

**Bangladesh Standard
SPECIFICATION FOR
FORTIFIED RICE**



ICS 67.060

**BANGLADESH STANDARDS AND TESTING INSTITUTION
MAAN BHABAN
116-A, TEJGAON INDUSTRIAL AREA
DHAKA-1208, BANGLADESH**

Price-1k-200/-

Constitution of the Cereals, Pulses and their Products Sectional Committee, AFDC-1

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FOREWORD

This Bangladesh Standard was adopted by the Bangladesh Standards Testing Institution on 13 May 2015 after the draft finalized by the Cereals, Pulses and their Products Sectional Committee had been approved by the Agricultural and Food Products Divisional Committee.

Rice is a staple food in Bangladesh. It is obtained from paddy after milling in the rice mill or hand pounding. Rice may be parboiled or Atap rice. Normal rice contains a number of natural vitamins and minerals. However, a significant portion of vitamins and minerals are lost during milling process. To compensate the losses that occurs during the milling and to make the rice more nutritious rice is fortified by adding rice premix kernels containing a number of vitamins and minerals.

To ensure the proper quality of fortified rice this standard is being formulated.

In the formulation of this standard assistance has been derived from the following publications.

- i) BDS 952:1981 Grades on Milled Rice
- ii) Concept Note-Introduction to Fortified Rice in Bangladesh
World Food Programme (WFP) and PATH

Taking into consideration the views of the manufacturers, consumers, trade bodies and technologists the sectional committee responsible for the preparation of this standard felt that this standard should be related to the manufacturing and trade practice followed in this field.

This standard is subject to periodical reviews and amendments, if necessary, in order to keep pace with the latest industrial and technological innovations. Any suggestions for improvement will be recorded and placed before the committee in due course.

For the purpose of deciding, whether a particular requirement of this standard is complied with the final value observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with BDS 103. The number of significant places retained in the rounded off value should be the same as that of the specified value in the standard.

**Bangladesh Standard
SPECIFICATION FOR
FORTIFIED RICE**

1. SCOPE

1.1 This standard prescribes the requirements, processing, methods of sampling and test for fortified rice.

2.0 REFERENCES

2.1 The Bangladesh Standards listed in Appendix-F are necessary adjuncts to this standard. For references, the latest edition of the referenced documents including any amendments applies.

3. DEFINITIONS

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

3.1.1. **Paddy (rough rice)** – Rice in husk after threshing.

3.1.2 **Rice** - rice is whole and broken kernels obtained from the species *Oryza sativa*

3.1.3 **Dehusked rice** - (brown rice or cargo rice) is paddy rice from which only the husk has been removed. The process of husking and handling may result in some loss of bran.

3.1.4 **Parboiled Rice** – Rice that is obtained by milling paddy that has been soaked in the water, boiled with steam to gelatinize the starch and then dried before milling.

3.1.5 **Unparboiled rice (atap rice)** - Rice that is obtained by milling dry paddy directly.

3.1.6 **Milled rice/white rice/polished rice** - Paddy from which the husk has been removed and separated and the germ and layers of bran wholly or partly removed and separated from the kernels.

3.1.7 **Husk** – Outer thick protective cover of paddy, also known as hull.

3.1.8 **Kernel** – Edible portion of the grain.

3.1.9 **Germ** – Embryo situated at one end of the grain.

3.1.10 **Chalky Kernel** – Kernels whole or broken, one half or more of the surface of which is white like the colour of chalk.

3.1.11 **Immature Kernel** – Immature kernel means rice kernels that are undeveloped (greenish in colour).

3.1.12 Damaged Kernel – Kernels that are damaged can be seen by necked eyes due to moisture, heat, fungi and others.

3.1.13 Degree of milling – A value expressed with reference to the removal of the germ the outer and inner bran layers during milling.

3.1.14 Head rice (unbroken) – The head rice or whole kernels shall be kernels of milled rice of not less than 8/10 th of the length of the grain. The head rice shall be determined by the use of indented places, perforated sieves or hand picking.

3.1.15 Contrasting classes – Kernels whole or broken of varieties or classes of rice other than the variety or class designated wherein size and shape of kernels differ distinctly from characteristics of kernels by the variety or class designated.

3.1.16 Commercially objectionable foreign odour – Odours which are entirely foreign to rice and which because of their presence render rice unfit for its normal commercial usage.

3.1.17 Insect free rice – Rice which does not contain live or dead weevils or other insects, insect webbing or insect refuse.

3.1.18 Adulteration – Alteration of the composition of the milled rice by any means what so ever so that the resulting mixture or combination is not of the nature prescribed, its colour quality or flavour is injuriously affected or its bulk or mass adversely affected. Parboiled kernels in non parboiled rice or vice versa will be considered as adulteration.

