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# Code of Practice

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Enhancement of coffee quality through  
prevention of mould formation

14 June 2002

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## Enhancement of coffee quality through prevention of mould formation

### Contents:

<b>1</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>2</b>	<b>HOW TO USE THIS CODE OF PRACTICE.....</b>	<b>1</b>
<b>3</b>	<b>GROWING AND HARVESTING .....</b>	<b>2</b>
3.1	GROWING.....	2
3.2	HARVESTING .....	2
<b>4</b>	<b>PROCESSING .....</b>	<b>2</b>
4.1	GENERAL.....	2
4.2	WET PROCESSING.....	3
4.3	DRY PROCESSING .....	3
4.4	HULLING .....	3
<b>5</b>	<b>INTERNAL TRANSPORT AND STORAGE.....</b>	<b>4</b>
5.1	INTERIOR TRANSPORT (TRANSPORT FROM COUNTRY OF ORIGIN TO PORT OF SHIPMENT).....	4
5.2	STORAGE AFTER PROCESSING OR IN THE PORT OF SHIPMENT .....	5
<b>6</b>	<b>STUFFING AND SHIPPING .....</b>	<b>5</b>
6.1	STUFFING .....	5
6.2	SHIPPING .....	7
<b>7</b>	<b>RECEIPT, STRIPPING, WAREHOUSE STORAGE AND DISTRIBUTION.....</b>	<b>7</b>
7.1	RECEIPT.....	7
7.2	STRIPPING .....	7
7.3	STORAGE.....	8
7.4	INLAND DISTRIBUTION.....	8
<b>8</b>	<b>FACTORY STORAGE, QUALITY CONTROL AND PROCESSING .....</b>	<b>8</b>
8.1	FACTORY STORAGE.....	8
8.2	QUALITY CONTROL.....	9
8.3	PROCESSING.....	9
8.4	PACKING AND DISTRIBUTION .....	10
<b>9</b>	<b>CONTRACTS .....</b>	<b>10</b>
<b>10</b>	<b>METHODS OF ANALYSIS AND SAMPLING .....</b>	<b>11</b>

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## 1 INTRODUCTION

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Food safety and public health are major policy issues. It involves authorities on the national, regional and international level as well as the food sector.

Among the many subjects affecting food safety are contaminants caused by mould formation. Some moulds produce toxins that can be harmful for human health. Collectively these are known as mycotoxins. One of them is Ochratoxin A (OTA) which is nephrotoxic and possibly carcinogenic to humans. It is predominantly produced by two fungal species, *Aspergillus* and *Penicillium*. OTA is found in many foodstuffs, predominantly in cereals but also in coffee beans. These moulds will only grow on foodstuffs that have been subjected to high levels of moisture. In coffee this leads to a contamination of the green coffee bean producing unacceptable flavours, and making such samples rejected for roasting.

Extensive sampling of green coffee from all origins has shown that OTA contamination may be more frequent in some areas, but that no producing country is entirely free from contamination. Similarly it has been shown that, while the initial contamination may occur at farm level, the actual OTA formation may happen throughout the entire chain, in every stage of transportation, storage and production.

Preventive measures taken by all participants in the chain from tree to cup are the best way to prevent mould formation and thus enhance coffee quality.

Without such a concerted effort of the coffee sector and related industries (shipping lines, warehouses) authorities in consuming countries may feel obliged to introduce maximum limits for OTA and possibly also for a series of other mycotoxins, which would create major problems for the coffee sector (cumbersome procedures for sampling and analysis, disruption of the logistical flow of coffee, secondary market of rejected shipments, difficulties over contractual obligations and insurance, etcetera, etcetera).

This Code of Practice is intended to assist operators throughout the chain to apply Good Agricultural Practices, Good Practices in Transport and Storage and Good Manufacturing Practices preventing OTA contamination and formation.

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## 2 HOW TO USE THIS CODE OF PRACTICE

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This Code is intended to assist all participants in the coffee chain (growers, operators of mills or curing stations, transport companies in countries of origin, operators of storage facilities in origin, shipping lines, warehouse companies and transport companies at destination, traders and roasters) with basic guidance how to minimise the risk of mould formation. It does not in itself constitute a legal or contractual obligation. Each link in the chain can refer to the chapters or paragraphs relevant to his operation. This has resulted in some repetitiveness, but this is a small price to pay for ease of use. The language used is rather direct, but this is to avoid an unnecessarily wordy document with many repetitions of phrases like 'where appropriate...'

