BELIZE NATIONAL STANDARD

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BELIZE NATIONAL STANDARD
SPECIFICATION FOR WHEAT FLOUR

(First Revision: 2007)

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CENTRAL AMERICA

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BELIZE NATIONAL STANDARD
SPECIFICATION FOR WHEAT FLOUR

Committee Representation

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 Food and Food Related Products, which at the time comprised of the following members:

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TECHNICAL SECRETARY
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0 FOREWORD

0.1 This standard sets out the requirements for wheat flour, and describes the methods of sampling and testing that should be used. Wheat flour is now manufactured in Belize and local supplies have now replaced imports from other countries. As wheat flour is an important nutritional input in domestic cookery, and in institutional or commercial baking as agrees and acceptable level of identity, purity, quality, acceptability, and nutrient value is desirable so that flour can move freely within the region.

0.2 This standard has been adapted from the Caribbean Community Standard for Wheat Flour CCS 0024: 1992

0.3 This standard will be reviewed, and may be revised from time to time to allow for changes in manufacturing technology or consumer preferences in Belize.

0.4 In view of the recent decisions in the FAO/WHO Codex Alimentarius/World Food Standards Programme, the use of potassium bromate as a food additive in wheat flour is not permitted by this standard.

1 SCOPE

1.1 This standard applies to wheat flour (also called flour, white flour, enriched flour) and whole wheat flour that is intended for human consumption, made from clean, sound and marketable grades of millable wheat grains of the species Triticum aestivum L. (common wheat) or from Triticum compactum Host, (club wheat).

1.2 It does not apply to:

(a) any product made from durum wheat (hard wheat, T. durum Desf.);

(b) whole meal flour or semolina made from common wheat or club wheat, or mixtures thereof;

(c) wheat flour to be used in brewing, for the production of starch or gluten, or for non-food use;

(d) wheat flour in which the protein content has been reduced;

(e) wheat flour subjected to special treatments other than bleaching or drying; or

(f) wheat flour containing ingredients not mentioned in Section 4.2 (such as self-raising flour).

2 DEFINITIONS

For the purpose of this standard the following definitions apply:

2.1 **Competent Authority** means a Minister, Ministry, department of government or statutory body in Belize (other than the Belize Bureau of Standards) administering any law regulating the transportation of food and/or food related products.

2.2 **Enriched Wheat Flour** is wheat flour containing vitamins and iron, in the proportions specified in Table 2. Where there is a significant nutritional deficiency of calcium, calcium may be added within the limits specified in Table 2.

2.3 **Food Additive** means any substance, the use of which results in it or its by-products becoming a part of, or affecting the characteristics of the flour.

2.4 **Type** means a description of the end use for which it is recommended, such as “bread”, “cake”, “pastry”, “cookie”, “biscuit”, “general purpose”, or “all purpose”.

2.5 **Wheat Flour** is the product prepared from grains of common wheat (Triticum aestivum L.) or club wheat (T.compactum Host.) or mixtures of these two species by grinding or milling processes in which the bran and germ are partly removed and the rest of the grain is comminuted to a suitable degree of fineness and which may contain any of the ingredients and foods additives listed in Section 4.2, 4.3, and 5.

3 GENERAL REQUIREMENTS

3.1 The wheat from which the flour is milled shall be of sound and marketable quality and, as far as is possible in good manufacturing practice, free from any foreign matter.

3.2 Any added ingredients shall be clean, safe and of grades of identity and quality that are recognized as suitable for use in foods.

3.3 Food additives shall conform to recognized specifications of identity, purity, and safety, such as those issued by the FAO/WHO Joint Expert Committee on Food Additives.

3.4 All processing in the mill, including drying, and milling of the wheat, handling of the intermediate products, and other treatments of the wheat flour, shall be done so that there are minimal adverse effects on the nutritive value and useful technological characteristics of the flour.

3.5 As far as is possible in good manufacturing practice, wheat flour shall be free from any objectionable matter, micro-organisms and substances originating from micro-organisms, in amounts that may reasonably be considered to represent a hazard to health.

3.6 The particle size of wheat flour should be such that not less than 98% by mass of the flour will pass through a 212 milli-micron (No. 70) sieve.

3.7 The particle size of whole wheat flour should be such that not less than 98% by mass of the flour will pass through a 841 milli-micron (No. 20) sieve.

4 SPECIFIC REQUIREMENTS

4.1 Wheat flour shall conform to the requirements of column 2 of Table 1 when tested for the characteristics in column 1 by the methods indicated in column 3.

