermetically sealed containers, either as rigid metal cans or flexible packs with barrier properties, under an inert gas or vacuum. The use of materials, particularly paper or stamps bearing trade specifications is allowed provided the printing or the labelling has been done with non-toxic ink or glue. The use of lead solder is not permitted.

C. Presentation

Cashew kernels may be presented:

- in small packages for direct sale to the consumer;⁸
- bulk packages e.g. 11.34 kilogramme cans flexible packs etc.

⁸ *The regulations of certain importing countries require compliance with a specific range of net weights for closed packages.*

VI. PROVISIONS CONCERNING MARKING

Each package or case (for small retail packs) must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

A. Identification

Packer)	Name and address or
and/or)	officially issued or
Dispatcher)	accepted code mark ⁹

B. Nature of Produce

- "Cashew kernels", if the contents not visible from outside
- Name of the variety and/or commercial type

C. Origin of produce

Country of origin and, optionally, district where grown or national, regional or local place name

D. Commercial specification

- Class ("extra", class I or class II or alternative acceptable designations as described in Annex II)
- Style ("whole", "butts", "splits" or "pieces")
- Size designation (if sized)
- Crop year (optional)
- Net weight, or the number of package units, followed by the net weight in the case of packages containing such units.

E. Official control mark (optional)

Adopted 1999
Inclusion of new Annex I 2002

⁹ *The national legislation of a number of European countries requires the explicit declaration of the name and address.*

ANNEX I
DETERMINATION OF THE MOISTURE CONTENT FOR DRY PRODUCE (NUTS)

METHOD 1 - LABORATORY REFERENCE METHOD

1. Scope and application

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

2. Reference

This method is based on the method prescribed by ISO: ISO 665-2000 Oilseeds - Determination of moisture and volatile matter content.

3. Definition

Moisture content and volatile matter content for dry produce (inshell nuts and shelled nuts): loss in mass measured under the operating conditions specified in ISO 665-2000 for oilseeds of medium size (see point 7.3 of ISO 665-2000). The moisture content is expressed as mass fraction, in percent, of the mass of the initial sample.

For whole nuts, when moisture content is expressed both on the whole nut and on the kernel, in cases of dispute between the two values, the moisture content value of the whole nut takes precedence.

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 665-2000 for more details)

- 5.1 Analytical balance sensitive to 1 mg or better.
- 5.2 Mechanical mill.
- 5.3 3 mm round-holes sieve.
- 5.4 Glass, porcelain or non-corrosive metal containers, provided with well-fitting lids, allowing the test portion to be spread to about 0.2 g/cm^2 (approximately 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 665-2000 for oilseeds of medium size (point 7 and 7.3 of ISO 665-2000), but with the following specific modifications, concerning the preparation of the test sample.

Although ISO 665-2000 sets up one initial period of 3 hours in the oven set at $103 \pm 2^\circ \text{C}$, for nuts it is recommended one initial period of 6 hours.

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

For shelled nuts, homogenize the laboratory sample and take a minimum of 100 g of kernels as a test sample.

For inshell nuts, take a minimum of 200 g and, using a nutcracker or hammer, remove the shells and fragments or particles of shell, using the rest as a test sample. The kernel skin (cuticle or spermoderm) is included in the test sample.

Grind and sieve 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 sieving operations).

Spread evenly over the base of the vessel about 10 g of the ground 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 nuts (shell plus kernel):

Homogenize the laboratory sample and take a minimum of 200 g of nuts as a test sample. Remove all the foreign matter (dust, stickers, etc.) from the test sample.

Grind the whole nuts using either a Rasc Mill, a Romer Mill or a Brabender apparatus or similar, without overheating the product.

Spread evenly over the base of the vessel about 15 g of the ground product as a test portion, replace the lid, and weigh the whole vessel. Carry out two determinations on the same test sample.

7. Expression of results and test report

Follow all the instructions as specified in ISO 665-2000 (point 9 and 11) for method of calculation and formulae, and for test report, without any modification.¹⁰

8. Precision

For conditions of repeatability and reproducibility apply specifications of ISO 665-2000 (point 10.2 and 10.3) for soya beans.

METHOD 2: RAPID METHOD

1. Principle

¹⁰ The main points specified are as follows:

- moisture and volatile matter content is expressed as mass fraction, in percent, of the mass of the initial sample.
- The result is the arithmetic mean of the two determinations; the difference between the two determinations should not exceed 0.2 % (mass fraction).
- The result has to be reported to one decimal place.

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

The use of apparatus based on the principle of electrical conductivity or resistance, as Moisture Meters, Moisture Testers and similar, is also allowed always at condition that the apparatus has to be calibrated according with the laboratory reference method for the tested product.

2. Apparatus

- 2.1 Mechanical mill or food chopper.
- 2.2 3 mm round-holes sieve (unless indicated otherwise by the instructions for use of the apparatus).
- 2.3 Halogen or infrared lamp with built-in analytical balance sensitive to 1 mg or better.

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.

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.

ANNEX II

DESIGNATIONS OF CLASSES

Designations for each class are shown in the table below.

Class	Quality	Colour	Optional Designation
Extra	Superior quality Characteristic of variety or commercial type	White Pale Ivory Pale ash-grey Light yellow	"White"
Class I	Good quality	Light Brown Light Ivory Light ash-grey Deep ivory Yellow	"Scorched"
Class II	Do not qualify for inclusion in higher classes, but which satisfy minimum requirements specified above.	Light Brown Amber Light Blue	"Scorched Seconds"
	Immature and speckled kernels are permitted provided they do not affect the characteristic shape of the kernel.	Deep Brown Deep Blue Discoloured Black spotted	"Dessert"

ANNEX III

DEFINITIONS OF DEFECTS

A. Defects of kernels

Superficial damage: Damage adversely affecting the appearance of the product, including blemishes and areas of discoloration. Scraped kernels, where characteristic shape is not affected are not considered defective.

Intrinsic defects: Shrivelled or immature kernels: the kernel is materially shrunken, wrinkled and tough. These are considered a defect only when the kernel is deformed and does not have its characteristic shape.

Spotted or speckled: the presence of black or brown spots or specks.

B. Other defects from external causes

Insect damage: Containing dead insects, mites, insect fragments, webbing, frass, excreta, or visible damage caused by boring and feeding of insects and animal parasites.

Mould: Mould filaments either on the inside or the outside of the kernel visible to the naked eye.

Rancidity: Oxidation or free fatty acid production in the lipids producing a disagreeable flavour.

Decay: Significant decomposition caused by the action of micro-organisms.

Foreign Matter: Any matter or material not usually associated with the product; excludes mineral impurities.

Testa: Skin adhering to any portion of the kernel.
