

**MS 293:2005 - ICS:67.140.30**  
**Specification for Grading Malaysian Cocoa Beans**

1. **Scope**

This Malaysian Standard specifies the requirements for grading cocoa beans and describes the methods of test for the bean count, the cut test, the determination of moisture content of cocoa beans and the determination of waste in cocoa beans consignment. This standard also describes recommendations for storage of cocoa beans given in Annex E.
2. **Normative reference**

The following normative reference is indispensable for the application of this standard. For dated reference, only the edition cited apply. For undated reference, the latest edition of the normative reference (including any amendment) apply.  
MS 230, Method of sampling cocoa beans.
3. **Definitions**

For the purpose of this standard, the following terms and definitions apply

  - 3.1 **Adulteration**

Adulteration of the composition of graded cocoa beans by any means whatsoever so that the resulting mixture or combination is not of the grade prescribed, or affects adversely the quality, flavour, or alters the bulk or mass.
  - 3.2 **Bean cluster**

Bean clump which consists of three or more beans fused together.
  - 3.3 **Bean count**

The total number of whole cocoa beans required to make a weight of 100 g in accordance to Annex A.
  - 3.4 **Broken bean**

Cocoa bean of which a fragment is missing, the missing part being equivalent to less than half of the bean.
  - 3.5 **Cocoa bean**

The fermented and dried, whole seed of *Theobroma cacao* L.
  - 3.6 **Defective bean**

Cocoa bean which is internally mouldy, slaty, insect damaged and germinated.
  - 3.7 **Double bean**

Two beans fused together which cannot be separated by hand.
  - 3.8 **Fermented bean**

Cocoa bean of which the colour of the cotyledons should range from partly purple and partly brown to a fully brown.
  - 3.9 **Flat bean**

Cocoa bean of which the cotyledons are too thin to be cut to give a full length of the cotyledon surface.
  - 3.10 **Foreign matter**

Any material and particle other than cocoa beans and waste.
  - 3.11 **Fragment**

A piece of cocoa beans less than half the original bean.
  - 3.12 **Germinated bean**

Cocoa bean of which the shell has been pierced, slit or broken by the growth of the seed germ.
  - 3.13 **Insect damaged bean**

Cocoa bean of which the internal parts are found to have been infested by insects which have inflicted damage visible to the naked eye or contain including mites, at any stage or development.
  - 3.14 **Mouldy bean**

Cocoa bean on the internal parts of which mould is visible to the naked eye.
  - 3.15 **Piece of shell**

Part of the shell without adhering cotyledons.
  - 3.16 **Slaty bean**

Cocoa bean which shows a slaty colour on half or more of the surface.

**3.17 Smoky bean**

Cocoa bean which has a smoky smell or taste.

**3.18 Waste**

Flat bean, fragment, piece of shell, dried placenta and dried pulp.

**4. Quality requirements**

**4.1** The cocoa beans shall be from ripe pods and adequately fermented, free from smoky smell, free from objectionable or foreign odour and free from any evidence of adulteration.

**4.2** The cocoa beans shall be evenly dried throughout. The moisture content shall be less than or equal to 7.5%.

**4.3** The cocoa beans shall be reasonably uniform in size.

**4.4** The consignment shall be free from bean clusters and reasonably free from double bean.

**4.5** The consignment shall contain less than or equal to 2% waste by weight.

**4.6** The consignment shall be free from insects including mites.

**4.7** The consignment shall be free from foreign matter.

**5. Grading**

**5.1** The grading specifications are given in Table 1.

**Table 1. Grade specifications.**

Standard Malaysian Cocoa Grades	Bean Count (100g)	Mouldy beans (% max.)	Slaty beans (% max.)	Insect damaged and germinated beans (% max)
SMC 1	<=100	<= 3	<= 3	<= 2.5
SMC 2	>100 <= 110	<= 3	<= 3	<= 2.5
SMC 3	> 110 <= 120	<= 3	<= 3	<= 2.5

NOTES :

- SMC denotes Standard Malaysian Cocoa.
- All percentages in the grade specifications are by count. The percentage given in the last column applies to all the mentioned therein, taken together.