Variations in the practice of coffee growing, processing, storing, transporting and roasting are such that not each variant could be treated separately. Of necessity this Code is therefore rather generic. Operators are recommended to adapt the

recommendations to their specific circumstances wherever necessary, while respecting the overall intent of the Code of Practice.

Questions and suggestions are very welcome. Please contact the secretariat of the European Coffee Federation:

- fax: +31-20-5113892
- e-mail: [ecf@coffee-associations.org](mailto:ecf@coffee-associations.org)

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## **3 GROWING AND HARVESTING**

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### **3.1 Growing**

Just like the coffee plant, fungi require water and nutrients in order to develop. The suggested measures are designed to minimise the time during which the fungi experience favourable conditions in coffee production. Healthy plants produce healthy fruits and the tissue layer of sound fruits can protect the moist, nutritious interior of the cherry from contact with mould. Nevertheless, contact with any obvious sources of fungal contamination (soil, poor water quality and mouldy fruits) should be minimised to help the cherries' natural defences.

### **3.2 Harvesting**

- The soil under the tree should be covered with a clean sheet of plastic during picking to avoid cherries getting contaminated by dirt or mixed up with mouldy cherries ("gleanings") from previous harvests.
- Cherries that have fallen to the ground are known to be susceptible to mould growth and therefore should not be used.
- Process fresh cherries as quickly as possible. Avoid storage of cherries, especially ripe and over-ripe ones, as any period of storage (in a bag or in a pile) increases the likelihood of mould growth.
- Do not dry on bare soil: Use trays or tarpaulins. Mould spores from previous lots are known to remain on the ground and this could result in clean cherries being contaminated during drying.
- The layer of drying cherries should be not more than 4 cm thick.
- Drying cherries must be regularly raked (5-10 times per day).
- Protect cherries during drying from rain and night dew.
- Avoid all re-wetting of partially dried and dried cherries, protecting them from moisture and rain.

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## **4 PROCESSING**

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### **4.1 General**

- Site processing plant in a dry area, not in a swamp.
- Dispose of pulp from wet processing away from clean dry coffee. Compost it before using it as mulch in the field
- Keep equipment and facilities clean, separating residual partially processed material and accumulation of dust and discarded material.

- Clean coffee from all husk material – more than 90% of mould comes from husks in sun dried cherries.
- Remove as many defects (husks, un-hulled cherries or mouldy beans) as possible.
- Use clean bags for storing and transporting cleaned dried beans.
- Keep separate cleaned dried beans from discarded material.
- Prevent recontamination by avoiding contact of clean green beans with dust, husks and dirty bags.
- Do not store cleaned, dry green coffee near rejects and husks.
- Processing should achieve a uniform green bean moisture content that is as low as feasible, but certainly not higher than 12,5% using ISO 6673 as the measuring method or using equipment calibrated to the same standard. This requirement does not apply to speciality coffees that traditionally have a high moisture content, e.g. Indian Monsooned coffees.

## **4.2 Wet processing**

- Pulp on the same day as harvesting
- Separate floaters
- Control quality of water
- Sanitise equipment
- Separate completely parch and pulp
- Complete fermentation within local standards
- Control quality of water and sanitation of equipment during washing
- Drying:
  - if possible, rapidly remove excess water with forced drying
  - dry slowly to avoid cracking by excessive heat, control layer thickness and turn regularly
  - avoid re-wetting
  - cover with ventilation especially at night
  - avoid soil contact
  - use mats or drying tables when possible
  - maintain mats/tables in clean and sanitised condition
  - achieve water content for parchment of maximally 12%

## **4.3 Dry processing**

- Start drying on day of harvesting
- Spread immediately – never heap – control layer thickness – turn regularly
- Avoid soil contact – dry on mats or preferably drying tables
- Avoid re-wetting – cover and ventilate
- Achieve water content of cherries of maximally 12%
- Clean and sanitise mats and tables or drying surfaces

## **4.4 Hulling**

Keep beans, parchment and husks completely separate

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## **5 INTERNAL TRANSPORT AND STORAGE**

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Under this chapter it must be stressed that, in view of the importance of moisture in relation to the formation of moulds and thus to the possible occurrence of OTA, improper drying and rewetting are by far the most significant risks. Strict adherence to all possible measures for proper moisture management is therefore of the utmost importance.