3.1.19 Foreign materials – All matters other than rice kernels rice polish and paddy.

3.1.20 Glutinous rice/waxy rice – Kernels of special varieties of rice 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.

3.1.21 White rice – Rice which has not received hydrothermal treatment.

3.1.22 Broken rice- Pieces of kernels having its length 2.5/10 th or more of the average length of the unbroken kernels. Broken rice shall be of two types namely (a) Big Broken (b) Small Broken as defined below:

(a) **Big Broken-** Pieces of kernels having its length of 5/10 th or more but less than 8/10th of the average length of the unbroken kernels.

(b) **Small Broken-** Pieces of kernels kernels having 2.5/10 th or more of the average length of the unbroken kernels of the variety concerned but less than 5/10th.

3.1.22 Moisture content: This is the water that the grain contains naturally.

3.1.23 Foreign matter: Anything other than rice and premix kernel.

3.1.24 Micronutrient: Vitamins and minerals.

3.1.25 Fortificant: Selected micronutrient(s) in a particular form to fortify selected food (e.g. rice, flour etc.)

3.1.26 Fortification: Addition of selected micronutrient(s) in a food so as to improve the nutritional quality of the food supply.

3.1.27 Rice premix kernels: Artificially made rice from the rice flour by adding micronutrient(s).

3.1.28 Blending: Blending involves mixing normal rice with rice premix kernels in a ratio (in this case 100:1) to produce fortified rice.

3.1.29 Fortified rice: Any type of rice supplemented by micronutrients. There are different type of rice fortification i.e. Bio-fortified rice; mechanically fortified rice. When normal rice (parboiled or atap) properly blended with rice premix kernels at specified ratio (in this case 100:1) to make fortified rice.

4. General Requirements for Rice Fortification through Addition of Premix

4.1 Description: Fortified rice shall consists of normal rice (parboiled or atap) properly blended with rice premix kernels at ratio of 100:1. Rice premix kernels shall contain essential micronutrient(s) that has been selected for fortification (Table 2).

4.2 The rice shall be current season's crop and shall be sound, dry and wholesome. Rice shall fulfill the standard set by the Government for internal procurement or barter.

4.3 Rice shall be of one grade and of normal colour, taste and smell.

4.4 The fortified rice shall conform to the requirements given in Table 1 and 2.

5. SIZE AND SHAPE OF MILLED RICE

5.1 Rice shall be of the following four classes according to grain size:

- a) **Extra long** – Milled kernels having a length of more than 7.5 mm and above.
- b) **Long grain**- Milled kernels having a length of 6.1 to 7.5 mm.
- c) **Medium grain**- Milled kernels having a length of 5.5 mm to 6.0 mm.
- d) **Short grain**- Milled kernels having a length of less than 5.5 mm

5.2 Rice shall also be of the following three types of shape:

- a) **Fine (Slender)** - Rice with whole milled kernels having length/breadth ratio 3.0 and above.
- b) **Medium** - Rice with whole milled kernels having length/breadth ratio between 2.1 to 3.0
- c) **Course** – Rice with whole milled kernels having length/breadth ratio 1.1 to 2.0

6. PROCESSING

6.1. Rice shall conform to any of the following degree of milling:

- a) **Husked rice** - Paddy from which only the husk has been removed. Also known as 'brown rice', 'cargo rice', 'hulled rice', 'loonzain rice', and 'anramato rice'.
- b) **Under milled rice**- Paddy from which the husk a part of the germ and all or part of the outer bran layers, but not the inner bran layers have been removed.
- c) **Reasonably well milled rice (Medium milled rice)**: Paddy from which the husk, the germ (Part of the germ in the case of round rice), the outer bran layers and the greater part of inner bran layers have been removed but parts of the length wise streaks of the bran layers may still be present on not more than 80 percent of the kernel.
- d) **Well milled rice**- Paddy from which the husk, the germ (part of the germ in the case of round rice) the outer bran layers and the greater part of the inner bran layers have been removed but parts of the lengthwise streaks of the bran layers may still be present on not more than 10 percent of the kernel.
- e) **Extra well milled rice** - Paddy from which the husk, the germ (part of the germ in the case of round rice) and the bran layers have been completely removed.