**5.2** A bean with multiple defects shall be recorded in one category only, i.e the latest favourable. The decreasing order of gravity is as follows :

- a. mouldy bean;
- b. slaty bean;
- c. insect damage and germinated bean.

**5.3 Sub-standard cocoa beans**

Any consignment of cocoa beans which cannot meet specification in Table 1 shall be regarded as sub-standard and marked 'SS'.

**6. Legal requirements**

The cocoa beans in all other aspects shall comply with the requirements of the legislation currently in force in Malaysia.

**7. Sampling**

Sampling shall be carried out in accordance with MS 230 or to the requirements of the certification body or regulatory authority.

**8. Test method**

The method of test shall be carried out in accordance with the relevant annexes of this Malaysian Standard.

**9. Packaging and labeling**

**9.1 Packaging**

Cocoa beans shall be packed in new gunny bags which are clean, sound, sufficiently strong and properly sewn and sealed. The bags and liners shall be made of non-toxic materials.

**9.2 Labeling**

**9.2.1** Each bag of cocoa beans shall be securely sealed and marked clearly and indelibly show the following information :

- a. Grade;
  - b. Name of producer/exporter and relevant licence number;
  - c. Consignment or lot or contact number as applicable;
  - d. Destination;
  - e. The words 'Produce of Malaysia'; and
  - f. Nett weight in kilogrammes.
- 9.2.2** Only non-toxic ink or paint shall be used for marking and shall not be allowed to come into contact with the beans.

**10. Certification mark**

Each product may by arrangement with a recognised certification body, be marked with the certification mark of that body, provided the product conforms to the requirements of this standard.

**Annex A  
(normative)  
Bean Count**

**A1. Principle**

The bean count is determined by the number of whole cocoa beans to make the weight of 100g

**A2. Preparation of test sample**

Obtain the test sample according to clause 7. Mix the test sample thoroughly.

**A3. Procedure**

**A3.1** Reduce the thoroughly mixed samples by quartering or by means of a subtitle dividing apparatus, to just over 250 beans per quarter.

**A3.2** Remove all broken beans, double beans, waste and foreign matters. Then, count the number of whole beans.

**A3.3** Weigh the whole beans to the nearest 0.05g.

**A4. Expression of result**

**A4.1** The bean count shall be expressed as number of whole beans per 100g.

$$\text{Bean count} = \frac{\text{Number of whole beans}}{\text{Weight of whole beans (g)}} \times 100$$

**A4.2** Calculate bean count for all four quarters and obtain average result.

**A5. Test report**

Report the average number of bean count of all four quarters.

**Annex B  
(normative)  
Determination of Waste**

**B1. Principle**

Waste is determined by the percentage by weight removed from whole cocoa beans and broken beans.

**B2. Preparation of test sample**

The test samples used in bean count (Annex A) is used in determined of waste.

**B3. Procedure**

**B3.1** Weigh each quartered sample.

**B3.2** Separate the waste in each quarter and weigh it according to each quarter.

**B4. Expression of result**

**B4.1** Waste shall be expressed as percentage by weight of beans examined.

$$\text{Waste, \%} = \frac{W - W1}{W} \times 100$$

Where

**W** is the weight of sample; and **W1** is the weight of whole beans and broken beans

**B4.2** Calculate waste for all four quarters and obtain average result.

**B5 Test report**

Report the average percentage of the waste of all four quarters sample.

**Annex C  
(normative)  
Cut Test**

**C1. Principle**

The cut test determines the percentage of defective beans from whole cocoa beans and the level of fermentation on cocoa beans.

**C2. Preparation of test sample**

The sample of whole cocoa beans from the bean count (Annex A) is used for the cut test. Select the quarter which contain the highest number of beans.

**C3. Procedure**

**C3.1** Cut all beans lengthwise through the middle, so as to expose the maximum cut surface of the cotyledons.

**C3.2** Examine visually both halves of each bean in full daylight or under an equivalent artificial light for its level of fermentation and defects.

**C3.3** Count separately the number of defective beans. I.e. mouldy beans, salty beans, insect damaged beans and germinated beans. Where a bean has multiple defects, count only one defect which occurs according to the order in 5.2.

