



International Coffee Organization  
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**Quality: Harmonisation of ICC  
Resolution number 420 with ISO  
Green Coffee Defects Chart**

## Background

1. At the meeting of the Executive Board in May 2006 the Secretariat was requested to look into the specifications of the recently approved ISO Standard 10470 – 2004 Green Coffee Defect reference chart – to analyse its implications with respect to the provisions set out in ICC Resolution number 420 (see paragraphs 27 and 28 of document EB-3916/06).
2. This document brings together a summary table which enables a comparison of the defects count used in the following systems/country:
  - Green Coffee Classification, used by the New York Board of Trade (NYBOT) and Brazil
  - ISO 10470 – 1993 assessment
  - ISO 10470 – 2004 assessment
  - TCVN 4193 (Vietnam)
  - Indonesia Standard
  - LIFFE gradings system.

It should be noted that the defects count taken into account for Resolution number 420, which was approved in May 2004 in connection with the Coffee Quality-Improvement Programme, is based on the Green Coffee Classification/Brazil systems for Arabica coffee and on the Vietnam/Indonesia systems for Robusta coffee.

3. It may be noted that details of the work on ISO standard 10470 were presented to the Council in September 2001 (see paragraph 31 of document ICC-84-12).

## Action

The Executive Board is requested to analyse this document and make appropriate recommendations to the Council.

**Quality: Harmonisation of ICC Resolution number 420  
with ISO Green Coffee Defects Chart**

1. ICC Resolution number 420 was approved by the Council in May 2004 establishing measures to be introduced, on a voluntary basis, by exporting Members in relation to the quality of coffee exported. The quality parameters specified in the Resolution were based on the New York green coffee classification/Brazilian method or equivalent, for Arabica coffee and, for Robusta based on the Vietnam/Indonesia methods. Previously Resolution number 407 established identical but compulsory targets, without requiring specification on the Certificates of origin.

2. The harmonisation of the recently revised ISO Standard 10470 – Green Coffee Defect reference chart – with the Resolution and, if possible, with the defect count classification methods used by the New York (for Arabica coffee) and London (for Robusta coffee) terminal markets, NYBOT and LIFFE respectively, could, in theory, pave the way for the adoption of a widespread method for defects counting to be used with classification systems throughout the whole coffee trading community. On the terminal markets, NYBOT's grading system for Arabica coffee is based on the Green Coffee Association classification system whereas LIFFE's grading system is based on classification derived from a defects count on a 500g sample.

3. If such a universal system could be achieved, it would be the responsibility of exporting countries to fully implement it in the classification of their coffees and, if implemented in the gradings systems used in each terminal market, this universal defects system would ensure consistency and facilitate the commitment by all parties to effectively bring into practice a worldwide quality-improvement programme. It is important to note here that the ISO Standard was developed by a technical sub-committee of individuals from the private coffee sector in a number of countries and is designed to emphasise those defects which have a significant impact on quality.

4. The ISO Standard, as to be expected, is the most comprehensive of all the defects standards analysed in this document; its first version in 1993 looked into defect analysis for both methods of processing for Arabica coffee (wet and dry) and for Robusta (dry) separately. The nature of defects is categorised as follows:

- i) Non-coffee defect: foreign matter not originating from the coffee fruit;
- ii) Defect of non-bean origin: coffee matter not originating from the bean;
- iii) Irregularly formed bean: divergent in form, shape and integrity;
- iv) Bean of irregular visual appearance: bean divergent in colour and surface appearance, and which risks influencing the cup taste; and,
- v) Off-taste coffee: defect of sensory concern, identified after sample roasting and cup testing, with a possible further risk of other contamination.

