THE OFFICIAL GAZETTE 5TH JULY, 2003
LEGAL SUPPLEMENT — B

GUYANA No. 21 of 2003

ORDER

Made Under

THE GUYANA NATIONAL BUREAU OF STANDARDS ACT 1984

(Act 11 of 1984)

IN EXERCISE OF THE POWERS CONFERRED UPON ME BY SECTION 20 OF THE NATIONAL BUREAU OF STANDARDS ACT 1984, I HEREBY MAKE THE FOLLOWING ORDER:-

1. This Order may be cited as the Guyana National Bureau of Standards (Compulsory Standard Specification) (Rice - Specification, Sampling Tests and Analysis) Order 2003. — Citation.

2. The Standard for Rice - Specification, Sampling, Tests and Analysis specified in the Schedule is hereby declared compulsory. — Standard specification declared compulsory.

SCHEDULE

GYS 211:2002

Rice - Specification, sampling, tests and analysis

1 Scope

This standard prescribes the 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 Definitions

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

2.1 **aromatic rice (white or parboiled):** Special varieties of rice that have a distinctive and characteristic aroma, e.g. basmati and jasmine rice.

2.2 **broken kernel:** Fragment of the kernel.

2.2.1 **small broken kernel:** Fragment of kernel, the length of which is less than or equal to one-quarter of the average length of the corresponding whole kernel.

2.2.2 **medium broken kernel:** 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.

2.2.3 **large broken kernel:** 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.

2.2.4 **chip:** Fragment of kernel, which passes through a metal sieve with round perforations 1.4 mm in diameter.

2.3 **bulk rice:** Rice which is transported without specific packaging. Rice shipped in one (1) tonne sacks are not classified as bulk rice.

2.4 **bulk sample/composite:** The quantity of grain obtained by combining and mixing the increments taken from a specific lot.

2.5 **cargo rice/brown rice/husked rice:** Rice from which the husk only has been removed.

2.6 **chalky kernel:** A kernel, whole or broken, of which at least three-quarters of the surface has an opaque and floury appearance.

2.7 **colour:** Refers to parboiled cargo/brown/husked rice which may be designated to be "parboiled light", "parboiled" or "parboiled dark", if the parcel meets colour requirements specified in the sub-sections below.

2.7.1 **parboiled (light) rice:** Parboiled rice not distinctly coloured by the parboiling process and has a Kett whiteness meter reading of 26.0 - 31.0.

2.7.2 **parboiled rice:** Parboiled rice distinctly but not materially coloured by the parboiling process and has a Kett whiteness meter reading of 20.0 - 25.9.

2.7.3 **parboiled (dark) rice:** Parboiled rice materially coloured by the parboiling process and has a Kett whiteness meter reading of 16.0 - 19.9.

2.8 **consignment:** The quantity of grain dispatched or received at one time and covered by a particular contract or shipping document. It may be composed of one or more lots. Consignments should be considered in lots not exceeding 500 metric tons.

2.9 **damaged kernel:** Whole or broken kernel showing obvious deterioration due to moisture, pests or other causes excluding heat damaged kernel.

2.9.1 **spotted kernel:** Whole or broken kernel showing a well defined small circle of dark colour or more or less regular shape.

2.9.2 **stained kernel:** Whole or broken kernel which has undergone on a small area of its surface an obvious change in its natural colour. The stains maybe of different colours e.g., blackish, reddish and brown. Deep black striations are also considered stains.

2.9.3 **pecks:** Whole or broken kernels of parboiled rice of which more than one quarter of the surface is brown or black in colour.

2.9.4 **immature kernel:** A whole or broken kernel which is undeveloped.

2.9.5 **shrivel kernel:** A kernel which has become shrunken and wrinkled from great heat or lack of moisture.

2.9.6 **black kernel:** A kernel showing a distinctly dark colouration.

2.10 **enriched rice:** Forms of milled rice to which nutrients or enriching substances have been added.

2.11 **glutinous rice:** Special varieties of rice (*Oryza sativa L. glutinosa*), the kernels of which have a white and opaque appearance. The starch of glutinous rice consists almost entirely of amylopectin. It has a tendency to stick together after cooking.

2.12 **green/immature kernel:** A whole or broken kernel, which is undeveloped and may be green in colour.

2.13 **heat-damaged kernel:** A whole kernel, which has changed its normal colour as a result of heating. Parboiled rice in a batch of non-parboiled rice is also included in this category.

2.13.1 **yellow kernel:** A whole kernel, which has undergone, totally or partially, through heating or other causes, a change in its natural colour and has taken a lemon or orange-yellow tone.