The lesser but nevertheless important danger is that of cross contamination. Here the general state of the transport- and storage facilities is very important.

### **5.1 Interior transport (transport from country of origin to port of shipment)**

In order to prevent re-wetting and cross contamination as much as possible, the following rules must be adhered to:

- The maximum moisture content above which the risk of OTA formation strongly increases is 12.5%. This level should not be exceeded anywhere from the point where the coffee leaves the mill until the point at which the coffee is stuffed (i.e. with ICO marks and/or customs identified)
- Avoid re-wetting by covering bags during transport.

#### **Trucks (Bags):**

- Control for rips in the coverage of trucks, leaking undersides of trucks. Check from the inside by closing all doors and watching for holes.
- Trucks must be clean, dry and odour-free. This also prevents cross contamination from earlier voyages.
- Do not load and unload trucks when exposed to rain.
- Do not bring wet trucks inside the mill.

#### **Containers:**

- Do not use damaged containers and prevent water leaks. Beware of rusty spots on roof and sides of containers. Check from the inside by closing all doors and watching for holes and foreign smells.
- If the container is in bad condition insist that the shipping company or terminal supply a proper one.
- Do not stuff and strip containers when exposed to rain.
- Do not bring wet container trucks inside the mill.
- Do use only clean, dry and odour-free containers. This also prevents cross contamination from earlier voyages.
- Prior loads: no IMCO cargo (chemicals and other cargo damaging foodstuffs).
- Make transit times as short possible and avoid long stops. Extensive trial shipments with probes placed at various places in the container showed that long hauls during interior transport, with prolonged stops during the transport, considerably increased the risk of condensation and thus of re-wetting.

- Avoid leaving stuffed containers for an extended period of time exposed to full sunshine. Preferably use a shaded area or put another container on top. The roof of an unprotected container can reach temperatures of over 80°C. Cooling off during the night results in condensation.

For stuffing recommendations see item 6.1.

## **5.2 Storage after processing or in the port of shipment**

- In order to avoid cross contamination never put parchment coffee together with dry cherries and/or beans. Separate finished products and debris, like chaff and hulls and husks.
- Store coffee in leak-proof warehouses. Store away from the walls. Use heat insulated roofed warehouses if available.
- Use clean and dry and odour-free bins and silos dedicated to coffee only. Here also avoid possible cross contamination.
- Preferably, keep storage in warehouses in humid areas (for example in seaports in the tropics) as short as possible to avoid re-adsorption of moisture.

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# **6 STUFFING AND SHIPPING**

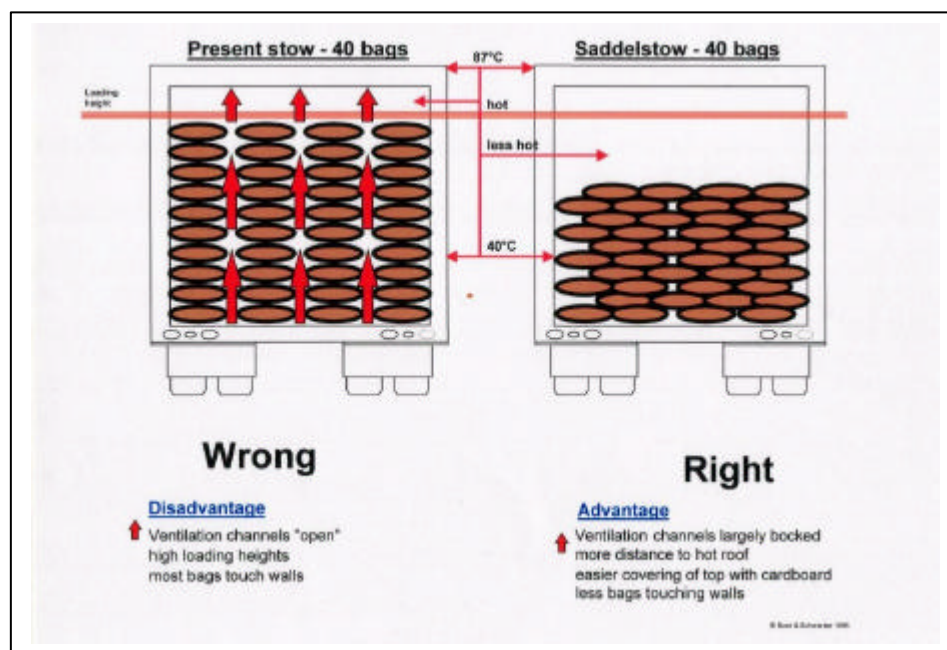
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## **6.1 Stuffing**