Defects are defined into the following characteristics:

- a) Defects associated with foreign matter
- b) Defects associated with non-bean matter coming from the fruit
- c) Defects associated with irregular beans
- d) Defects associated with visual appearance; and
- e) Defects mostly evident in cupping

The influence of defects on the loss of mass and on sensorial assessment is evaluated by using coefficients – 0; 0.5 and 1 – in accordance with the degree of their influence on quality:

- 0 = no influence
- 0.5 = medium influence
- 1.0 = serious influence

5. The ISO sensorial concern is related to the influence of defects in the organoleptic properties of the product cup as well as the visual properties of the coffee presented to the final consumer. The loss of mass parameters identify those defect components in coffee which must be eliminated if non coffee material in the product is to be avoided. The ISO also includes an informative table showing the correlation of the main causes of these defects (as classified in items a) to e) in paragraph 4, their effect on roasting/brew flavour and possibilities of their removal classified into three categories:

A = no direct removal;

B = removal by usual techniques like sieving; and,

C = removal by special techniques

A quick reference chart combining all these concepts defined in the ISO is attached for reference – see Table 1.

6. As indicated in Annex B to ISO 10470-2004 (attached), defects are weighed and their mass fraction calculated as a percentage in a 300g sample. To facilitate an appraisal of the value of the coffee each percentage is multiplied by the defects coefficient to obtain quality impact units. The actual defects identified, are, however, similar in all systems. In comparing the new ISO standard to existing defects systems it may be noted (Table 2) that, in general, the new system gives less importance to nearly half of the defects listed compared to the old systems.

7. It may be noted that, separately from defects, moisture content limits have been set as follows:

- ICC Resolution number 420: not below 8% and 12.5% maximum (except for speciality coffees that traditionally have a high moisture content, i.e. Indian Monsooned coffees);
- Vietnam (TCVN 4193):  $\leq 12.5\%$ ;
- Indonesia: Dry processed coffee: maximum 13%; and,  
Wet processed coffee: maximum 12%;
- LIFFE; Green Coffee Classification (Brazil/NYBOT): no direct reference to moisture limits

8. The main question to be addressed is whether ICO Member countries and the terminal markets are interested in revising the defects counting methods used in their grading systems. The goal would be to maintain the structure of their systems, e.g. New York/Brazil types 2 to 9, but modify the assessment of defects value by changing to the new ISO system as a better reflection of quality determinants.

TABLE 1

ISO 10470: 2004 - QUICK REFERENCE CHART: Name of defects, definitions, causes, effects on roasting/brew flavour; loss of mass, sensorial concern and removal

Name of defect		Definition or characteristics of defect	Causes	Effect of roasting/brew flavour	Loss of mass	Sensorial concern	Removal 1/
<b>1. Defects associated with foreign matter</b>							
1.1	Stones	of any size found in a green coffee lot	Inadequate separation/cleaning	Mainly economic	1	0	B
1.2	Sticks	of any size found in a green coffee lot	Inadequate separation/cleaning	Non-specific downgrading of flavour	1	0	B
1.3	Soil agglomerate	Granulated lump of soil particles	Inadequate separation/cleaning	Mainly economic	1	0	B
1.4	Metallic matter	Particles found on the area after drying the coffee and/or after degradation of the industrial equipment	Inadequate separation/cleaning	Mainly economic	1	0	B
1.5	Foreign matter other than described	Cigarette stubs, plastic particles, bag particles, strings	Inadequate separation/cleaning	Mainly economic	1	0	B
<b>2. Defects associated with non-bean matter coming from the fruit</b>							
2.1	Bean in parchment	Bean entirely or partially enclosed in its parchment (endocarp)	Faulty hulling and separation of the dry parchment	Non-specific downgrading of flavour	0.5	0	A
2.2	Piece of parchment	Fragment of dried endocarp (parchment)	Inadequate separation after hulling the parchment	Non-specific downgrading of flavour	0.5	0	B
2.3	Dried cherry (pod)	Dried fruit of the coffee tree, comprising its external envelopes and one or more beans	Incorrect dehulling, allowing whole dried cherries to remain	Non-specific downgrading of flavour; foul odour and flavour	0.5	0	B
			Inadequate separation after hulling the parchment	Non-specific downgrading of flavour			
2.4	Husk fragment	Fragment of the dried external envelope (pericarp) - these can be small, medium or large fragments	Poor separation after dehulling	Non-specific downgrading of flavour; foul flavour	0.5	0	B
<b>3. Defects associated with irregular beans</b>							
3.1	Malformed bean; shell and ear	Coffee bean with distinguishable abnormal shape, including: - shell: malformed bean presenting a cavity - malformed bean with ear shape	General handling producing the separation of the inner and outer parts of an elephant bean (shell and ear)	Uneven roast with respect to normal beans; less acidity. May split on roasting and char at edges	0 a/	0.5 a/	B
3.2	Bean fragment	Fragment of a bean with volume < ½ bean	General handling; formed mainly during dehulling operations and/or dehulling	Difficulties occur in roasting. May affect flavour	0.5	0.5	B
3.3	Broken bean	Fragment of a bean with volume ≥ ½ bean	General handling; formed mainly during dehulling operations and/or dehulling	Uneven roast; less acidity. May affect flavour slightly	0.5	0.5	B
3.4	Insect-damaged bean	Bean damaged internally or externally by insect attack	Attack on cherries/seed by berry borer or others during storage due to inadequate storage controls	When caused by berry borer, beans have a slightly darker colour on roasting. Slightly bitter flavour or tarry, bitter flavour	0	0.5	A