7. The fortified rice shall conform to the requirements given in Table 1 and 2.

TABLE 1 : REQUIREMENT FOR FORTIFIED PARBOILED AND ATAP RICE

Sl. No.	Characteristic	Types of Rice		Methods of Test Ref. to Annex
		Parboiled Rice	Atap Rice	
i.	Moisture content, percent by mass, Max.	14.0	14.0	A
ii.	Head Rice, percent by mass, Min.	90.0	85.0	C
iii.	Big Broken, percent by mass, Max.	8.0	12.0	C
iv.	Broken and Small Broken, percent by mass, Max.	2.0	3.0	C
v.	Damaged grain, percent by mass, Max.	1.0	2.0	C
vi.	Admixture of different variety of rice, percent by mass, Max.	8.0	8.0	C
vii.	Chalky/Immature grain percent by mass, Max.	2.0	3.0	C
viii.	Paddy (grain per 1 kg), Max.	2.0	3.0	C
ix.	Foreign matters, percent by mass, Max.	0.3	0.5	C
x.	Degree of milling	Well milled rice	Reasonably milled rice	C
xi.	Fortified Kernels blended with 1:100kg normal rice	1.0 kg $\pm$ 15%	1.0 kg $\pm$ 15%	E

TABLE 2 : COMPOSITIONS OF FORTIFIED RICE

Sl. No.	Nutrients-Units	Rice consumption of 150-300 g/cap/d, in ppm (mg/kg)	Targeted amount in 100 g uncooked rice	Target fortification level, including 30% overage for vitamins to compensate	Target range ex factory	Expected range at household level
i.	Vitamin A (Palmitate)	1.5	150 mcg (=RE)	195 mcg	185 – 215 mcg	150 – 215 mcg
ii.	Vitamin B ₁ (as Thiamin mononitrate)	4.0	0.4 mg	0.52 mg	0.45 - 0.60 mg	0.40 - 0.60 mg
iii.	Vitamin B ₁₂ (Cyanocobalamine)	0.01	1 mcg	1.3 mcg	1.15 - 1.45 mcg	1.00 - 1.45 mcg
iv.	Folic Acid (vitamin B ₉)	1.3	130 mcg	170 mcg	150 -190 mcg	130 – 190 mcg
v.	Iron (Ferric pyrophosphate)	60	6 mg	6 mg	5 – 7 mg	5 – 7 mg
vi.	Zinc (as Zinc oxide)	40	4 mg	4 mg	3.5 - 4.5 mg	3.5 - 4.5 mg

NOTES:

1. Iron fortificant that can be used in rice is ferric pyrophosphate. Its bioavailability when added to rice is most similar to elemental iron for which 60 ppm is recommended by WHO. Other fortificants such as NaFeEDTA and ferrous fumarate give a brown coloured kernel and suggested not to be used.

2. Target range ex-factory applies +/- 10 % and rounding.

3. Expected range at household level (or anywhere in the supply chain) has for the vitamins the targeted amount as the minimum and ex-factory max as maximum. For minerals the ex-range is taken.

7.1 Hygienic requirements: The fortified rice shall be cleaned and bagged in premises maintained in hygienic conditions in accordance with BDS 822.

8. PACKING AND MARKING

8.1 Packing: Fortified rice shall be packed in food grade bag which is safe-guard the hygienic and other qualities of the food.

8.2 Marking: Each bag shall be marked or labelled with the following information's

- Name and type of the fortified rice
- Name and address of the Miller/Packer
- Batch or code number
- Net mass
- Season of Production
- Date of packing
- Date of Best before
- Maximum retail price (in case of Govt. safety net programme price would not be required)
- Any other requirements as specified under the Bangladesh Standards of Weights and Measures (Packaged Commodities) Rules, 2007.



8.2.1 All marking shall be applied on the bags in such a manner that the dye or ink does not penetrate into the material.

8.2.2 Each bag may also be marked with BSTI Certificate Mark.

NOTE: The use of BSTI Certification Mark is governed by the provisions of Bangladesh Standards and Testing Institution Ordinance, 1985 and BSTI (Amendment) Act 2003 and the Rules and Regulations made thereunder. Details of conditions under which a license for the use of BSTI Certification Mark may be granted to manufacturers or processors, may be obtained from Bangladesh Standards and Testing Institution.

9. METHODS OF SAMPLING AND ANALYSIS

9.1 Sampling - Fortified rice shall be sampled according to the methods prescribed in Annex-B

9.2 Analysis - Fortified rice shall be analyzed according to the methods prescribed in Annex-C

ANNEX – A
[Table 1, item (i)]
DETERMINATION OF MOISTURE CONTENT

A-1 METHOD

A-1.1 The moisture content is determined by measuring the weight loss of a powdered sample dried at a temperature of 130 °C – 133 °C

A-2 APPRATUS

a) Analytical balance

b) Grinding mill which shall be made of material which does not absorb moisture and easy to clean and has as little dead space as possible enables grinding to be carried out rapidly and uniformly without appreciable development of heat and as far as possible without contact with the outside air and is adjustable so as to obtain particles of dimensions indicated in A-3

c) Dish of non corrodible or failing this of glass with a sufficiently tight fitting lid the effective surface enabling the test portion to be distributed so as to give not more than 0.3g/cm².

d) Constant temperature oven electrically heated controlled in such a way that the temperature of air and of the shelves carrying the test portions is with in the range 130 °C – 133 °C in the neighborhood of the test portions in normal working.