- Provide good quality control tests (including cupping) especially to check for moisture and defects. If the moisture content is found to be in excess of 12.5%, refrain from shipping and bring down the moisture content first by drying again. Check on mould growth visually and by cupping (earthy/mouldy/musty taste).
- Do not use damaged containers and prevent water leaks. Beware of rusty spots on roof and sides of containers. Check from the inside by closing all doors and watching for holes and foreign smells.
- If the container is in bad condition insist that the shipping company or terminal supply a proper one.
- Make sure that pallets or wooden floors of containers are dry. Coffee absorbs moisture quickly if the bags get wet and as a result the moisture content increases considerably.
- Lining. Cardboard, single-side corrugated and waxed on the inside has proven to be the best protection against condensation for bags in containers, but also kraft paper has been used successfully. Line sides of container for bags with water-absorbent paper. Tape but not glue to avoid problems when removing the paper.
- Do not stuff containers when exposed to rain.
- In stuffing the container, bags or bulk, keep coffee away from the roof.
- Type of containers. If available, fully ventilated containers are preferable for coffee in bags, especially if shipped from a high humidity origin. Alternatively

the standard dry container with added protection (top, sides and doors) is fully acceptable. For bulk containers use closed liners and avoid spillage between the liner and the doors of the container. Take care of gradual filling of the container. Avoid heaps in the middle. Condense water will flow down and form pockets at the lower points.

- Ventilation holes in the container are to be kept free. Do not cover with tape.
- Cover bags in the container with water-absorbent material to prevent rewetting during transport of the top layer of coffee through condensation. Strong cardboard (one-sided corrugated, flat side waxed) is preferred. Drying agents like drybags absorb around 75% of their own weight in moisture and may be used for added protection if parties so agree (some receivers do not prefer this method because in the case of a broken or torn drybag on arrival, HACCP rules require the analysis of the foreign matter before the coffee can be used for processing). However, experience as to the effectiveness of drybags differs because the quantities of condensation are very large.
- The risk of moisture damage in the container is generally larger for bags in containers than for bulk. Contact of the bags with the side of the container (heating) and the airflow between the bags are serious risk factors for condensation. Enough top space between bags and the roof is important. Use the saddle stow method, which minimises side contact and airflow between the bags (see following illustration). You will stow the same quantity but the height will be less.





## **6.2 Shipping**

- Transport trials have proven that not very much happens to the moisture and temperature of the coffee during the sea voyage. Avoid unprotected stowage on deck (top layer) and stow away from boilers and heated tanks/bulkheads.
- Preferably use direct shipment and avoid trans-shipments where possible. Trans-shipment, especially in ports in northern zones, increases the risk of condensation.
- In trans-shipment ports avoid leaving stuffed containers for an extended period of time exposed to full sunshine. Preferably use a shaded area or put another container on top. The roof of an unprotected container can reach temperatures of over 80°C. Cooling off during the night results in condensation.

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## **7 RECEIPT, STRIPPING, WAREHOUSE STORAGE AND DISTRIBUTION**

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### **7.1 Receipt**

- Upon arrival of the ocean vessel the coffee must be received and discharged as soon as possible. Avoid unnecessary delays once the coffee has arrived. Take care that the necessary documents for the receipt of the coffee are available. A longer stay in the port after arrival of the container is a high risk factor for condensation. Transport trials have proven that big differences in temperature during day and night cause significant risk of condensation and thus of re-wetting.
- If no immediate receipt or on transport can be arranged it would be preferable to stow the container inside a shed or in shaded conditions.

### **7.2 Stripping**

- If the container is stripped upon receipt in a shed or warehouse or silo in the port, take care that such is done inside or under a good protection against rain.
- If the container is stripped at the final inland place of destination the same applies.
- Upon stripping the container, immediately check for smell, signs of condensation/leakage and outward signs of damages.
- If either is the case check further by taking quality samples on the spot. If damages are observed, separate damaged from sound coffee. If not, take care of proper storage.
- Provide good quality control tests (including cupping) to check for moisture and defects (see Chapter 10). Check on mould growth visually and by typical odour development at sniffing and cupping.