TABLE 1

ISO 10470: 2004 - QUICK REFERENCE CHART: Name of defects, definitions, causes, effects on roasting/brew flavour; loss of mass, sensorial concern and removal

Name of defect		Definition or characteristics of defect	Causes	Effect of roasting/brew flavour	Loss of mass	Sensorial concern	Removal 1/
3.5	Insect-infested bean	Bean harbouring 1 or more dead or alive insects at any stage of development	-	-	0 a/	0.5 a/	-
3.6	Pulper-nipped bean; pulper-cut bean	Wet-processed bean cut or bruised during pulping, often with brown or blackish marks	Faulty adjustment of pulping machine or feeding with under-ripe cherries or malformed beans	Will affect flavour according to degree of damage	0 a/	0.5 (sometimes a fermented flavour will appear)	B
<b>4. Defects associated with visual appearance</b>							
4.1	Black bean and partly black bean	Bean interior is partly or totally black (endosperm)	Effect on cherry/beans whilst on trees and on the ground caused by cherry with disease due to attacks by fungi	Slow to roast; roasted black beans tend to be yellowish. Flavour differences for various reasons; generally harsh flavour	0	1	C
4.2	Black-green bean	Unripe bean, often with a wrinkled surface, with dark green almost black colour and a glossy silverskin	Immature beans affected by high temperature and/or by faulty drying in parchment and in cherry (either patio or mechanical)	Rotten fish flavour	0	1	C
4.3	Brown bean ("ardido")	Bean with a range of colours: very light brown-redish, brown-black; yellowish green to dark reddish brown, and dark-brown internally (endosperm). Note 1: When roasted and infused it produces an unpleasant sour taste (stinker) Note 2: Not to be confused with the foxy silverskin bean ("melado") which is internally a normal green colour revealed by gentle scratching of surface, and produces no off-flavour in the cup	Excess treatment in the fermentation process; cause for sour bean not certain; cause for "ardido" beans believed to be due to mature beans being killed in the dry cherries, and infected by moulds. Also possible slow drying process of thick layers; accidental fermentation by moulds on either mature or immature beans before drying; attacks by bugs on the immature cherry, or by over-ripe cherries and faulty pulping or by prolonged slow drying of over-ripe cherries	Sour flavour. Other defects may occur (e.g. potato-like, wine-like, onion, acetic flavour). Slightly fruity/cherry taste; sometimes harsh/commonish	0	1	C
4.4	Amber bean	Bean with yellow colour, usually semi-transparent	Iron deficiency in the soil	Lack of acidity (i.e. commonish flavour)	0	0.5	C

TABLE 1

ISO 10470: 2004 - QUICK REFERENCE CHART: Name of defects, definitions, causes, effects on roasting/brew flavour; loss of mass, sensorial concern and removal 1/