The oven shall have a heat capacity such that when initially adjusted to a temperature of 131 °C it can again reach this temperature in less than 45 minutes (preferably in less than 30 minutes) after inserting the maximum number of test portions than can be dried simultaneously.

e) Desiccator with a thick perforated plate of metal or failing this of porcelain containing pure phosphorous pentoxide (P₂O₅) of analytical grade or anhydrous calcium sulphate (CaSO₄) granulated and impregnated with cobalt chloride as indicator or any other effective desiccant.

A-3 PREPARATION OF SAMPLE

A-3.1 The sample shall be ground so as to obtain a portion having particles of sizes below or equal to 1.7 mm less than 10 % mass being over 1 mm and more than 50 % by mass being less than 0.5 mm. Adjust the grinding mill to obtain particles of the requisite dimensions grind a small quantity of the product and reject this. Then quickly grind an amount of sample slightly greater than that required for the test which shall be at least 10 g.

A-4 PROCEDURE

A-4.1 Transfer the ground portion to a previously dried and tared dish. Quickly close the latter and weigh it to the nearest mg. (The time between taking the sample and weighing before drying should be less than 2 minutes if a small mill of the classical cone hammer type is used). Place the open dish containing the test portion in the oven and leave it for 2 hours reckoned from the moment when the oven temperature again reaches 130 °C

After this period and carrying out the operation rapidly take the dish out of the oven cover it and put in the desiccator never put dishes on the top of one another in the desiccator. Weigh the dish when it has cooled to laboratory temperature (generally between 30 and 45 minutes after it is put into the desiccator). Carry out at least two determinations on the same sample.

A-5 CALCULATION OF RESULTS

$$\text{Moisture content percent by mass} = \frac{m_0 - m_1}{m_0} \times 100$$

Where,

m_0 = initial mass of test portion

m_1 = mass of the dry test portion.

Take as the result the arithmetic mean of the two determinations

A-6 NOTE:

a) The difference between two determinations carried out simultaneously or in rapid succession by the same analyst should not exceed 0.1 g of moisture per 100 g of sample. If it does so the determination should be repeated duplicate.

b) Never place together in the oven moist samples and nearly dry test portions as this will result in partial dehydration of the latter.

Annex – B

(Clause 9.1)

SAMPLING OF FORTIFIED RICE

B-1 Scope and field of application – This Bangladesh Standard specifies general conditions relating the sampling for assessment of quality of cereal grains. It does not apply to seed grain.

B-2 Definitions – For the purpose of this Standard the following definitions shall apply.

B -2.1 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.

B-2.2 Lot – A stated quantity presumed to be of uniform characteristics taken from the consignment and allowing the quality to be assessed.

B-2.3 Increment – A small quantity of grain taken from a single position in the lot. A series of increments should be taken from different positions in the lot.

B-2.4 Bulk sample – The quantity of grain obtained by combining and mixing the increments taken from a specific lot.

B -2.5 Laboratory Sample – The quantity of grain removed from the bulk sample and intended for analysis or other examination.

B-3 General

B-3.1 Samples shall be taken jointly by sampling superintendents appointed by buyers and sellers or by a sampling superintendents appointed jointly.

B-3.2 Samples shall be fully representative of the lot from which they are taken. Therefore as the composition of the lot is seldom uniform a sufficient number of increments shall be taken and carefully mixed thus giving a bulk sample from which are obtained by successive divisions the laboratory samples.

B-3.4 Special care is necessary to ensure that all sampling apparatus is clean, dry and free from foreign odours. Sampling shall be carried out in such a manner as to protect the samples, the sampling instruments and the containers in which the samples are placed from adventitious contamination such as rain, dust etc.

B-4 Apparatus - Apparatus is required as follows (see figures 1 to 9 for examples)

NOTE – Many different types and variations of apparatus are available. The dimensions given in the figures are included therefore solely as a guide.

B-4.1 sampling from bulk - Shovels hand scoops cylindrical samplers and apparatus for taking increments periodically from a flow of grain.

B-4.2 Sampling from bags

Sack type spears or triers.

B-4.3 Mixing and dividing - Shovels and dividing apparatus.

B-5 Location of sampling - The location and time of sampling shall be determined by agreement between the parties concerned. Particular requirements applying to leading and discharge are given below.

B-5.1 Loading - It is important that grain which is to be dispatched by vessel is sampled during loading or immediately before at the place of loading.