### **7.3 Storage**

- Take care of proper storage in well-ventilated and leak-proof warehouses or in insulated or in-house silos.
- Use insulated roofed warehouses if available.
- For coffee in bulk, use clean, dry and odour-free bins and silos dedicated to coffee only.
- Do not store coffee in bags close to the walls.
- Leave enough space between the stacks for proper ventilation and to allow for sampling.

### **7.4 Inland distribution.**

Coffee stored in the port areas or sold on FCL basis will be transported from the port to final inland place of destination. Here also the risks for re-wetting and cross-contamination exist.

- Load and unload only in dry conditions or under protective cover from rain.
- Properly cover bags during transport. Control for rips in the cover, leaking undersides of the trucks proper state of the truck in general.
- Make sure that pallets or wooden floors of trucks are dry, clean and odour-free to avoid absorption by the coffee.
- Use only clean, dry and odour-free means of transport to avoid cross contamination.
- Control the state of the container. Damage may have occurred during the voyage or during the handling upon unloading of the container.
- Avoid leaving containers for an extended period of time exposed to full sunshine. Place the container in the shade or put an empty container on top of full ones to provide for shade.

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## **8 FACTORY STORAGE, QUALITY CONTROL AND PROCESSING**

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### **8.1 Factory storage**

- Containers should be stripped as soon as possible upon arrival.
- Containers awaiting unloading should be protected and longer exposure to direct sunshine should be avoided.
- Prior to stripping, containers should be inspected for visual damages:
  - leaking doors (wet spots on liner, wet bags in front layer),
  - cracks in container construction, rusty spots, holes and dents in roof and sides,
  - condensation at container walls and roof.Sound coffee from such lots should be separated out from damaged coffee and used only after proper quality control.

- During unloading and further transportation coffee has to be well protected from rain and snow.
- Wet bags have to be separated before debugging.
- Coffee in bags has to be stored on dry pallets. Stacks should not be in contact with walls and roof.
- Warehouses for coffee should be dry, odour-free and well protected against changes of temperature and climate.
- Warehouse doors and windows should not stay open unnecessarily because even at low temperature in the northern hemisphere coffee continues to adsorb water in times of high relative moisture of the air.
- Free standing single-wall silos that are not encapsulated in a building should not be used for green coffee storage. Direct influence of climatic changes (sunshine, low temperatures, wind) might induce moisture migration and formation of areas of high risk for mould growth.
- Warehouses, silos and equipment for coffee transportation should always be properly cleaned and maintained.

## **8.2 Quality control**

- Standard quality control measures give in many cases strong hints on potential contamination:
  - musty or mouldy smell of green beans
  - musty, mouldy or earthy cup taste
  - too high moisture content.
 These lots should be specially sampled and submitted to OTA-analysis.
- In case of suspected lots OTA analysis should be executed as fast as possible. Long waiting times might worsen the problem.

## **8.3 Processing**

### *8.3.1. Cleaning*

- Prior to usage all green coffee should be thoroughly cleaned to remove dust, dried cherries, black beans, husks and other impurities.
- Cleaning residues should always be held separate from sound coffee. They have to be disposed of properly and should be kept out of the human food chain.
- Chaff from roasting is still potentially a high risk for contamination. It has to be treated similar to cleaning residues.

### *8.3.2. Green coffee treatment processes*

- Green coffee from decaffeination, green bean steaming and wet cleaning processes should be dried immediately after processing to a maximum moisture level consistent with mould prevention.
- Before storage in silos green coffee from the drier has to be cooled down to ambient temperatures.

- All equipment that is in contact with moist green beans has to be cleaned frequently from remaining beans, dust and chaff to avoid mould formation. Plant construction should support easy cleaning.

#### 8.3.3. *Roasting*

- During roasting OTA is significantly reduced.
- After roasting the moisture level of the roast and ground coffee should be kept below 5%, which is the legal maximum limit in most of the EU countries. Further mould growth has not been reported when this maximum is observed.

### **8.4 Packing and distribution**

- Roasted coffee in water permeable packing (whole beans in paper packs) has to be protected during storage and distribution from additional water uptake by adsorption.
- Water damaged roasted coffee in paper packs should not be reworked. It has to be disposed of.