Name of defect		Definition or characteristics of defect	Causes	Effect of roasting/brew flavour	Loss of mass	Sensorial concern	Removal 1/
4.5	Immature bean; "quacker" bean	Unripe bean, often with a wrinkled surface, having a greenish or metallic silverskin; cell walls and internal structure are not fully developed	Cherries being picked before ripe (i.e. green, yellow skins); the silver skin is a metallic green in colour	Slow and irregular roast; more bitterness; lack of acidity; commonish flavour. Sometimes a fermented taste	0	0.5 (sometimes a fermented flavour may appear)	C
4.6	Waxy bean	Bean with translucent waxy appearance and a range of colours from yellowish green to dark reddish brown, the latter being the most typical; the cell and surface have a decayed fibrous appearance	Cherries are picked when over-ripe (brown skins); fermentative effect of bacteria on surface and interior	Gives various flavour effects from fruity to sulfurous	0	0.5 (sometimes a fermented flavour may appear)	C
4.7	Blotchy bean; spotted bean	Bean showing irregular greenish, whitish or sometimes yellow patches	Faulty drying of the parchment	Non-specific downgrading of flavour	0	0.5	C
4.8	Withered bean	Wrinkled bean and light in mass	Not clearly identified or distinguished. Cause not established	Non-specific downgrading of flavour	0	0.5	C
4.9	Spongy bean	Bean with cork-ish consistency; it is generally whitish in colour	Moisture absorption during storage/transportation leading to enzyme activation	Roasts rapidly, tending to carbonize. Lack of acidity; woody flavour with poor aroma	1	0.5	C
4.10	White bean	Bean with a whitish surface	Discoloration due to bacteria attack during storage/transportation; associated with old crop coffee	Non-specific downgrading of flavour. Stale taste for every kind of coffee	0	0.5	C
<b>5. Defects mostly evident in cupping</b>							
5.1	Bean producing stinker or fermented flavours	Bean with normal appearance but a very unpleasant flavour is detected in the cup (like fermented, sour, stinker or rotten fish)	Cause uncertain but associated with fermentation and washing stages where beans are over-long exposed to polluted water. Delay in pulping can cause stinker bean	Foul odour, rotten fish flavour, fermented flavour	0	1	A
5.2	Bean producing other current off-flavours	Bean with normal appearance but in the cup unpleasant musty, foul, dirty, earthy, woody, Rio, phenolic or jute-bag-like flavours can be detected	Different causes	Musty, foul, dirty, earthy, woody, Rioy, phenolic or jute bag like flavours	0	1	A

1/ A = No direct removal; B = Usual techniques like sieving; C = Special techniques