B-5.2 Discharge - Lost grain is received from ocean going vessels or river transport in both cases sampling shall be carried out during discharge from the vessel.

B-6 Method of taking samples from cereals carried in bulk

B-6.1 Carriage by sea or inland waterway

B-6.1.1 Unless otherwise specified in the contract consignments shall be considered in lots of 500 tones or such parts thereof as constitutes as a single consignment.

B-6.1.2 When sampling takes place while the product is in motion, increment shall be taken at time intervals dependent on the rate of flow.

B-6.1.3 When bulk grain is sampled in the hold during discharge increments shall be taken from as many places as possible excluding the run and at intervals determined by the rate of discharge.

B-6.1.4 If sampling takes place from weigh hoppers increments shall be taken by means of cylindrical samplers, shovels or mechanical samplers in accordance with the practice of the port.

B-6.1.5 The procedure for silos or warehouses is necessarily dependent on local conditions.

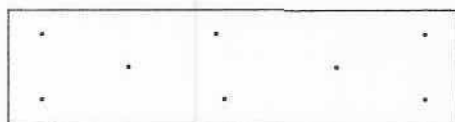
B-6.2 Carriage by rail or road.

B-6.2.1 Unless otherwise specified in the contract each laden wagon or lorry shall be sampled.

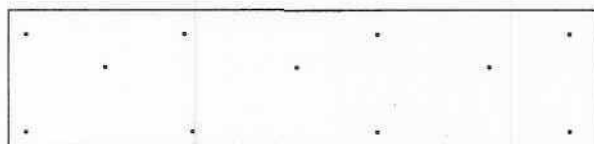
B-6.2.2 If sampling takes place from laden wagons or lorries the increments shall be taken throughout the whole depth of the layer by means of a cylindrical sampler and at the following points:



Wagons or lorries up to 15 t:
Five sampling points (middle and
Approximately 500 mm from sides)



Wagons from 15 to 30 t:
Eight sampling points



Wagons from 30 to 50 t:
Eleven sampling points

B-6.2.3 If the type of wagon does not allow samples to be taken in this manner or by agreement between buyer and seller the method of sampling shall be as described in 6.1.2

B-7 Method of taking samples from cereals carried in bags

Unless otherwise specified in the contract or unless the practice at a port requires otherwise increments shall be taken from different parts of a bag (for example top, middle and bottom) by means of a sack-type spear from the number of bags specified in Table 1

TABLE-1 NUMBER OF BAGS TO BE SAMPLED

In consignment	Number of bags to be sampled
Up to 10	Each bag
10 to 100	10 taken at random
More than 100	Square root (approximately) of total number taken according to a suitable sampling*

*See for example the annex.

B-8 Bulk sample

The bulk sample shall be formed by combining the increments and mixing them well.

B-9 Laboratory samples

The bulk sample shall be divided to obtain the required number of laboratory samples by use of the apparatus mentioned in clause 4. The number of laboratory samples to be taken for analysis and arbitration shall be specified in the contract or otherwise agreed between the buyer and the seller.

B-10 Size of samples

Samples of the sizes given in Table 2 are usually suitable for all grains.

Lot	Increment	Bulk sample	Laboratory sample
Up to 500 tones	1 kg (Max)	100 kg	5 kg

Larger or smaller laboratory samples may be required in some cases according to the tests to be carried out.

B-11 Packaging and labeling of samples

B-11.1 The laboratory samples shall be packed in unglazed, unbleached in sewn cotton bags of very close texture 1.

B-11.1.2 Samples for the determination of moisture or for other tests in which it is important to avoid the loss of volatile matter (for example examination for evidence of chemical treatment) shall be packed in air-tight and moisture-tight closures. The containers shall be completely filled and the closures shall be sealed to prevent loosening or tampering.

B-11.1.3 The bags and other containers shall carry the seal of each sampler. If paper labels are used for the samples they shall be of a suitably high quality for the purpose. The eyelet hole on the label shall be reinforced. The label shall be sealed to the container holding the sample and shall carry the seal each sampler these seals shall be arranged in such a way as to guarantee the inviolability of the sample.

The information on the label shall include such of the following items as are required by the terms of the contract:

- 1) Ship or wagon
- 2) From
- 3) To
- 4) Date of arrival
- 5) Quantity
- 6) Bulk/Bags/Number
- 7) Goods
- 8) Identification mark or Lot No.
- 9) Name of seller

- 10) Name of buyer
- 11) Contract No. and Date
- 12) Date of sampling
- 13) Date of final discharge
- 14) Place and point of sampling
- 15) sampled by.

The information recorded on the label shall be permanent. By agreement between seller and buyer, a duplicate label may be included inside the sample container, unless the sample is intended for moisture determination. Also by agreement between seller and buyer the above information may also be recorded indelibly on the bags containing the samples.