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## **9 CONTRACTS**

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The various standard contracts make reference to this code of practice. This code may be used as guideline for the contracting parties under one of the standard contracts as well as the individual companies' conditions, and will thus form part of the consensus of will of the parties. The Code of Practice does not in itself constitute a legal or contractual obligation. In case of dispute arbitrators may use the code of practise as the basis for the consensus of will of the contracting parties. This applies to the standard contracts of the ECF, namely E.C.C., E.C.S.C. and E.D.C.C. A FCA (Free Carrier) contract is under discussion in co-operation with representatives of producer countries.

Specifically but not exclusively this code of practice has relevance for the following articles (E.C.C.):

Preamble C

Art. 5 Packing

Art. 7 Quality, where excessive moisture content is mentioned.

Art. 8 Samples

Art. 12 On-carriage

Art. 17 Authorisation to export/import

Art. 18 Certificates

Art. 25 Jurisdiction

The moisture level of 12.5% as mentioned throughout this Code must be considered to be the limit above which the moisture content starts to be excessive. The recommended control point is at the final stuffing of the container, regardless of location. See Chapter 6.

Standardisation of acceptable measuring equipment must be implemented (see Chapter 10). Calibration of the various methods should be specified. The standardised equipment is not exclusive, but new equipment must be calibrated to the ones included in this code of practise.

For standardised sampling method, refer to Chapter 10.

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## **10 METHODS OF ANALYSIS AND SAMPLING**

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The method of moisture analysis used by the ICO for its Quality Improvement Programme is ISO 6673. For reasons of consistency it is recommended that all operators use this method and/or calibrate their commercial moisture measurement equipment to this standard.

## Green coffee — Determination of loss in mass at 105 °C

### 1 Scope and field of application

This International Standard specifies a method for the determination of the loss in mass at 105 °C of green coffee.

It is applicable to decaffeinated and non-decaffeinated green coffee as defined in ISO 3509.

This method of determining the loss in mass can be considered, by convention, as a method for determining the water content and can be used as such by agreement between the interested parties, but it gives results which are lower, by about 1,0 %, than those obtained with the methods described in ISO 1447 and ISO 1446 (this latter method serves only as a reference method for calibrating methods of determining the water content).

### 2 References

ISO 1446, *Green coffee — Determination of moisture content (Basic reference method)*.

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

ISO 3509, *Coffee and its products — Vocabulary*.

ISO 4072, *Green coffee in bags — Sampling*.

### 3 Definition

**loss in mass at 105 °C:** Principally water and small quantities of volatile matter which are vaporized under the conditions specified in this International Standard, and expressed as a percentage by mass.

### 4 Principle

Heating a test portion at 105 °C for 16 h at atmospheric pressure.

### 5 Apparatus

Usual laboratory apparatus, and in particular

**5.1 Oven,** electrically heated, fitted with a system of forced ventilation and capable of being controlled at  $105 \pm 1$  °C.

**5.2 Dish,** made of aluminium, glass or stainless steel with a close-fitting lid. The diameter should be approximately 90 mm and the height 20 to 30 mm.

**5.3 Analytical balance.**

**5.4 Desiccator,** containing an efficient desiccant, for example anhydrous calcium sulphate or silica gel.

### 6 Sampling

See ISO 4072.

It is important to proceed as rapidly as possible when samples are exposed to the atmosphere, in order to prevent any pick up or loss of moisture.

### 7 Procedure

#### 7.1 Preparation of the dish

Dry the dish (5.2) and its lid for 1 h in the oven (5.1) controlled at  $105 \pm 1$  °C.

Remove the dish and its lid from the oven and allow to cool to room temperature in the desiccator (5.4).

Weigh the dish and its lid to the nearest 0,1 mg.

#### 7.2 Test portion

Place a test portion of approximately 10 g into the prepared dish (see 7.1) and spread the beans uniformly over the bottom of the dish.

Cover the dish with its lid and weigh to the nearest 0,1 mg.

## ISO 6673-1983 (E)

NOTE — If performing a series of tests, prepare dishes as described in 7.1 and place the covered and weighed dishes in the desiccator in order to avoid any pick up or loss of moisture.

### 7.3 Determination

Place the dish containing the test portion, with the lid removed but alongside or beneath the dish, in the oven (5.1), controlled at  $105 \pm 1$  °C, and dry for  $16 \pm 0,5$  h.

Fit the lid on the dish and place it in the desiccator (5.4). Allow to cool to room temperature and then weigh to the nearest 0,1 mg.

### 7.4 Number of determinations

Carry out two determinations on the same test sample.