2.13.2 **amber kernel:** A whole kernel, which has undergone through heating or other causes, a slight uniform change in colour over the whole surface; this change alters the colour of the kernel to a slight amber - yellow.

2.14 **increments:** Small equal quantities of grains taken from different sampling points in the lot throughout the full depth of the lot.

2.15 **laboratory sample:** The quantity of grains removed from the bulk sample and intended for analysis or other examination.

2.16 **lot:** A stated quantity, presumed to be of uniform characteristics, taken from the consignment, and allowing the quality to be assessed.

2.17 **milling yield (head rice):** An estimate of the quantity of kernels having the length of 3/4 or more of the average length of the whole kernel.

2.18 **milled rice:** Rice obtained after milling which involves removing all or part of the bran and germ from the husked rice.

2.18.1 **under-milled rice:** Rice obtained by milling husked rice, but not to the degree necessary to meet the requirements of well-milled rice.

2.18.2 **well-milled rice:** 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.

2.18.3 **extra-well-milled rice:** 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 have been removed.

2.19 **non-gelatinized kernel:** Whole or broken kernel of parboiled rice with distinct white or chalky areas due to incomplete gelatinization of the starch.

2.20 **paddy/paddy rice/rough rice:** Rice retaining its husk after threshing.

2.21 **parboiled rice:** 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.

2.22 **red kernel:** Whole or broken kernel, having a red coloured pericarp (bran layer) covering the complete surface, but excluding heat-damaged kernels.

2.23 **red-striated kernel:** 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.

2.24 **total milled yield:** 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.

2.25 **whole kernel/head rice:** Kernels of rice which are equal to or greater than three-quarters of the average kernel length.

3 Classification

Rice shall be classified as follows:-

3.1 **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.

3.2 **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.

3.3 **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.

4 Principles/conventions governing the application of this standard

4.1 All determinations shall be on the basis of the original sample.

4.2 Percentages shall be determined on the basis of weight.

4.3 Kernels with defects, once assigned to a particular category, cannot be used in another category.

4.4 **Broken rice assessments: Total broken rice is extracted, to calculate the percentage broken**

4.4.1 Estimation of broken rice in mixed varieties: find the kernel fragments, the length of which is less than three-quarters of the average length of the corresponding whole kernels.

4.5 Discolouration (yellow, amber and heat damage) is estimated in the milled sample.

4.6 When a kernel has several defects, it shall be classified in the category where the maximum permissible value is the lowest.

4.7 All parts of kernels which get stuck in the perforations of a sieve shall be considered to be retained by the sieve.

4.8 Average length is determined on the basis of measuring the length of one-hundred (100) whole kernels chosen at random.

4.9 Mechanical sizing of kernels shall be adjusted by methods given by the regulatory authority of the particular territory.

4.10 Moisture content in paddy or milled rice is determined by an approved device **(Appendix B)** in accordance with the associated prescribed procedures and/or by the **International Standards ISO 712:1985 Cereal and cereal products - Determination of moisture content.**

5 General, organoleptic and health characteristics

Rice shall be safe and suitable for human consumption. Rice shall be free from abnormal flavours, odours, living or dead insects, insect fragments and mites.

5.1 **Musty or sour odours** - Cargo rice shall be free of musty, earthy and mouldy ground odours. There shall be no sour odours, which are rancid or acidic. When a musty or sour

odour is found in cargo rice, the grader shall record same on the Inspection Certificate.

5.2 **Commercially objectionable foreign odours** - Odours entirely foreign to rice and which make the rice unfit for normal commercial use. These include fertilizer, hides, oil products, smoke, fire-burnt paddy and decaying animal or vegetable matter.

5.3 **Foreign matter** - Organic and inorganic components other than kernels of rice, whole or broken. Organic extraneous matters such as seeds, husk, animal droppings, fragments of straws, etc. Inorganic extraneous matters such as stones, sand, dust, etc.

5.4 **Hygiene** - The product shall be prepared and handled in accordance with the appropriate sections of the **Codex Alimentarius Commission, General Principles of Food Hygiene (Revised Draft; January 1994, Volume A, Edition 2, 1985)**.

5.5 **Enriched rice** - Vitamins, minerals and other substances may be added to rice in conformity with the limits shown in **Table 7**.

5.6 **Microbiological requirements**

Table 1
Microbiological requirements for rice

Limit	Quantitative range (g)	
	White rice	Parboiled rice
Moulds	10^2-10^4	<=10^2
Yeast	10^2-10^4	<=10^2
Aerobic plate count	10^2-10^6	<=10^2
Coliform count	10^2-10^4	<=10^2
E. coli	< 10^2-10^3	<=10^2

5.7 **Contaminants**

5.7.1 The products covered by the provisions of these standards shall be free of heavy metals in amounts which may represent a hazard to human health.