B-12 Dispatch of samples - Laboratory samples shall be dispatched as soon as possible and only in exceptional circumstances more than 48 hrs after sampling has been completed non business days excluded.

B-13 Sampling report - If a sampling report is prepared besides giving the usual information it shall make reference to the condition of the grain sample including signs of insect infestation visible in the warehouse or silo or during working the vessel or other carrier. This infestation is not always readily apparent in the sample except on close inspection or sieving. The report shall also refer to the technique applied if this is other than that described in this Bangladesh Standard and all the circumstances that may have influence sampling.

Annex-B (1)

Sampling scheme for consignments of more than 100 bags

For consignments larger than 100 bags the number of bags to be sampled is approximately the square root of the number of bags in the consignments. The consignment shall be mentally divided into a number of groups each including a number n of bags corresponding with the square root of the number of bags in the consignment (rounded upwards). For size N of 101.....10,000 bags the number n of bags forming one group is indicated in table 3. For each of these groups one bag shall be selected at random for sampling.

If there is a remainder after dividing the consignment into a number n of bags one bag from this remainder shall also be taken for sampling.

In order to be sure that in the groups the sampler obtains a division at random of the bags to be sampled, it is recommended that he notes the number 1..... n and each time crosses out one number before choosing out of the group of n bags and sampling the bag that corresponds with this number.

Example: The consignment contains 200 bags (N) for N equal to 197....225, the size n of each group equals 15 bags. Note the numbers 1, 2, 3,.....14,15. Cross out one number for example 7. Take from the first group of 15 bags the seventh bag and sample it. Cross out another number for example 3. Take from the second group of 15 bags the third bag and sample it. Continue in this way until 13 groups of 15 bags (a total of 195 bags) have been sampled. The remaining group is smaller than 15 bags (a total of 195 bags) have been sampled. The remaining group is smaller than 15 bags still take one bag at random out of it. A total of 14 bags ($= n-1$) has therefore been sampled out of a consignment of 200 bags.

TABLE 3 SAMPLING SCHEME FOR CONSIGNMENTS OF MORE THAN 100 BAGS
N= Number of bags in consignment; n= Number of bags in group

N	n	N	n
101 - 121	11	3026 - 3136	56
122 - 144	12	3137 - 3249	57
145 - 169	13	3250 - 3364	58
170 - 196	14	3365 - 3481	59
197 - 225	15	3482 - 3600	60
226 - 256	16	3601 - 3721	61
257 - 289	17	3722 - 3844	62
290 - 324	18	3845 - 3969	63
325 - 361	19	3970 - 4096	64
362 - 400	20	4097 - 4225	65
401 - 441	21	4226 - 4356	66
442 - 484	22	4357 - 4489	67
485 - 529	23	4490 - 4624	68
530 - 576	24	4625 - 4761	69
577 - 625	25	4762 - 4900	70
626 - 676	26	4901 - 5041	71
677 - 729	27	5042 - 5184	72
730 - 784	28	5185 - 5329	73
785 - 841	29	5330 - 5476	74
842 - 900	30	5477 - 5625	75
901 - 961	31	5626 - 5776	76
962 - 1024	32	5777 - 5929	77
1025 - 1089	33	5930 - 6084	78
1090 - 1156	34	6085 - 6241	79
1157 - 1225	35	6242 - 6400	80
1226 - 1296	36	6401 - 6561	81
1297 - 1369	37	6562 - 6724	82
1370 - 1444	38	6725 - 6889	83
1445 - 1521	39	6890 - 7056	84
1522 - 1600	40	7057 - 7225	85
1601 - 1681	41	7226 - 7396	86
1682 - 1764	42	7397 - 7569	87
1765 - 1849	43	7570 - 7744	88
1850 - 1936	44	7745 - 7921	89
1937 - 2025	45	7922 - 8100	90
2026 - 2116	46	8101 - 8281	91
2117 - 2209	47	8282 - 8464	92
2210 - 2304	48	8465 - 8649	93
2305 - 2401	49	8650 - 8836	94
2402 - 2500	50	8837 - 9025	95
2501 - 2601	51	9026 - 9216	96
2602 - 2704	52	9217 - 9409	97
2705 - 2809	53	9410 - 9604	98
2810 - 2916	54	9605 - 9801	99
2917 - 3025	55	9802 - 10000	100

For consignments larger than 10000 bags n equals the square root of N rounded upwards.

ANNEX-C
(Clause 9.2)
ANALYSIS OF FORTIFIED RICE

C-1 Definition:

For the purpose of this standard the following definitions apply.

C-1.1 Original sample: A representative portion of the laboratory sample

C-1.2 Test sample: Portion of sample used for a specific test.