## 8 Expression of results

The loss in mass at 105 °C, expressed as a percentage by mass, is equal to

$$\frac{(m_1 - m_2) \times 100}{m_1 - m_0}$$

where

$m_0$  is the mass, in grams, of the dish and lid (see 7.1);

$m_1$  is the mass, in grams, of the dish, test portion and lid before drying (see 7.2);

$m_2$  is the mass, in grams, of the dish, test portion and lid after drying (see 7.3).

Take as the result the arithmetic mean of the two determinations (see 7.4).

## 9 Precision

An inter-laboratory test, carried out at the international level, in which 14 laboratories, each performing two determinations, participated, gave the statistical information (evaluated in accordance with ISO 5725<sup>1)</sup>) summarized in the table.

## 10 Test report

The test report shall show the method used and the result obtained. It shall also mention any operating details not specified in this International Standard, or regarded as optional, as well as any circumstances that may have influenced the result.

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

Table

Results expressed as percentages by mass

Sample	A	B	C	D	E
Number of laboratories retained after eliminating outliers	13	13	13	13	13
Mean	8,50	9,11	9,14	11,10	11,40
Standard deviation of repeatability ( $s_r$ )	0,09	0,04	0,06	0,09	0,12
Coefficient of variation of repeatability	1,1 %	0,4 %	0,7 %	0,8 %	1,1 %
Repeatability ( $2,83 \times s_r$ )	0,25	0,11	0,17	0,25	0,34
Standard deviation of reproducibility ( $s_R$ )	0,21	0,42	0,33	0,19	0,22
Coefficient of variation of reproducibility	2,5 %	4,6 %	3,6 %	1,7 %	1,9 %
Reproducibility ( $2,83 \times s_R$ )	0,59	1,19	0,93	0,54	0,62

1) ISO 5725, Precision of test methods — Determination of repeatability and reproducibility by inter-laboratory tests.

The method of sampling referred to in ISO 6673 is ISO 4072:

## Green coffee in bags — Sampling

### 1 Scope and field of application

**1.1** This International Standard specifies a method of sampling a consignment of green coffee, shipped in ten bags or more, for the purpose of examination to determine whether the consignment complies with a contract specification.

**1.2** The method may also be used for the preparation of a sample intended

- a) to serve as a basis for an offer for sale;
- b) for examination to verify that the coffee to be offered for sale satisfies the producer's sales specification;
- c) for examination to determine one or more of the characteristics of the coffee for technical, commercial, administrative and arbitration purposes;
- d) for quality control or quality inspection;
- e) for retention as a reference sample for use if required in litigation.

**1.3** This International Standard applies to green coffee in bags, as defined in ISO 3509.

### 2 References

ISO 3509, *Coffee and its products — Vocabulary*.

ISO 6666, *Coffee tasters*.<sup>1)</sup>

### 3 Definitions

For the purpose of this International Standard, the following definitions apply.

**3.1 consignment** : The quantity of green coffee in bags dispatched or received at one time and covered by a particular contract or shipping document. It may be composed of one or more lots.

**3.2 lot** : A part of a consignment or a consignment, presumed to be of uniform characteristics, consisting of not more than 1 000 bags of the same type, with the same marks and

mass, containing green coffee assumed to have common properties of reasonably uniform character and to which a given scheme of examination can be applied.

**3.3 damaged bags** : Bags which are torn, stained, soiled or otherwise detectably contaminated, indicating possible damage to the coffee contained in them.

**3.4 sample** : A part of a lot, from which the properties of the lot are to be estimated by examination.

**3.5 increment; primary sample** : The quantity of  $30 \pm 6$  g of green coffee beans taken from a single bag of a specific lot.

**3.6 bulk sample; lot sample** : The quantity of not less than 1 500 g of green coffee beans obtained by combining all the increments (3.5) taken from bags of a specific lot.

**3.7 blended bulk sample; blended lot sample** : The quantity of green coffee beans obtained by combining and blending all the increments (3.5) taken from bags of a specific lot.

**3.8 laboratory sample; final sample** : The quantity of not less than 300 g of green coffee beans removed from the blended bulk sample (3.7) of a specific lot.

### 4 Administrative arrangements

#### 4.1 Sampling personnel

Sampling shall be carried out by experienced samplers or samplers qualified by training, or shall be carried out by specialized sampling organizations.