5.7.2 Rice shall comply with those maximum residue limits for pesticides established by **Codex Alimentarius Commission**.

6 Grade designation

The grade designation for all classes of rice for processing shall include the following order:-

1. Extra A
2. A
3. B
4. C
5. Sample grade

7 Grade requirements

7.1 Factors for grade requirements shall be in accordance with values (percentage %) shown in **Tables 2 - 6**. The characteristics of sample grade rice are defined in **7.2**.

Table 2
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	2.0	2.5	3.5
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
Milling yield (Head rice) (Minimum)	55.0	50.0	45.0	40.0
Total milled yield (Minimum)	70.0	67.0	65.0	63.0

Table 3
Requirements for grades of cargo rice
(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	3.0	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
Milling yield (Head rice) (Minimum)	72.0	71.0	70.0	65.0
Total milled yield (Minimum)	88.0	86.0	82.0	80.0
Broken kernels	6.0	8.0	12.0	15.0
Chalky kernels	2.0	3.0	4.0	6.0
Total foreign matter	0.5	1.0	1.0	1.0
Organic Inorganic	0.5 0.0	1.0 0.0	1.0 0.0	1.0 0.0

Table 4
Requirements for grades of milled rice
(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)	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	4.0 0	7.0 1.0	15.0 2.0	25.0 3.0
Paddy	0	0.1	0.5	0.5
Total foreign matter Organic Inorganic	0.1 0.1 0	0.2 0.2 0	0.5 0.5 0	0.5 0.5 0

Table 5
Requirements for grades of cargo parboiled rice
(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
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
Milling yield (Head rice) (Minimum)	84.0	79.0	74.0	70.0
Paddy	1.0	1.0	1.5	1.5
Total foreign matter Organic Inorganic	0.1 0.1 0	0.2 0.2 0	0.5 0.5 0	0.5 0.5 0
Colour*				

* Colour classification applicable to all grades analysed on milled samples (Kett whiteness meter):

Category of rice	Meter reading
Parboiled light	26.0 - 31.0
Parboiled medium	20.0 - 25.9
Parboiled dark	16.0 - 19.9

Table 6
Requirements for grades of milled parboiled rice
(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
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	0.3	0.4
Red striated kernels	0.5	1.0	1.5	2.0
Total foreign matter Organic Inorganic	0.1 0.1 0	0.2 0.2 0	0.5 0.5 0	0.5 0.5 0
Colour*				

* Colour classification applicable to all grades (Kett whiteness meter):

Category of rice	Meter reading
Parboiled light	26.0 - 31.0
Parboiled medium	20.0 - 25.9
Parboiled dark	16.0 - 19.9

7.2 Sample grade shall be paddy, cargo, milled, cargo parboiled and milled parboiled rice which:-

(1) Does not meet the requirements for any of the grades from Extra A (Premium) to C;
(2) Is not an approved variety;
(3) Has a nasty or sour odour;
(4) Has an objectionable odour;
(5) Insect-infested or of distinctly low quality.

8 Compositional requirements for enriched rice

Table 7
Limits of vitamins and minerals used to enrich rice

Vitamins and minerals	Allowances
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.

* This substance is a preservative which is not used to enrich rice; it is an optional ingredient used in enriched rice.

8.1 When these listed vitamins, minerals and other substances 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.

8.2 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 7** should be no less than 85 percent of minimum quantity stated.

9 Packaging and labelling

9.1 **Packaging** - The packaging shall not transmit any smell or taste and shall not contain substances which may damage the product or constitute a health risk. New, clean,

sufficiently strong and machine-stitched bags shall be used.

9.2 **Labelling** - Each package or container shall be properly labelled in compliance with the **Caricom Standard Specification for Labelling of Commodities: General Principles (CCS : Part 1: 1994).**

When any enriching substances are added to the milled rice, the label shall have the common name of the rice preceded by the word "enriched", for example, "Enriched rice" or "Enriched parboiled rice."

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

10 Sampling

The procedures used to carry out sampling of grains shall comply with the **International Standard, ISO 950 : 1979, Cereals - Sampling.**

11 Methods of test and analysis

11.1 Factor analysis for the various grading requirements

11.1.1 Procedure 1: Foreign odours/pests

(1) Smell the sample for foreign odours.

(2) Visually examine for the presence of live or dead insects, their fragments and excreta, etc.

(3) Record findings.

11.1.2 Procedure 2: Moisture content

(1) Using a divider reduce a sample of 500 g to two samples of 100 g each.

