

# **BELIZE STANDARD**

**BZS 20: 2015 (Revised)**

## **BELIZE STANDARD FOR RICE - SPECIFICATION**

**(First Revision)**

**BBS  
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**BELIZE NATIONAL STANDARD  
FOR RICE - SPECIFICATION**

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The preparation of this standard for the Standards Advisory Council established under the Standards Act 1992, was carried out under the supervision of the Bureau's Technical Committee for Rice, which at the time comprised of the following members:

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**BELIZE NATIONAL STANDARD FOR  
RICE - SPECIFICATION**

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**0 FOREWORD**

- 0.1 This standard was formulated in an effort to improve the quality of rice being produced and sold on the local and overseas market.
- 0.2 This standard is intended to be compulsory for farmers, millers, exporters, importers and other related personnel, thereby promoting standardization for this particular commodity.
- 0.3 This standard is adapted from the CARICOM Regional Standard for Rice – Specification CRS 44: 2013.

**1 SCOPE**

This standard establishes requirements for grades of paddy, cargo rice, milled rice, cargo parboiled rice and milled parboiled rice. It also specifies the general conditions for sampling and the methodologies for assessing the various factors used in determining the quality of rice.

**2 NORMATIVE REFERENCES**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- a) BZS 1: Part 2 - Labelling of Pre-packaged Foods,
- b) AOAC - Official Methods of Analysis of the Association of Official Analytical Chemists,
- c) CRCP 5:2010 - Code of Practice - General Principles of Food Hygiene
- d) ISO 712:2009 - Cereal and cereal products - Determination of moisture content
- e) ISO 24333:2009 - Cereal and cereal products - Sampling

**3 DEFINITIONS**

For the purpose of this standard, the following definitions shall apply:

- 3.1 **Broken Kernel** means a fragment of the kernel.
  - 3.1.1 **Small Broken Kernel** means a fragment of kernel, the length of which is less than or equal to one-quarter of the average length of the corresponding whole kernel.
  - 3.1.2 **Medium Broken Kernel** means a fragment of kernel, the length of

which is less than or equal to one-half but greater than one quarter of the average length of the corresponding whole kernel.

- 3.1.3 **Large Broken Kernel** means a fragment of kernel, the length of which is less than three-quarters but greater than one-half of the average length of the corresponding whole kernel.
- 3.1.4 **Chip** means a fragment of kernel, which passes through a metal sieve with round perforations 1.4mm in diameter.
- 3.2 **Bulk Sample/Composite** means the quantity of grain obtained by combining and mixing the increments taken from a specific lot.
- 3.3 **Cargo Rice/Brown Rice/Husked Rice** means rice from which the husk only has been removed.
- 3.4 **Chalky Kernel** means a kernel, whole or broken, of non-glutinous rice varieties which at least **three-quarters** of the surface have an opaque and floury appearance.
- 3.5 **Colour** refers to the colour (“parboiled light”, “parboiled medium” or “parboiled dark”) designated to parboiled cargo/brown/husked rice, if the parcel meets colour requirements specified in 3.5.1 to 3.5.3.
- 3.5.1 Parboiled Light Rice** means parboiled rice which is not distinctly coloured by the parboiling process and has an approved whiteness/colour/milling meter reading of **26.0-31.0**.
- 3.5.2 Parboiled Medium Rice** means parboiled rice which is distinctly but not materially coloured by the parboiling process and has a Kett whiteness meter reading of **20.0-25.9**.
- 3.5.3 Parboiled Dark Rice:** Parboiled rice materially coloured by the parboiling process and has a Kett whiteness meter reading of **16.0-19.9**.
- 3.6 **Consignment** means the quantity of grain dispatched or received at one time and covered by a particular contract or shipping document.
- Note 1:** It may be composed of one or more lots.
- Note 2:** Consignments should be considered in lots not exceeding 500 metric tons.
- 3.7 **Damaged kernel** means whole or broken kernels of rice which are distinctly discoloured or damaged by water, insects, heat, or any other means, and parboiled kernels in non-parboiled rice
- 3.8 **Enriched Rice** means forms of milled rice to which nutrients or enriching substances have been added.