TABLE 1
(Section 4.1)

(1)	(2)	(3)
Characteristic	**Requirement**	**Method of test**
Moisture	Not more than 14.5%	Appendix A
Ash, before adding Inorganic matter*	Not more than 1.2%(wheat flour) Not more than 1.9% (whole wheat flour)	Appendix B
Protein (N x 5.7)	Not less than 7.0% on a dry basis	Appendix C

*Refers to 14% Moisture Basis

4.2 **Requirements for Nutrients and Minerals**

The vitamins and minerals mentioned in Column 1 of Table 2 shall be present in wheat flour as specified in Column 2.

TABLE 2 (Section 4.2)

(1) **Substance**	(2) **Requirements**
Thiamine	6.2 mg/Kg (ppm)
Riboflavin	4.2 mg/Kg (ppm)
Niacin, niacinamide	55 mg/Kg (ppm)
Iron	55 mg/Kg (ppm)
Calcium (optional)	Not less than 110 mg and Not more than 140 mg/100 g
Folic Acid	1.8 mg/Kg (ppm)

4.3 Wheat flour may contain the following ingredients in amounts necessary for technological purposes:

(a) malted wheat flour;

b) malted barley flour;

(c) malted rye flour;

(d) wheat gluten;

(e) the following enzymes:

(i) amylase;
(ii) bromelain;
(iii) glucoamylase;
(iv) lactase;
(v) lipoxidase;
(vi) protease; and
(vii) xylanase.

(f) L-cysteine, as hydrochloride, not more than 90 ppm;

(g) calcium carbonate, calcium sulphate, ground limestone, ground chalk, in amounts needed to conform to the requirements of Table

2 for calcium (if added);

(h) ascorbic acid, not more than 200 ppm; and

(j) monocalcium phosphate, not more than 2500 ppm.

5 FOOD ADDITIVES WHICH MAY BE USED

5.1 The following food additives may be used in wheat flour, within the limits specified or, where no limits are stated, in accordance with good manufacturing practices:

(a) acetone peroxide

(b) ammonium chloride, not more than 2000 ppm;

(c) ammonium persulphate, not more than 250 ppm;

(d) benzoyl peroxide, not more than 150 ppm combined with not more than 900 ppm of one or more of the following as carriers:-
calcium carbonate, calcium sulphate,
dicalcium or tricalcium phosphate,
magnesium carbonate, starch,
potassium or sodium aluminum sulphate;

(e) chlorine;

(f) chlorine dioxide;

(g) lecithin, not more than 200 ppm;

(h) sulphur dioxide (in flours intended for use in making biscuits or pastry), not more than 200 ppm; and

(j) azodicarbonamide, not more than 45 ppm.

6 CONTAMINANTS - LIMITS

6.1 Wheat flour shall not contain the following elements in amounts that exceed the limits specified in column 2:

(1)	(2)
Arsenic (As)	1 ppm;
Copper (Cu)	20 ppm;

Lead	(Pb)	2 ppm;
Zinc	(Zn)	50 ppm.

6.2 Where wheat grain used in the production of wheat flour is fumigated to destroy or control infestations by insects, mites, moulds, or rodents, the residues of pesticides in the flour shall not exceed those set by the Codex Committee on Pesticide Residues.

7 HYGIENE

7.1 Flour shall be manufactured, packaged, transported and stored in accordance with codes of hygienic practice that are approved by the competent authority.

7.2 Particular attention shall be given to the prevention of contamination of the wheat and other ingredients, materials in process, equipment, or packaging materials by dirt, mould, birds, insects, mites, and other vermin.

7.3 Proper housekeeping and sanitation practices shall be followed in the storage, milling, packaging, and warehousing sections of the plant.

7.4 The employees shall be trained to follow proper sanitation practices and to maintain their personal cleanliness, and shall be provided with the appropriate clothing, toilet, first aid, changing and other facilities that are necessary.

8 PACKAGING REQUIREMENTS

8.1 Wheat flour shall be packed in containers, which will safeguard the hygienic, nutritional, and technological characteristics of the flour, and protect it against contamination.

8.2 Containers shall be made of materials, which are safe and suitable for the purpose, such as bags or sacks of new cotton cloth, multi-wall paper, strong paper, polypropylene fibre, or plastic film.

8.3 Containers shall not contaminate the product by migration of any toxic substance, or give the flour any undesirable odour or flavour.

9 LABELLING REQUIREMENTS

9.1 The labelling on retail packages of flour shall be in the English Language, clearly and prominently displayed, and readily legible under customary conditions of purchase and use. Information presented in other languages shall be clearly separated from that in English.