(2) Use an approved moisture meter **(Appendix B)** with its associated procedures to test each 100 g sample for moisture content and record

(3) Combine samples when tests are completed.

(4) The test should be carried out in duplicate.

Note: ISO 712:1985, Cereals and cereal products - Determination of moisture content, can be used alternatively.

11.1.3 Procedure 3: Classification length/width ratio

Average kernel length

(1) Using a divider, reduce a sample of 200 g to two samples of 35 g each.

(2) From one 35 gram sample, select 100 whole kernels at random. Each kernel 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.

(3) Average length of kernels for both samples is calculated.

(4) Measured kernels are returned to the samples.

Determination of width

(1) 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.

(2) Calculate and record the average length/width ratio.

Length/width ratio of kernels:

Extra long	> 3.5
Long	3.0 - 3.4
Medium	2.0 - 2.9
Short	< 2.0

11.1.4 Procedure 4: Broken kernels

(1) Weigh the two (approximately 35 g) samples to ascertain correct weight.

(2) Remove all broken kernels.

(3) Weigh the broken kernels, and calculate the percentage as follows:

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

(4) Calculate the average of the two samples and record the result as the representative percentage.

(5) Record result.

11.1.5 Procedure 5: Analysis of other factors

(1) Return broken rice to the two 35 g samples at the end of procedure 4.

(2) Analyse samples for the following factors as requested in the respective grading requirements:-

(a) Red kernels;
(b) Red striated kernels;
(c) Non-gelatinized kernels;
(d) Heat-damaged kernels (Amber and yellow);
(e) Green kernels;
(f) Chalky kernels;
(g) Paddy;
(h) Foreign matter (Organic and inorganic); and
(i) Damaged kernels;

(3) 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.

11.1.6 Procedure 6: Milling yield (Head rice)

(1) 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).

(2) Having determined the milling time, weigh approximately 200 g of cargo rice and mill for the length of time determined.

(3) Weigh the total milled rice (A) and record the weight obtained.

(4) Using a sample divider, reduce the milled rice to two working samples of 50 g each.

(5) Remove all broken kernels from the first 50 g 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:

Head rice (B) = 42 g

Total milled rice = 131 g

$$= \frac{0.84 \times 131 \times 100}{200} = 55.02\%$$

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.

11.1.7 Procedure 7: Colour

Using a representative sample:

(1) Pass sample through boerner divider and reduce to three sub-samples of at least 20 g.

(2) Weigh accurately the same amount (20 g approximately) for each sub-sample.

(3) Standardise meter by inserting sample case with calibration plate and by pressing sensitivity button if reading does not correspond to 86.2.

(4) Place sample holder with first sub-sample (20 g) into the machine.

(5) Record meter reading.

(6) Discard sample.

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

Meter sensitivity reading can vary by + / -0.4.

Category	Meter reading
Parboiled light	26.0 - 31.0
Parboiled medium	20.0 - 25.9
Parboiled dark	16.0 - 19.9

11.2 Microbiological analysis

The methods for determining the substances listed in **Table 1** shall comply with the **Official Methods of Analysis of the Association of Official Analytical Chemists (AOAC), (Latest edition).**

11.3 Analysis of vitamins, minerals and other substances

The methods for determining vitamins, minerals and other substances listed in **Table 7** shall comply with the **Official Methods of Analysis of the Association of Official Analytical Chemists (AOAC), (Latest edition).**

Appendix A

Recommended list of equipment used in testing and analysis

1. Ohaus triple beam balance
   Model 2610 (750-S)

2. Ohaus digital balance
   Model GA 200
   100/120V 220/240V Ac
   50/60 Hz

3. Ohaus scout 2
   Model SC 4010

4. Ohaus navigator
   Model NV 610N
   110 VAC 50/60 Hz

5. Satake testing miller
   Model TM - 05
   110 VAC 50/60 Hz

6. Leroy testing miller
   Model 1 M - 05
   110 VAC 50/60 Hz

7. Mc Gill No. 3 rice miller
   110 VAC 50/60 Hz

8. Satake mini testing sheller
   Model THU - 35 A
   110 VAC 50/60 Hz

9. Rimac mini testing sheller
   Model TM - 5
   110 VAC 50/60 Hz

21. Seedburo heavy duty boerner divider
Model No. 34

22. Seedburo precision divider
Model No. 106

23. Seedburo riffle divider
Model No. 275

24. Seedburo rice sizing machine
Model No. 539 SET
115 VAC 60Hz

25. Kett whiteness meter
C-300
90-220 VAC 50/60Hz

26. Indented plates
Indentations: 3mm, 4mm, 5mm and 5.5mm

Dated this 2nd day of July, 2003

Minister of Tourism, Industry and Commerce