C-2 Paddy and foreign matter.

C-2.1 Basis of determination: Original sample.

C-2.2 Obtaining test sample: Divide the laboratory sample using a sample divider to obtain a test sample of 1000 ± 1 g.

C-2.3 Weighing accuracy: Use a balance that is accurate to at least 1 g for weighing test sample and 0.1 g for weighing separated paddy and foreign matter.

C-2.4 Method of determination: Handpicking.

C-2.5 Procedure: remove all paddy kernels and foreign matters from test sample. Count number of paddy kernels and express result as number of paddy grains per 1000 g.

Weigh foreign matters to nearest 0.1 gm and express result as per cent. Preserve the sample portion free from paddy and foreign matter for other determinations and call it as "secondary sample."

C-3 Moisture.

C-3.1 Basis of determination: Secondary sample.

C-3.2 Obtaining test sample: Divide the secondary sample as mentioned at 2.5 using a sample divider to obtain a test sample of not less than 50 g. Then proceed as per appendix A-3.

C-4 Head rice, big broken and small broken.

C-4.1 Basis of determination: Secondary sample.

C-4.2 Obtaining test sample: Divide the secondary sample using a sample divider to obtain a test sample of not less than 25 g.

C-4.3 Weighing accuracy: Use a balance that is accurate to at least 0.01 g.

C-4.4 Method of determination: Handpicking.

C-4.5 Procedure - Handpicking and separate head rice, big broken, broken and small broken from test sample. Express result of each factor as percentage of test sample at C-4.2. Preserve head rice for determination of degree of milling.

C-5 Chalky/immature grains and damaged grains.

C-5.1 Basis of determination - Secondary sample.

C-5.2 Obtaining test sample - Divide the secondary sample using a sample divider to obtain a test sample of not less than 25mg.

C-5.3 Weighing accuracy - Use a balance that is accurate to at least 0.01 g.

C-5.4 Method of determination - Hand picking.

C-5.5 Procedure - Separate chalky /immature grain or damaged grains from the test sample and express result as percentage.

C-6 Contrasting varieties

C-6.1 Basis of determination - Secondary sample.

C-6.2 Obtaining test sample - Divide the secondary sample using a sample divider and obtain a portion of about 30g. Separate all broken from this portion and divide the whole grain portion to obtain a test sample of not less than 15g.

C-6.3 Weighing accuracy - Use a balance that is accurate to at least 0.01g.

C-6.4 Method of determination - Handpicking.

C-6.5 Procedure - Separate contrasting varieties from the test sample and express result as percentage.

C-7 Degree of milling

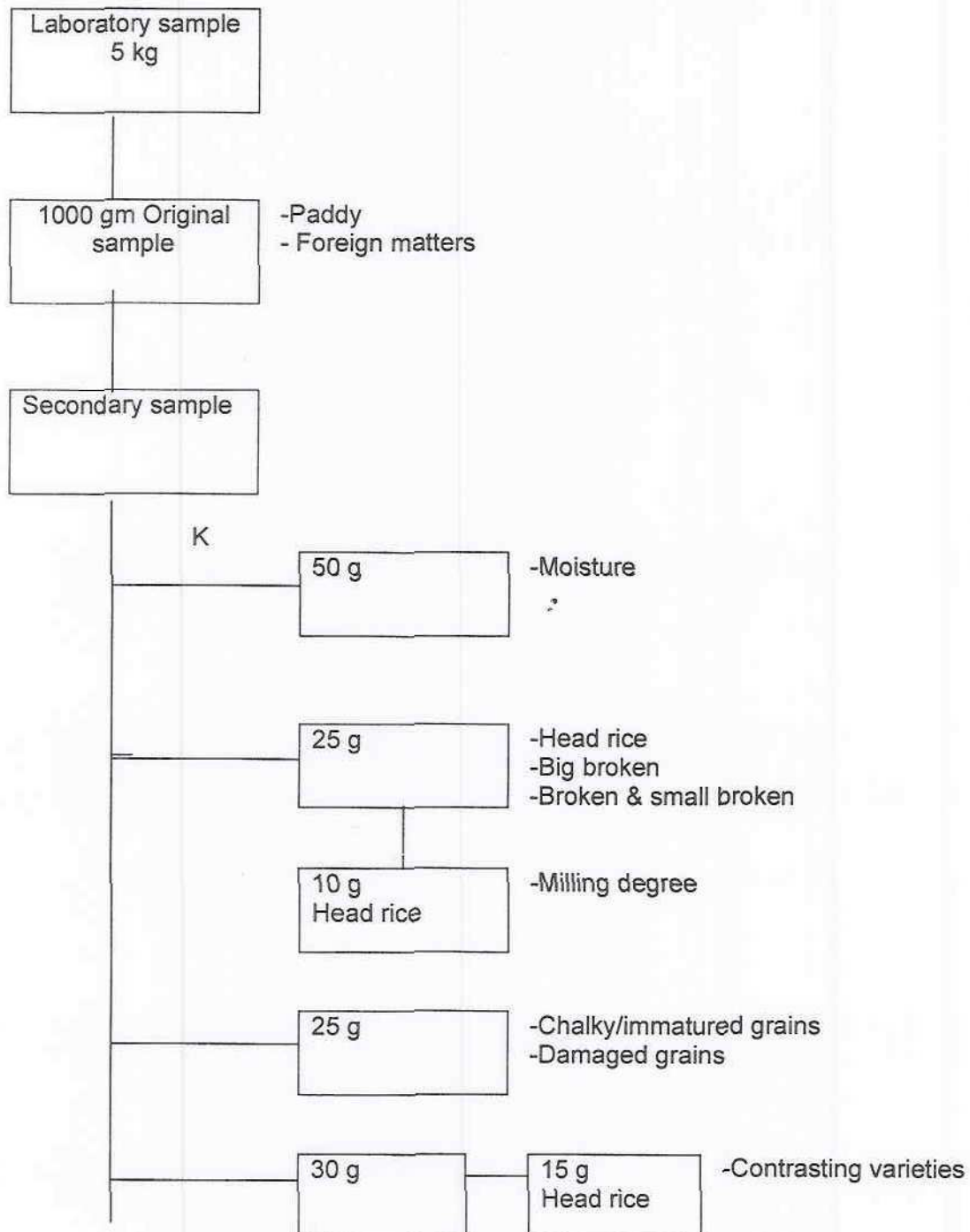
C-7.1 Basis of determination - Head rice