9.2 The information carried on the label shall include:

(a) the name of the food, “flour”, “wheat flour”, “white flour” or “whole
wheat flour”;

(b) any brand name or trade name;

(c) the name of the manufacturer or of the person controlling the brand name or trade name, together with an adequate postal address;

(d) the name of the country of origin;

(e) the average net contents of each package when packed in terms of units of mass in grams (g) or kilograms (kg), (which may also be shown in avoirdupois pounds and ounces) using Arabic numerals;

(f) where the vitamins and minerals mentioned in Table 2 are present in the flour, the amount of each present in 100 g of flour (at 14% moisture content) shall be declared, expressed in milligrams (mg), and the flour may be described as “enriched”, or “vitamin enriched”, and as “calcium enriched” if the level of calcium is in accordance with Table 2 and represents 16.6 percent of the Recommended Daily Allowance set by the Caribbean Food and Nutrition Institute;

(g) a list of ingredients in descending order of their proportion by weight; the additives mentioned in Section 5.0 may be described as bleaching agents, or as flour improvers;

(h) the batch number, date of manufacture or date of packaging, declared in code or uncoded, together with a date of minimum durability (expressed as “Best before end 1993-12" or “Use before end 1993-12"); and

(j) storage instructions, in close proximity to the date marking.

9.3 When an indication of the type of flour is included on the label, the protein and ash contents of the flour shall be within the limits set out in Table 3.

TABLE 3

Type of Flour	Protein Content*	Ash Content*
All purpose, General Purpose	10.5 to 12.0 %	up to 0.7%
Biscuit	8.0 to 9.0 %	up to 0.45 %
Bread	12.0 to 13.5 %	up to 0.75 %
Cake, Pastry	7.0 to 10.0 %	up to 0.45 %
Whole Wheat Flour	12.0 to 14.5 %	1.3 to 1.9 %

*Refers to 14% Moisture Basis

9.4 Instructions for use may also be included on the label.

10 QUALITY ASSURANCE

10.1 To be eligible for a licence to use to the Belize Standard Mark, the manufacturer of wheat flour shall operate a quality assurance system conforming to the general requirements of ISO 9001-2000 – Quality Management Systems-Requirements, using adequate staff, sampling procedures and testing equipment, as approved by the Belize Bureau of Standards.

10.2 An approved quality assurance system may include sampling or test procedures suited to routine or continuous production that differ from those mentioned in Sections 11 and 12.

10.3 It is recommended that wheat flour be produced under an approved quality assurance system.

11 METHODS OF SAMPLING

11.1 The methods of sampling which should be used will depend on whether the wheat flour is:

(a) in a consignment of retail packages (up to 25 kg) in a shipment or

in a warehouse;

(b) in bulk packages (over 25 kg, in a freight container or road or rail tanker); and

(c) discharged in a stream from a bulk container, or in production in the mill in a stream moving towards the final packaging operation.

The following methods are recommended; they are based on methods published by ISO and AOAC.

11.2 **Sampling From a Consignment in Retail Package**

11.2.1 Where a consignment is known to consist of wheat flour packaged from different manufacturing batches which can be separated, each batch shall constitute one lot.

11.2.2 Where it appears that the lot or consignment includes packages that have been damaged or contaminated during transport, handling, or storage, these shall be kept separate and sampled separately. Samples of such unsound material shall not be mixed with samples from the sound material. Samples shall be taken from packages with clean, polished, pointed metallic triers, and placed in sample containers that are clean, dry and free from odours which have stood open for some minutes near the place where the flour is to be sampled. Containers shall be capable of being sealed air-tight and moisture-tight, and may be made of glass, metal, or plastic having no action on the flour.

11.2.3 The number of packages to be sampled will depend on the size of the lot, according to Table 4.

11.2.4 Samples shall be taken as follows:

(a) from the top, middle, and bottom thirds of each package and then combined, or

(b) from one top corner to the centre of the package diagonally, and from the other top corner diagonally to half the distance to the centre of the package, and combined;

(c) the combined cores form a “bag sample”;

(d) a bag sample shall be at least 100 g;

(e) each package shall be re-sealed after sampling; and

(f) bag samples shall be properly labelled showing the date and place of sampling, the shipment, and the name of sampler, and shall be delivered to a laboratory as soon as possible.

TABLE 4
(Section 11.2.4)

Number of Packages to be samples in a Lot

Number of Packages in Lot (N)	**Number to be sampled** (n)
1 to 10	all
10 to 100	10, taken at random
101 and over	The whole number* Nearest to the square root of N, taken at random or using a sampling plan.

*For example, if N = 150, n = 12; if N = 200,

n = 15; if N = 300, n = 18; if N = 400, n = 20.