**C4. Expression of result**

**C4.1** The results for each kind of defect shall be expressed as percentage by the number of beans examined.

$$\text{Defective beans, \%} = \frac{\text{Number of defective beans}}{\text{Number of whole beans}} \times 100$$

Where

**W** is the weight of sample; and **W1** is the weight of whole beans and broken beans

**C4.2** The degree of fermentation shall be expressed as percentage by the number of beans examined.

$$\text{Fermented beans, \%} = \frac{\text{Number of fully brown beans}}{\text{Number of whole beans}} \times 100$$

**C5. Test report**

**C5.1** Report the percentage of defective beans i.e. mouldy beans, salty beans, insect damaged beans and germinated beans.

**C5.2** The degree of fermentation for the cocoa beans consignment shall refer to Table C1. Report the percentage of fermentation level.

**Table C1. Degree of fermentation**

Fermentation level	Category
>60% of the cut bean is fully brown	Good
45% - 60% of the cut bean id fully brown	Moderately good
< 45 % of the cut bean id fully brown	Fairly good

**Annex D  
(normative)  
Determination Of Moisture Content**

**D1. Principle**

The moisture content is determined by the oven method. However, for quick certification purposes, the moisture content may be determined by the moisture meter or its equivalence.

**D2. Apparatus**

The usual laboratory equipment, and the following items:

**D2.1 Grinder**, which permit the beans to be ground without heating.

**D2.2 D2.2 Ventilated oven**, fitted with a fan and able to maintain the temperature set at (103 ± 2)

degree celcius.

**D2.3 Dishes with lids** , of corrosion- resistant metal or glass, with at least 35 cm <sup>2</sup> effective surface (e.g. diameter 70mm,min ) and depth of 20 mm to 25 mm.

**D2.4 Desiccators**

**D2.5 Analytical balance, weighing to 1 mg.**

**D3 Preparation of test sample.**

Take one quarter of the test sample obtained according to Clause 7. By successive reductions of the one quarter, draw approximately 50 g of beans. Grind the beans roughly so that the greatest dimension of the particles does not exceed 5 mm. Avoid the formation of a paste.

**D4 Procedure**

**D4.1** Weigh a dry empty dish with lid and add in dish about 10 g test sample prepared in C3. Cover the dish with lid and weigh to the nearest 1 mg.

**D4.2** Place the dish containing the test portion in the oven set at (103 ± 2) degree celcius. Remove the lid and leave it for ( 16 ± 1)h. Do not open the oven.

**D4.3** Remove the dish and cover immediately with its lid. Cool the dish in the desiccators to room temperature approximately 30 min to 40 min.

Weigh dish with lid to the nearest 1 mg.

**D4.4** NOTE. The grinding and weighing operation should be carried out as rapidly as possible, and recommended within 5 min.

**D5 Expression of result**

The moisture content of the sample shall be expressed as percentage by weight.

$$\text{Moisture content, \%} = (W1 - W2) \times \frac{100}{W1 - W0}$$

Where,

W<sub>0</sub> is the weight, in grammes, of the empty dish with lid;

W<sub>1</sub> is the weight, in grammes, of the dish with lid and test sample before oven drying; and

W<sub>2</sub> is the weight, in grammes, of the dish with lid and test sample after oven drying.

**D6 Test report**

Report the percentage of moisture content by weight.

**Annex E  
(informative)  
Storage**

The recommended guidance for storage of cocoa beans are as follows;

- a) The consignments should be placed in warehouses constructed and used in such a way the moisture content is kept sufficiently low and consistent with local conditions.
- b) The storage facility should prevent any infestation by insects, rodents and other animal pests.
- c) The cocoa beans bags should be stacked on pallets adequately that:
  - i) a passage of at least 60 cm wide should separate the bags of individual grades and lots, and the walls of the storage facility;
  - ii) disinfestations by approved fumigant may be carried out : and
  - iii) contamination by odours of flavours, or by dust from other products or foods such as oil, cement and tar should be prevented
- d) The moisture content of each lot should be periodically checked during storage and immediately before shipment.