C-7.2 Obtaining test sample: Divide the head rice portion as mentioned at C-4.5 using a sample divider to obtain a test sample of not less than 10g.

C-7.3 Method of determination - Handpicking.

C-7.4 Procedure: Separate husked rice under milled rice and medium milled rice from the test sample as defined in clause 4. Count the number of grains in each portion calculate percentage and categorize as reasonably well milled rice, well milled rice and extra well milled rice.

ANALYSIS OF FORTIFIED RICE (BREAKDOWN)



ANNEX - D

Classification of Common Commercial Rice Varieties of Bangladesh

Sl. No.	Variety	Size	Shape
1.	Jhingashail	Long	Fine
2.	Latashail	Long	Fine
3.	Bribalam (BR 7)	Long	Fine
4.	Shahibalam (BR 16)	Long	Fine
5.	IR -28 (BR 6)	Long	Fine
6.	IR -8	Long	Medium
7.	Kataribhog	Medium	Fine
8.	Joshua	Medium	Fine
9.	Mohini (BR 15)	Medium	Fine
10.	Progoti (BR 10)	Medium	Fine
11.	Chandina (BR 1)	Medium	Medium
12.	Brishail (BR 4)	Medium	Medium
13.	Mukta (BR 11)	Medium	Medium
14.	Banshful	Short	Coarse
15.	Tepi Hai	Short	Coarse

Annex- E

[Table 1, item (xi)]

DETERMINATION OF BLENDING QUALITY OF FORTIFIED RICE

E-1 APPARATUS

E-1.1 UV Lamp - 9 Watt, approximately 360 nm or UV tester: e.g. Professional Money Detector

E-1.2 Digital Pocket Balance - 100 g or 200 g $\pm$ 0.01 g accuracy or Chemical balance having accuracy of $\pm$ 0.01 g

E-2 PROCEDURE

E-2.1 A representative sample of about 100 g fortified rice to be drawn from the secondary sample using standard divider.

E-2.2 Weigh the sample accurately with digital/chemical balance with accuracy of $\pm$ 0.01 g.

E-2.3 Spread the sample in single layer under UV lamp/tester in single layer in a dark room with emission of 350 – 365 nm and the rice premix kernel will show strong yellow fluorescence and separate those kernels from normal rice and collect. Finally weigh the quantity of rice premix kernels.

E-CALCULATION

Percentage of rice premix kernel in normal rice = $\frac{100 \times (W2 - W)}{(W1 - W2)}$

Where,

W = Weight of the empty dish

W1 = Weight of the dish with working sample

W2 = Weight of the rice premix kernels separated from the working sample along with the dish

APPENDIX-F
(Sub-Clause-2.1)
LIST OF RELEVANT BANGLADESH STANDARDS

BDS No.	Title
103	Methods of rounding off numerical value
822	Code of hygienic conditions for food processing units.
952	Grades on Milled Rice