a/ Defects mostly affecting roasted bean quality

TABLE 2

Standard classification source:	Green Coffee Classification (Brazil/NY) (NYBOT)	ISO 10470 1993 assessment			ISO 10470 2004 assessment		TCVN 4193	Standard for Green Coffee Beans		LIFFE
		Arabica	Arabica	Robusta	Loss of mass	Sensorial concern		Vietnam	Indonesia	
Defect/type/method	Arabica	Wet	Dry	Dry	-	-	Arabica Robusta	Arabica Robusta	-	
	1 black bean	1	VS	VS	VS	0	1	1.00	1	1 1/
1 dark brown bean	-	MS	M	NE	0	1	0.25	1 2/	-	
1 dried coffee cherry	1	MS	S	S	0.5	0	1.00	-	1	
1 bean in parchment	-	MS	NE	NE	0.5	0	0.50	1 1/	1 1/	
1 sour bean*	1	VS	VS	S	0	1	1.00	-	1 1/	
1 full mouldy bean (more than 50% mould)*	-	VS 3/	VS 3/	VS 3/	-	-	1.00	-	1	
1 partly mouldy bean (less than 50% mould)*	-	VS 3/	VS 3/	VS 3/	-	-	0.50	-	0.50	
1 half black bean	-	VS 3/	VS 3/	VS 3/	0	1	0.50	-	-	
1 immature bean	1 4/	S	S	S	0	0.5	0.20	1 3/	1	
1 withered bean	-	MS	not identified	not identified	0	0.5	0.50	-	1	
1 spongy bean	-	MS	S	S	1	0.5	0.20	-	-	
1 shell	1 5/	M	M	M	0	0.5	0.20		1	
1 spotted bean		M	NE	NE	0	0.5	0.10	1 6/	-	
1 bean with 1 hole made by insects	1 4/	M 3/	M 3/	MS 3/	0	0.5	0.10	1 6/	1 1/	
1 bean with >=2 holes made by insects	1 4/	M 3/	M 3/	MS 3/	0	0.5	0.20	1 4/	1 4/	
1 broken bean (with 1/2 or 3/4 bean remaining)	1 4/	M	M	-	0.5	0.5	0.10	1 4/	1 4/	
1 bean fragment (with < 1/2 bean remaining)	1 4/	M	M	M	0.5	0.5	0.20	-	-	
1 large husk fragment (>= 3/4 husk)	1	M	S	S	0.5	0	1.00	1	1 1/	
1 medium husk fragment (from 1/2 to 3/4 husk)	1 5/	M	MS	MS	0.5	0	0.50	1 1/	-	
1 small husk fragment (>= 1/2 husk)	1 4/	M	M	M	0.5	0	0.20	1 4/	-	
1 large parchment (>= 1/2 husk)	1	MS 3/	NE	NE	0.5	0	0.20	1 1/	1 1/	
1 small parchment (< 1/2 husk)	1 4/	MS 3/	NE	NE	0.5	0	0.10	-	-	
1 large stick (2-4 cm long)	5	VS	VS	VS	1	0	5.00	5	5	
1 medium stick (1-2 cm long)	2	S	MS	S	1	0	2.00	2	2	
1 small stick (< 1cm long)	1	M	S	M	1	0	1.00	1	1 1/	
1 large stone, clod (on sieve n°. 20)	5	VS	VS	VS	1	0	5.00	5	5	
1 medium stone, clod (under sieve n°. 20 and on sieve n°. 12)	2	S	VS	VS	1	0	2.00	2	2	
1 small stone, clod (under sieve n°. 12 and on sieve n°. 10)	1	MS	VS	VS	1	0	0.50	1	1 5/	
Other foreign matter (not listed above) Under 0.5g From .05g to 1.0g Every 1.0g from over 1.0g	max 1%	-			1	0	1.00 2.00 3.00	max 0.5%	1 or more at graders' discretion	

\* Maximum value of faults per 300g sample: 5 faults

VS = very serious; S = serious; MS = moderately serious; M = minor; NE = Not expected

1/ Up to 2 occurrences

2/ Up to 4 occurrences

3/ No distinction under this classification

4/ Up to 5 occurrences

5/ Up to 3 occurrences

6/ Up to 10 occurrences



## Annex B (informative)

### Application example

Obtain a representative sample of 300 g after having performed adequate sampling following a procedure such as given in ISO 4072.

Spread the test portion over a plain orange or black surface and examine it under diffuse daylight (not direct sunlight), or artificial light reproducing daylight as closely as possible. For a better identification, refer to Annex C of ISO 10470:2004, *Green coffee — Defect reference chart*, which shows colour photographs of the defects.

Pick out all foreign matter and defective beans and group them by categories as defined in ISO 10470. Put them in separated piles or different containers. Weigh, to the nearest 0,1 g, each category of foreign matter and defects and calculate their mass fraction as a percentage.

The impact of foreign matter and defects on the quality is calculated for both loss of mass and sensorial concern by multiplying each percentage by the coefficient found in the Defect reference chart of ISO 10470. At the end, the final values obtained are equivalent to "Quality Impact Units".

#### Hypothetical example

Defect	Mass		Loss of mass		Sensorial concern	
	g	%	Coefficient	Actual	Coefficient	Actual
Stones	1,2	0,4	1,0	0,4	0	0
Beans in parchment	3,0	1,0	0,5	0,5	0	0
Black beans	3,0	1,0	0	0	1,0	1,0
Immature beans	10,5	3,5	0	0	0,5	1,75
Spongy beans	9,0	3,0	1,0	3	0,5	1,50
Brown beans	7,5	2,5	0	0	1,0	2,50
Sound beans	265,8	88,6				
TOTAL	300,0	100,0		3,9		8,75

This procedure can be applied to any contract of purchase of green coffee that may be negotiated between provider and client. For (a) certain defect(s), the contract may impose either a maximum mass fraction in percent or a maximum value of "Quality Impact Units". Such limits may be defined in advance between the two parties.