- 3.9 **Glutinous/waxy Rice** means special varieties of rice (*Oryza sativa L. glutinosa*), containing kernels which appear white and opaque.
- Note:** The starch of glutinous rice consists almost entirely of amylopectin. It has a tendency to stick together after cooking.
- 3.10 **Green/Immature Kernel** means a whole or broken kernel, which is undeveloped and may be green in colour.
- 3.11 **Heat-damaged Kernel** means a whole kernel, which has changed its normal colour as a result of heating.
- Note:** Parboiled rice in a batch of non- parboiled rice is also included in this category.
- 3.11.1 **Yellow Kernel** means a whole kernel, which has undergone, totally or partially, a change in its natural colour and has taken a lemon or orange-yellow tone through heating or other causes.
- 3.11.2 **Amber Kernel** means a whole kernel, which has undergone, through heating or other causes, a slight uniform change in colour over the whole surface which alters the colour of the kernel to a slight amber - yellow.
- 3.12 **Increments** mean small equal quantities of grains taken from different sampling points in the lot throughout the full depth of the lot.
- 3.13 **Sample** means the quantity of grains removed from the bulk sample and intended for laboratory analysis or other examination.
- 3.14 **Lot** means a stated quantity, presumed to be of uniform characteristics, taken from the consignment, and allowing the quality to be assessed.
- 3.15 **Milling Yield/Head Rice Yield** means an estimate of the quantity of kernels having the length of  $\frac{3}{4}$  or more of the average length of the whole kernel.
- 3.16 **Milled/white Rice** means Rice obtained after milling which involves removing all or part of the bran and germ from the husked rice.
- 3.16.1 **Well-milled Rice** means Rice obtained by milling husked rice in such a way that some of the germ, and all the external layers and most of the internal layers of the bran have been removed.
- 3.16.2 **Extra-well-milled Rice** means Rice obtained by milling husked rice, to the degree that almost all the germ, and all the external layers and the largest part of the internal layers of the bran, and some of the endosperm has been removed.
- 3.17 **Non-gelatinized Kernel** means whole or broken kernel of parboiled rice with at least one quarter white or chalky areas due to incomplete gelatinization of the

starch.

- 3.18 **Paddy/Paddy Rice/Rough Rice** means rice retaining its husk after threshing.
- 3.19 **Parboiled Rice** means rice, the starch of which has been fully gelatinized by soaking paddy or cargo/brown/husked rice in water followed by a heat treatment and a drying process.
- 3.20 **Red Kernel** means whole or broken kernel, excluding heat- damaged kernels, having a red coloured pericarp (bran layer) covering the complete surface..
- 3.21 **Red-striated/red-streaked Kernel** means kernel, whole or broken, with red-streaks, the lengths of which are greater than or equal to one-half of that of the whole kernel, but where the surface covered by these red streaks is less than one-quarter of the total surface.
- 3.22 **Total Milled Yield** means an estimate of the quantity of whole kernels and broken kernels that are produced in the milling of cargo rice to a well- milled degree.
- 3.23 **Whole Kernel/Head Rice** means kernels of rice which are equal to or greater than three-quarters of the average kernel length.
- 3.24 **Commercially objectionable foreign odours** mean odours entirely foreign to rice and which make the rice unfit for normal commercial use.
- NOTE:** These odours may result from fertilizer, hides, oil products, smoke, fire-burnt paddy and decaying animal or vegetable matter.
- 3.25 **Foreign matter** means organic and inorganic components other than kernels of rice, whole or broken.
- NOTE:** Organic extraneous matters may include seeds, husk, animal droppings, fragments of straws, etc. Inorganic extraneous matters such as stones, sand, dust, etc.

#### **4 CLASSIFICATION**

Rice shall be classified as follows:-

- 4.1 **Long Grain Rice** - Rice with 80% or more of kernels after milling to a well-milled degree, having a length of at least 6.67 mm and a length/width ratio of over 3.0.
- 4.2 **Medium Grain Rice** - Rice with 80% or more of kernels after milling to a well-milled degree, having a length of 6.20 to 6.66 mm and a length/width ratio between 2.0 and 3.0.