#### 4.2 Sampling

Sampling shall be carried out on each lot in a place designed to protect the samples, the sampling apparatus and the containers and packages intended to receive the samples, from adventitious contamination, rain, etc. Special care shall be taken to ensure that the sampling apparatus is clean, dry and free from foreign odours.

<sup>1)</sup> At present at the stage of draft.



The sampler shall note any evidence of damaged bags or potential contamination.

#### 4.3 Sampling report

After preparation of the samples, a sampling report shall be prepared (see clause 11).

### 5 Identification and general inspection of the lot prior to sampling

Before any samples are taken, positively identify the lot.

### 6 Principle of the method of sampling

The method specified follows an established scheme of an arbitrary nature, based on experience.

### 7 Apparatus

**7.1 Coffee trier**: a special device for removing coffee through the bag wall without opening the bag, as specified in ISO 6666.

### 8 Sample containers and packages

The containers and packages mentioned in 4.2, together with their closure systems, shall be clean and dry and shall be made from materials which will not affect the odour, flavour or composition of the samples.

They shall be sufficiently robust to withstand hazards during transport by the chosen method and shall have the ability to preserve the samples unchanged for the appropriate period.

### 9 Procedure

#### 9.1 Taking increments

**9.1.1** Unless there is a stipulation to the contrary in the contract, the number of bags selected from a lot for the purpose of taking increments of  $30 \pm 6$  g (see 3.5) shall be not less than 10 if there are 10 to 100 bags in the lot, and shall be not less than 10 % of the total if there are more than 100 bags in the lot.

**9.1.2** The increments shall be taken at random from individual bags from different locations on the pile, using the coffee trier (7.1). Each bag should be preferably be sampled at three different points.

#### NOTES

1 Damaged bags should be separated from the remainder of the lot. They may be sampled separately and increments kept separate (see 9.2.1).

2 In order to obtain a bulk sample of 1 500 g (see 3.6), it may be necessary to take more than three increments from each bag.

### 9.2 Preparation of samples

#### 9.2.1 Bulk sample

Examine the increments as they are taken. If they are evidently homogeneous, combine them in a container. Label the bulk sample obtained (see clause 10).

If there is a noticeable lack of uniformity among any of the increments, keep them separate and report this condition in the sampling report (see clause 11).

Samples taken from damaged bags shall not be included in the bulk sample (see note 1 to 9.1.2).

#### 9.2.2 Blended bulk sample

Remove the bulk sample (9.2.1) from its container and thoroughly mix it.

#### 9.2.3 Laboratory samples

Prepare each laboratory sample by removing a quantity of not less than 300 g from the blended bulk sample (9.2.2). Pack and label each laboratory sample obtained (see clause 10).

### 10 Packing and marking of samples

#### 10.1 Precautions to be taken when packing samples

Samples intended for the determination of moisture content, or for any other test liable to be influenced by an alteration of the moisture content, shall be packed in moisture-proof containers fitted with airtight closures. The containers, in this case, shall be completely filled with green coffee and the closures shall be sealed to prevent loss or alteration of the contents.

NOTE — For the examination of quality characteristics that are not liable to be influenced by an alteration of the moisture content, separate samples should be taken and placed in appropriate containers which allow access of air.

#### 10.2 Marking

The samples shall be identified by recording the following information on the container or package, or on a label affixed to the container or package, unless otherwise specified:

- 1) Date of sampling
- 2) Name of sampler and his employer
- 3) Shipping document or contract No.
- 4) Ship (or other transport vehicle)
- 5) Location of coffee
- 6) Identifying marks and numbers (including the origin of the coffee)

7) Number of bags in the lot

8) Mass of the sample

## 11 Sampling report

The sampling report shall give all information relevant to the method of sampling and shall refer to the presence of damaged bags, the type(s) of damage and approximate number of damaged bags in the lot.

Any other pertinent observation concerning the condition of the lot shall also be included.

The report shall refer to the conditions in the location of the lot, especially with regard to any potentially contaminating material in the vicinity.

## 12 Precautions during storage and transport of samples

**12.1** Laboratory samples shall be dispatched to the place of examination as soon as possible after preparation and only in exceptional circumstances more than 48 h after preparation, non-business days excluded.

A copy of the sampling report (see clause 11) shall be sent with them.

**12.2** After taking the laboratory samples, the rest of the blended bulk sample from each lot shall be retained in a container labelled in accordance with 10.2, for further use if necessary (inspection, etc.), until final acceptance of the consignment by the purchaser.

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