11.2.6 A bulk sample shall be prepared in the laboratory by combining all the bag samples and thoroughly mixing them.

11.2.7 The bulk sample may be reduced in size by quartering to give laboratory samples that are large enough to perform in duplicate the tests specified in **Table 1**, and any other tests requested; laboratory samples shall be stored in clean dry air-tight and moisture-tight containers that are properly labelled with all relevant information.

11.2.8 In cases of dispute, the bulk sample may be divided into three laboratory samples, one for each party, and one to be kept for reference.

11.3 **Sampling from bulk containers, freight containers, and tank trucks.**

11.3.1 This should be done on loading or unloading the flour using the procedures recommended in **ISO 6644:2002 – "**Flowing Cereals and Milled Cereal Products – Automatic

Sampling by Mechanical Means.

11.4 **Sampling during production**

11.4.1 Samples may be taken from flour moving through the plant before packaging, using hand scoops or automatic sampling methods such as those recommended in **ISO 13690:1999**, " Cereals and Milled Cereal Products – Sampling of Static Batches".

12 METHODS OF TEST

12.1 The test methods described in Appendices A, B, C and D shall be used to determine whether a sample from a consignment of wheat flour conforms to the requirements of **Table 1.**

12.2 The methods in the Appendices should also be used in the routine quality assurance, but other methods, which are rapid and of equal or comparable accuracy may be used.

12.3 Methods for the determination of the levels of thiamine, riboflavin, niacin, niacinamide, iron, calcium, or for traces of arsenic, copper, lead and zinc are not included in this standard. If it is necessary to verify by analysis the proportions of these substances in wheat flour, analytical methods published by the following organizations should be used:

(a) Association of Official Analytical Chemists (AOAC), Washington, DC, USA;

(b) International Association of Cereal Science and Technology (ICC), Schwechat, Austria;

(c) International Union of Pure and Applied Chemistry (IUPAC), Oxford, UK; and

(d) American Association of Cereal Chemists (AACC).

12.4 In the absence of any method published by any of these organizations, another
method of test or analysis may be used provided that its accuracy, reproducibility, and reliability have been demonstrated by collaborative tests conducted by laboratories having extensive experience in the subject.

13 CONFORMITY

13.1 A lot or consignment sampled as in Section 11 shall be deemed to conform

to

this standard if the test results for each characteristic satisfy the requirements of **Table 1**, and if inspection shows that the labelling of the retail packages used to pack the flour is in accordance with Section 9.0, and if test reports on samples taken from the plant within the previous six months show that the requirements of **Table 2** have been met.

13.2 Wheat flour produced under an approved quality assurance system shall be deemed to conform to this standard if:

(a) test results from routine samples taken from production satisfy the requirements of **Table 1**; and either

(b) test results from samples taken at intervals of not more than six months satisfy the requirements of **Table 2**; or

(c) records of the production and information of the wheat flour and of the use of vitamins and minerals therein show that the requirements of **Table 2** are satisfied;

(d) there is adequate evidence on file by certification of manufactures or suppliers of ingredients and food additives that the requirements of Sections 3.2 and 3.3 are satisfied; and

(e) test results from samples of flour taken at intervals of not more than six months satisfy the requirements of Section 6.1 for the levels of arsenic, copper, lead and zinc in the flour.

APPENDIX A
Determination of Moisture Content

A.1 PRINCIPLE

A sample of flour is dried to constant mass at 130-133ºC.

A.2 APPARATUS

The usual laboratory apparatus, including: -

(a) analytical balance, weighing to 1 mg;

(b) desiccator, containing an effective desiccant such as ignited calcium oxide;

(c) metal dish, diameter about 50-60 mm, depth about 15 mm with a close-fitting cover, which will not corrode in the conditions of the test; and

(d) oven, controlled to a constant temperature between 130 and135ºC, with ventilation.

A.3 **PROCEDURE**

(a) the metal dish with its cover is previously heated to 100^{o}C and cooled in the desiccator, and is weighed when at room temperature to the nearest 1 mg;

(b) approximately 5 g of the laboratory sample (Section 11.2.7) is introduced into the dish, covered, and weighed to the nearest 1 mg;

(c) the dish, cover, and sample are placed in the oven, the sample is uncovered, and left for 90 minutes at 130-135ºC;

(d) the dish is then covered, rapidly removed from the oven, and placed in the desiccator to cool to room temperature; and

(e) the dish, cover, and sample are then weighed to the nearest 1 mg soon after reaching room temperature.

A.4 **CALCULATION**

The percentage moisture content is given by:

moisture % = 100 x $(M_2 - M_3)/(M_2 - M_1)$

Where: M_1 = mass of dish and cover

M_2 = mass of dish, cover, and sample

M_3 = mass of dish, cover, and dried sample.