- 4.3 **Short Grain Rice** - Rice with 80% or more of kernels after milling to a well-milled degree, having a length of less than 6.20 mm and a length/width ratio of less than 2.0.

## **5 APPLICATION OF THIS STANDARD**

- 5.1 All determinations shall be on the basis of the original sample.
- 5.2 Percentages shall be determined on the basis of weight.
- 5.3 Kernels with defects, once assigned to a particular category, cannot be used in another category.
- 5.4 For broken rice assessments, the total broken rice is extracted.
- 5.4.1 To estimate the broken rice in mixed varieties, the kernel fragments shall be determined and its length shall be less than three-quarters of the average length of the corresponding whole kernels.
- 5.5 Discoloration (yellow, amber and heat damaged kernels) shall be estimated in the milled sample.
- 5.6 When a kernel has several defects, it shall be classified according to the category in which the maximum permissible value is the lowest.
- 5.7 All parts of kernels which remain in the perforations of a sieve shall be considered to be retained by the sieve.
- 5.8 Average length is determined on the basis of measuring the length of one hundred (100) whole kernels chosen at random.
- 5.9 Mechanical sizing of kernels shall be adjusted by methods approved by the Belize Bureau of Standards.
- 5.10 Moisture content in paddy or milled rice shall be determined by a recommended device as outlined in Annex A and in accordance with the procedures described in Annex B and or by ISO 712:2009.

## **6 GENERAL ORGANOLEPTIC AND HEALTH CHARACTERISTICS**

### **6.1 General Requirements**

- 6.1.1 Rice shall be safe and suitable for human consumption and free from:
- a) Commercially objectionable foreign odours and flavours;
  - b) Foreign matter;
  - c) Living or dead insects;
  - d) Insect fragments; and
  - e) Mites.

- 6.1.2 Cargo Rice shall be free of musty, earthy and mouldy ground odours. There shall be no sour rancid or acidic odours. If a musty or sour odour is found in cargo rice, the grader shall record this information on the Inspection Certificate.
- 6.1.3 The product shall be prepared and handled in accordance with the appropriate sections of the Codex Alimentarius Commission, General Principles of Food Hygiene or CRCP 5: 2010
- 6.1.4 Handling, storage and transport procedures shall be established to:
- a) sort food and food ingredients to segregate material which is evidently unfit for human consumption;
  - b) dispose of any rejected material in a hygienic manner; and
  - c) protect food and food ingredients from contamination by pests or by chemical, physical or microbiological contaminants or other objectionable substances during handling, storage and transport.
- 6.1.5 Care shall be taken to prevent deterioration and spoilage through appropriate measures which may incorporate temperature, humidity and or other such controls.
- 6.1.6 Rice shall be free of microbiological contaminants and chemicals (i.e. Aflatoxin which is created by improper storage causing growth of *Aspergillus flavus*).

**6.2 Microbiological requirements**

**TABLE 1  
Microbiological requirements for rice**

<b>Limit (g)</b>	<b>Quantitative Range White Rice</b>	<b>Parboiled Rice</b>
Moulds	$10^2 - 10^4$	$\leq 10^2$
Aerobic Plate Count	$10^2 - 10^6$	$\leq 10^2$
Coliform Count	$10^2 - 10^4$	$\leq 10^2$
<i>E. coli</i>	$< 10^2 - 10^3$	$\leq 10^2$

**6.3 Contaminants**

Rice shall comply with the maximum residue limits specified in Table 1 for pesticide residues.

**TABLE 2  
Maximum Pesticide Residue Limits**

<b>Pesticide residue</b>	<b>Maximum Residue Limit (MRL) mg/kg</b>

Bentazone	0.1
Chlorpyrifos	0.5
Chlorpyrifos-Methyl	0.1
Diflubenzuron	0.01
Fipronil	0.01
Paraquat	0.05
Thiacloprid	0.02
Trifloxystrobin	5
Cyhalothrin (includes lambda-cyhalothrin)	1
Cypermethrins (including alpha-and-zeta cypermethrin)	2
Azoxystrobin	5

## 7 GRADE DESIGNATION

The grade designation for all classes of rice for processing shall be determined in accordance with Clause 8 and assigned according to the following priority:

- a) Extra A Premium
- b) A
- c) B
- d) C
- e) D
- f) Reject

## 8 GRADE REQUIREMENTS

8.1 Grades shall be assigned in accordance with Tables 3 - 7.

**NOTE:** The characteristics of other rice for processing (ORP) are defined in 8.2.

**TABLE 3**  
**REQUIREMENTS FOR GRADES OF PADDY**  
(All values are maximum except where otherwise indicated)

Factors	Extra A Premium (%)	A (%)	B (%)	C (%)
Moisture Content	14.0	14.0	14.0	14.0
Damaged kernels (Singly or Combined)	1.0	2.5	3.5	4.5

Red kernels	1.0	2.5	3.5	5.5
Heat-damaged kernels	0.1	0.2	0.6	1.5
Green kernels	2.0	3.0	4.0	6.0
Chalky kernels	2.0	3.0	4.0	6.0
Head rice yield (Minimum)	55.0	50.0	45.0	40.0
Total milled yield (Minimum)	70.0	67.0	65.0	63.0

**TABLE 4  
REQUIREMENTS FOR GRADES OF CARGO RICE (All  
values are maximum except where otherwise indicated)**

<b>Factors</b>	<b>Extra A Premium (%)</b>	<b>A (%)</b>	<b>B (%)</b>	<b>C (%)</b>
Moisture Content	14.0	14.0	14.0	14.0
Damaged kernels (Singly or Combined)	1.0	2.5	3.0	4.0
Red kernels	1.0	2.5	3.5	5.5
Yellow kernels	0.1	0.2	0.6	1.5
Amber kernels	0.5	0.8	1.0	2.0
Green kernels	2.0	3.0	4.0	6.0
Paddy	0.5	1.0	1.5	2.0
Head rice yield (Minimum)	65.0	62.0	61.0	60.0

Total milled yield (Minimum)	88.0	86.0	82.0	80.0
Chalky kernels	2.0	3.0	4.0	6.0
Total Foreign Matter	0.5	1.0	1.0	1.0
Organic	0.5	1.0	1.0	1.0
Inorganic	0.0	0.0	0.0	0.0

**TABLE 5 (a)**  
**REQUIREMENTS FOR GRADES OF MILLED/WHITE**  
**RICE (All values are maximum except where otherwise**  
**indicated)**

<b>Factors</b>	Extra A Premium (%)	A (%)	B (%)	C (%)
Moisture Content	14.0	14.0	14.0	14.0
Damaged kernels (Singly or Combined)	0.5	1.0	2.0	3.0
Red striated kernels	0.1	0.5	1.0	2.5
Yellow kernels	0.1	0.2	0.6	1.5
Amber kernels	0.5	0.8	1.0	2.0
Chalky kernels	2.0	4.0	6.0	8.0
Total Broken kernels - Chips	7.0 0	10 1.0	18 2.0	30 3.0
Paddy	0	0.1	0.5	0.5
Total Foreign Matter	0.1	0.2	0.5	0.5
Organic	0.1	0.2	0.5	0.5
Inorganic	0	0	0	0

Colour classification shall be applicable to all grades analysed on milled samples and shall be in accordance to Table 5 (b).

**Table 5 (b)  
Colour classification of milled rice**

<b>Category</b>	<b>Whiteness/Colour/Milling meter reading</b>
Well milled rice	38.0 – 39.0
Extra well milled rice	40.0 – 41.0

**TABLE 6 (a)  
REQUIREMENTS FOR GRADES OF CARGO PARBOILED RICE  
(All values are maximum except where otherwise indicated)**

<b>Factors</b>	Extra A Premium (%)	A (%)	B (%)	C (%)
Moisture Content	14.0	14.0	14.0	14.0
Broken	4.0	6.0	8.0	10.0
Damaged kernels (Singly or Combined)	1.0	1.5	2.0	3.0
Non-Gelatinized Kernels	0.1	0.2	0.3	0.4
Red kernels	1.0	1.5	3.0	3.5
Total Milled Yield (Minimum)	88.0	85.0	82.0	80.0
Head Rice yield(Minimum)	84.0	79.0	74.0	70.0
Paddy	1.0	1.0	1.5	1.5
Total Foreign Matter	0.1	0.2	0.5	0.5
Organic	0.1	0.2	0.5	0.5
Inorganic	0	0	0	0

Colour classification shall be applicable to all grades analyzed on milled samples and shall be in accordance to Table 6 (b).