NOTE: The above methods is equivalent to AOAC (1984) 14.004 and ISO 712 - 1985

APPENDIX B
Determination of Ash Content

B.1 **PRINCIPLE**

The sample of flour is ignited at 550^{o}C.

B.2 **APPARATUS**

The usual laboratory apparatus, including:-

(a) analytical balance, weighing to 1 mg;

(b) desiccator, containing an effective desiccant;

(c) dish of fused silica, to hold 5 g of flour; and

(d) furnace, capable of maintaining a temperature of 550 + 5^{o}C.

B.3 **PROCEDURE**

(a) the dish is first heated in the furnace to 550^{o}C for 10 minutes, then let cool in the desiccator to room temperature and weighed to the nearest 1 mg (M_1);

(b) approximately 3 to 5 g of the laboratory sample of flour (Section 11.2.7) is immediately placed in the dish and weighed to the nearest 1 mg (M_2); and

(c) the dish and sample are ignited in the furnace at 500^{0}C until grey ash is obtained, then they are removed and let cool in the desiccator to room temperature, and weighed to the nearest 1 mg (M_3).

B.4 **CALCULATION**

The percentage ash content is given by:

$$\text{ash } \% = 100 \times (M_2 - M_3) / (M_2 - M_1)$$

Where,

M_1 = mass of dish

M_2 = mass of dish and sample

M_3 = mass of dish and ashed sample.

APPENDIX C
DETERMINATION OF PROTEIN

C.1 **PRINCIPLE**

The percentage of nitrogen in the flour is determined and the protein content is calculated as 5.7 x % N.

C.2 **APPARATUS**

The usual laboratory apparatus, including: -

(a) Kjeldahl flasks, 600 - 800 mL capacity, of thick well-annealed glass;

(b) Kjeldahl distillation apparatus with a scrubber or trap to catch caustic soda spray, and exit from condenser dipping in a receiver containing acid; and

(c) Heating device for Kjeldahl flask, capable of heating 250 ml of water to 100^{o}C from 25 ^{o}C about 5 minutes.

C.3 **REAGENTS**

(a) Methyl red indicator, 1 mg methyl red in 200 mL ethanol;

(b) Potassium sulphate or anhydrous sodium sulphate, N-free;

(c) Mercuric oxide, N-free (or metallic mercury);

(d) Sodium hydroxide pellets, N-free (may be used as an aqueous solution, 450 g in one litre);

(e) Sulphuric acid, 93 - 98%, N-free;

(f) Standard sodium hydroxide solution, 0.1 N or 0.5 N;

(g) Standard hydrochloric or sulphuric acid solution 0.1 N or 0.5 N;

(h) Sodium thiosulphate solution, 80 g sodium thiosulphate in 1 litre; and

(j) Zinc granules.

C.4 **PROCEDURE**

(a) Place about 2.0 - 2.5 g of flour, accurately weighed, in a Kjeldahl flash, add 0.7 g mercuric oxide or 0.65 g metallic mercury, 15 g of potassium sulphate or sodium sulphate, and 30 ml of strong sulphuric acid, and heat in an inclined position until frothing has ended (froth may be controlled by adding a small amount of paraffin), and then boil for about 120 minutes;

(b) Let the flask cool, and then add 200 ml of water, and cool again to room temperature, add 25 ml of thiosulphate solution, and mix to precipitate mercury, then a few of the zinc granules to prevent bumping;

(c) Tilt the flask and carefully add a layer of sodium hydroxide without

shaking (use about 15 g of solid sodium hydroxide or equivalent in solution for 10 ml of sulphuric acid added in step (a) (above), and immediately connect the flask to the scrubber and condenser, then mix contents;

(d) The end of the condenser is positioned dipping below the surface of 30 - 35 ml of standard acid, accurately measured into the receiver, with 5-7 drops of methyl red;

(e) The flask is heated until all the ammonia has distilled over (about 150 ml of distillate) into the receiver, then the condenser is removed after washing the end into the receiver, and the excess of standard acid in the distillate is titrated with the standard sodium hydroxide solution; and

(f) A blank titration is done on the reagents used as above.

C.5 CALCULATION

The percentage of nitrogen in the flour is given by:

$$\% N = \frac{(B - T) \times N - soda \times 1.4007}{\text{Mass of sample}}$$

where B = number of ml of standard sodium hydroxide used in blank titration;

T = number of ml of standard sodium hydroxide used in titration in determination;

N - soda = normality of the standard sodium hydroxide solution.

The percentage of protein in the flour is 5.7 x % N.