**Table 6 (b)**  
**Colour classification for cargo parboiled rice**

<b>Category of rice</b>	<b>Whiteness/Colour/Milling meter reading</b>
Parboiled light	26.0 - 31.0
Parboiled medium	20.0 - 25.9
Parboiled dark	16.0 - 19.9

**TABLE 7 (a)**  
**REQUIREMENTS FOR GRADES OF MILLED PARBOILED RICE**  
**(All values are maximum except where otherwise indicated)**

<b>Factors</b>	<b>Extra A Premium (%)</b>	<b>A (%)</b>	<b>B (%)</b>	<b>C (%)</b>
Moisture Content	14.0	14.0	14.0	14.0
Paddy	0.0	0.1	0.2	0.3
Broken kernels	4.0	6.0	8.0	10.0
Damaged kernels (Singly or Combined)	0.5	1.0	1.5	2.5
Non-Gelatinized Kernels	0.1	0.2	0.4	0.6
Red Striated Kernels	0.5	1.0	1.5	2.0
Total Foreign Matter	0.1	0.2	0.5	0.5
Organic	0.1	0.2	0.5	0.5
Inorganic	0	0	0	0

Colour classification shall be applicable to all grades analyzed on milled samples and shall be in accordance to Table 7 (b).

**TABLE 7 (b)**  
**Colour classification for milled parboiled rice**

<b>Category of rice</b>	<b>Whiteness/Colour/Milling meter reading</b>
Parboiled light	26.0 - 31.0
Parboiled medium	20.0 - 25.9
Parboiled dark	16.0 - 19.9

- 8.2 Grade D shall be other rice for processing of paddy, cargo, milled, cargo parboiled and milled parboiled rice which does not meet the requirements for any of the grades from Extra A Premium, A, B and C.
- 8.3 Rejects shall be paddy, cargo, milled, cargo parboiled and milled parboiled rice which are unfit for human consumption for any of the reasons below:
- a) is not an approved variety;
  - b) has an objectionable odour; or
  - c) is insect-infested or of distinctly low quality.

**9 COMPOSITIONAL REQUIREMENTS FOR ENRICHED RICE**

- 9.1 When the vitamins, minerals and other substances listed in Table 8, are added to the rice they can be combined with harmless substances to render them insoluble in water. These substances can only be added in forms that are harmless and can be assimilated by the body.
- 9.2 If the vitamins, minerals and other substances are to be retained after the rice is washed and cooked, the quantity of the substances listed in Table 8 should be no less than 85 percent of minimum quantity stated.

**TABLE 8  
LIMITS OF VITAMINS AND MINERALS AND OTHER SUBSTANCES USED  
IN ENRICHED RICE**

<b>Vitamins, Minerals and other substances</b>	<b>Allowances</b>
Folic acid	Not less than 0.7 mg and not more than 1.4 mg.
Niacin or Niacinamide	Not less than 16 mg and not more than 32 mg.
Thiamin	Not less than 2.0 mg and not more than 4.0 mg.
Riboflavin	Not less than 1.2 mg and not more than 2.4 mg.
Vitamin D	Not less than 250 U.S.P units and not more than 1,000 U.S.P units.
Calcium (Ca)	Not less than 300 mg and not more than 1,000 mg.
Iron (Fe)	Not less than 13 mg and not more than 26 mg.



*Butylated hydroxytoluene	This must be in an amount as not to exceed 0.0033 percent by mass of the finished product.
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**\* This substance is a preservative which is not used to enrich rice; it is an optional ingredient used in enriched rice.**

## 10 PACKAGING AND LABELLING

### 10.1 Packaging

The packaging shall preserve the hygienic, nutritional, technological and organoleptic qualities of the product and shall not contain substances which may damage the product or constitute a health risk. Packaging material shall be new, clean, and sufficiently strong to be machine-sewn or sealed.

### 10.2 Labelling

All rice packages shall comply with the Belize National Standard Specification for Labelling: Labelling of Prepackaged Foods – BZS 1: Part 3. In addition the labels shall comply with the following provisions:

- a) All rice packages shall have the grade designation as set out under clause 7 and type of rice, for example “Extra A Premium Milled Rice”.
- b) The label shall have the type of the rice preceded by the word "enriched" when any enriching substances are added to the milled rice, for example, “Enriched rice” or “Enriched parboiled rice.”
- c) When the optional ingredient, butylated hydroxytoluene, is added to the rice, the label shall have the following statement prominently stated on the label: “Butylated hydroxytoluene added as a preservative.”

**NOTE:** Such a statement is needed so that it would be understood by the ordinary individual under customary conditions of purchase.

## 11 SAMPLING

The procedures used to carry out sampling of grains shall comply with ISO 24333.

## 12 METHODS OF TEST AND ANALYSIS

12.1 The methods of testing and analysis are outlined in Annex B.

12.2 The methods for determining vitamins, minerals and other substances listed in Table 1 and 8 shall comply with the latest edition of Official Methods of Analysis of the Association of Official Analytical Chemists (AOAC).

**APPENDIX A  
(Informative)**

**RECOMMENDED LIST OF EQUIPMENT USED IN TESTING AND  
ANALYSIS**

1. Satake Testing Miller  
Model TM - 05  
110 VAC 50/60 Hz
2. Leroy Testing Miller  
Model 1 M - 05  
110 VAC 50/60 Hz
3. Mc Gill No. 3 Rice Miller  
110 VAC 50/60 Hz
4. Satake Mini Testing Sheller  
Model THU - 35A  
110 VAC 50/60 Hz
5. Rimac Mini Testing Sheller  
Model TM - 05  
110 VAC 50/60 Hz
6. Hercules Mini Testing Sheller  
Model MTS - 35A  
110 VAC 50/60 Hz
7. Seedburo Sample Sheller  
Model No. 580DC/B  
110 VAC 50/60 Hz
8. Colombini & Mini Testing Sheller  
Model G 390/R  
110 VAC 50/60 Hz
9. Burrows Digital Moisture Computer  
Model DMC 700  
110-220VAC 50/60 Hz
10. Motomco 919 Moisture Meter  
110 VAC 50/60 Hz
11. Dole Moisture Meter  
Model 400
12. Seedburo Portable Moisture Tester  
Model MGT
13. Brown Duvel Moisture Tester  
Model No. BD-1  
110 VAC 60Hz

14. Mechanical Conversion Oven  
Model No: 3515 M  
120 VAC 50/60 Hz
15. All Purpose Laboratory Oven  
Model No. LO201C  
120 VAC 50/60 Hz
16. Carter Day Dockage Tester  
Model XT-3  
110 VAC 50/60 Hz
17. Seedburo Heavy Duty Boerner Divider  
Model No. 34
18. Seedburo Precision Divider  
Model No. 106
19. Seedburo Riffle Divider  
Model No. 275
20. Seedburo Rice Sizing Machine  
Model No. 539 SET  
115 VAC 60 Hz
21. Kett Whiteness Meter  
C-300  
90-220 VAC 50/60 Hz
22. Indented Plates  
Indentations: 3mm, 4mm, 5mm and 5.5 mm
23. Seedburo Moisture Tester  
MD1705
24. Satake Milling/Colour Meter  
MM1C

**Annex B**  
**(normative)**  
**Methods of test and analysis**

**Factor Analysis for the various Grading Requirements**

**B.1 Procedure: Foreign Odours/Pests**

- a) Smell the sample for foreign odours.
- b) Visually examine for the presence of live or dead insects, their fragments and excreta, etc.
- c) Record findings.

**B.2 Procedure: Moisture Content**

- a) Using a divider reduce a sample of 500 g to two samples of 100 g each.
- b) Use an approved moisture meter (Appendix A) with its associated procedures to test each 100 g sample for moisture content and record the results.
- c) Combine samples when tests are completed. (d) The test should be carried out in duplicate.

**Note: An alternative test is ISO 712:2009**

**B.3 Procedure: Classification Length/Width Ratio**

**B.3.1 Determination of Kernel Length**

- a) Using a divider, reduce a sample of 200 g to two samples of 35 g each.
- b) From one 35 gram sample, select 100 whole kernels at random. Each kernel is measured individually with a dial caliper, with accuracy of 0.01 mm. The average length is calculated. The analysis is repeated using the second 35 g sample.
- c) The average length of kernels for both samples is calculated.
- d) Measured kernels are returned to the samples.

**B.3.2 Determination of Kernel Width**

- a) Measure the width of each kernel individually with a dial caliper, with an accuracy of 0.01 mm or measure kernels in groups of 10.
- b) Calculate and record the average length/width ratio.

Length/width ratio of kernels

Ex. Long > 3.5

Long	3.0 - 3.4
Medium	2.0 - 2.9
Short	<2.0

**B.4 Procedure: Broken Kernels**

- a) Weigh the two (approximately 35 g) samples to ascertain correct weight.
- b) Remove all broken kernels.
- c) Weigh the broken kernels, and calculate the percentage as follows:

$$\text{Broken in sample} = \frac{\text{Weight of broken}}{(\%) \text{ Weight of sample}} \times 100$$

- d) Calculate the average of the two samples and record the result as the representative percentage.
- e) Record result.

**B.5 Procedure: Analysis of Other Factors**

- a) Return broken rice to the two 35 g samples at the end of procedure 4.
- b) Analyse samples for the following factors as requested in the respective grading requirements:-

Red kernels  
Red striated kernels  
Non-Gelatinized kernels  
Heat-Damaged kernels (Amber and Yellow) Green kernels  
Chalky kernels  
Paddy  
Foreign matter (Organic and Inorganic)  
Damaged kernels

- c) These are separated and weighed and the percentage of each factor determined as follows:-

$$\text{Factor in sample} = \frac{\text{Weight of factor}}{(\%) \text{ Weight of sample}} \times 100$$

Calculate the average of the two samples and record result.

**Note: The average is used as the representative percentage.**

**B.6 Procedure: Milling Yield (head rice)**

- a) Make a test run in the milling machine with approximately 200 g of cargo rice to determine the time taken to achieve a well milled degree (This time will vary with different varieties and types).
- b) Having determined the milling time, weigh approximately 200 grams of cargo rice

and mill for the length of time determined.

- c) Weigh the total milled rice (A) and record the weight obtained.
- d) (d) Using a sample divider, reduce the milled rice to two working samples of 50 grams each.
- e) Remove all broken kernels from the first 50g sample. Weigh and record the value of the head rice (B) obtained from this sample.

The milling yield of the first 50g sample is calculated using the formula below:-

$$\text{Head Rice (B) \%} = \frac{\text{Head Rice} \times 100}{\text{Sample weight (50)}}$$

$$\text{Milling Yield \%} = \frac{(B/100) \times A \times 100}{200}$$

A worked example is shown below

$$\begin{aligned} \text{Head Rice (B)} &= 42 \text{ g} \\ \text{Total Milled Rice} &= 131 \text{ g} \\ & \frac{0.84 \times 131 \times 100}{200} = 55.02\% \end{aligned}$$

Milling yield determination is repeated on the second 50 g sample, and the average value recorded. **If the difference between the results of the two determinations, carried out simultaneously, exceeds 1.0% absolute, the test shall be repeated.**

**B.7 Procedure: Colour**

Using a representative sample:

- a) Pass sample through Boerner divider and reduce to three sub- samples **of at least 20g.**
- b) Weigh accurately **the same amount (20g approximately) for each sub-sample.**
- c) Standardize meter by inserting sample case with calibration plate and by pressing sensitivity button if reading does not correspond to 86.2
- d) Place sample holder with first sub-sample (20g) into the machine.
- e) Record meter reading
- f) Discard sample

g) Repeat steps 3 to 6 using the other two samples.

Meter sensitivity reading can vary by + / -0.4.

<b><u>Category</u></b>	<b><u>Meter Reading</u></b>
Parboiled light	26.0-31.0
Parboiled medium	20.0-25.9
Parboiled dark	16.0-19.9