

ICS 67.060

DMS 30:2023

Fourth edition

DRAFT MALAWI STANDARD

Fortified wheat flour – Specification

NOTE: This is a draft proposal and it shall neither be used nor regarded as a Malawi Standard

Fortified wheat flour – Specification

Obtainable from the
Malawi Bureau of Standards
Ali Hassan Mwinyi Road
P O Box 946
BLANTYRE

Tel: +265 1 870 488
Fax: +265 1 870 756
E-mail: mbs@mbsmw.org
Web-site: www.mbsmw.org

Price based on 8 pages

© Copyright reserved

TABLE OF CONTENTS

Contents	page
Foreword.....	ii
Technical committee.....	ii
Notice.....	ii
Scope.....	1
Normative references.....	1
Terms and definitions.....	2
Essential composition and quality factors.....	3
Fortification requirements.....	5
Food additives.....	7
Hygiene.....	7
Contaminants.....	7
Packaging.....	7
Labelling.....	7
Sampling and methods of analysis.....	8

FOREWORD

This draft Malawi standard was prepared by MBS/TC 19, the Technical Committee on *Bread and confectioneries*, to provide requirements for fortified wheat flour. This draft proposal is the revision of MS 30:2011, *fortified wheat flour – Specification*.

This draft Malawi standard is based on the following African standards:

African standard, ARS 470:2023, *Wheat flour – Specification*; and

African standard, ARS 860:2014, *Fortified wheat flour – Specification*.

Acknowledgement is made for the use of the information.

TECHNICAL COMMITTEE

This draft Malawi standard was prepared by MBS/TC 19, the Technical Committee on *Bread and confectioneries*, and the following companies, organizations and institutions were consulted:

Bakelines Limited;

Bakeman's Confectioneries Limited;

Bakhresa Malawi;

Blantyre City Council;

Bread Talk;

Bvumbwe Agricultural Research Station;

Competition and Fair Trading Commission;

Consumers Association of Malawi;

H.M.S Food and Grains Limited;

International Potato Centre Malawi;

Kachere Bakery;

Lilongwe University of Agriculture and Natural Resources;

Malawi University of Business and Applied Sciences;

Mega Bakers;

Ministry of Health – Department of Nutrition, HIV and AIDS;

Ministry of Trade and Industry;

National Fortification Alliance;

Rab Processors;

Shoprite Trading Limited;

Tehilah Bakery;

University of Malawi; and

Universal Industries.

NOTICE

This standard shall be reviewed every five years, or earlier whenever it is necessary, in order to keep abreast of progress. Comments are welcome and shall be considered when the standard is being reviewed.

DRAFT MALAWI STANDARD

Fortified wheat flour – Specification

1 SCOPE

This draft Malawi standard specifies the requirements, test methods and sampling for fortified wheat flour prepared from common wheat (*Triticum aestivum* L.) or club wheat (*Triticum compactum* Host), or their mixtures intended for human consumption.

2 NORMATIVE REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this draft proposal. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of the standard, parties to agreements based on this draft Malawi standard are encouraged to take steps to ensure the use of the most recent editions of the standards indicated below. Information on currently valid national and international standards can be obtained from the Malawi Bureau of Standards.

MS 19: *Labelling of prepacked foods – General standard;*

MS 21: *Food and food processing units – Code of hygienic conditions;*

MS 55: *Wheat grain – Specification;*

MS 144: *Agricultural food products – Determination crude fibre content – General method;*

MS 145: *Cereals and cereal products – Sampling;*

MS 149: *Cereals, pulses and derived products – Determination of ash content;*

MS 188: *Edible salt – Specification;*

MS 237: *Food additives – General standard;*

MS 302: *Contaminants and toxins in food and feed – General standard;*

MS 624: *Nutrition labelling – Guidelines;*

MS 625: *Nutrition claims – General standard;*

ISO 1871: *Food and feed products – General guidelines for the determination of nitrogen by the Kjeldahl method;*

ISO 4833: *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of microorganisms – Colony-count technique at 30 degrees C;*

ISO 6540: *Maize – Determination of moisture content (on milled grains and on whole grains);*

ISO 6579: *Microbiology of food and animal feeding stuffs – Horizontal method for the detection of Salmonella spp;*

ISO 6888 (all parts): *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of coagulase-positive staphylococci (Staphylococcus aureus and other species);*

ISO 16050: *Foodstuffs – Determination of aflatoxin B1, and the total content of aflatoxins B1, B2, G1 and G2 in cereals, nuts and derived products – High-performance liquid chromatographic method;*

ISO 16649-2: *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of beta-glucuronidase-positive Escherichia coli – Part 2: Colony-count technique at 44 degrees C using 5-bromo-4-chloro-3-indolyl beta-D-glucuronide;*

ISO 21527-2: *Microbiology of food and animal feeding stuffs – Horizontal method for the enumeration of yeasts and moulds – Part 2: Colony count technique in products with water activity less than or equal to 0.95; and*

ISO 2591-1: *Test sieving – Part 1: Methods using test sieves of woven wire cloth and perforated metal plate.*

3 TERMS AND DEFINITIONS

For the purposes of this draft Malawi standard, the following terms and definitions shall apply:

3.1

fortified wheat flour

product prepared from common wheat grain (*Triticum aestivum L.*) or club wheat (*Triticum compactum Host*) or their mixtures by grinding or milling process to which nutrients have been added in accordance with this draft proposal

3.2

white wheat flour

patent wheat flour

obtained by milling wheat grains at extraction rates that leaves negligible amounts of bran

3.3

bakers flour

white wheat flour obtained by milling wheat intended for bread making

3.4

household or home baking flour

product prepared from common wheat grain (*Triticum aestivum L.*) or club wheat (*Triticum compactum Host*) or their mixtures by grinding or milling process

3.5

biscuit flour

white wheat flour obtained by milling a blend of hard and soft wheat with a high percentage of soft wheat for biscuit manufacture

3.6

cracker flour

white wheat flour obtained by milling low protein wheat with no improvers

3.7

self-raising flour

white wheat flour obtained by milling a blend of soft and hard wheat to which raising agents are added

3.8

standard flour

wheat flour obtained by milling wheat grains at a higher extraction than home baking flour

3.9

soft wheat

wheat with low gluten content, and a soft, floury endosperm ratio of not less than 70 % mass fraction; in general, it is suitable for cake, biscuit, and low-volume breads

3.10

hard wheat

wheat with kernels having a high hardness criterion

3.11

wholemeal flour

wheat flour obtained by milling the entire wheat grain to fine particle size without any separation

3.12

atta flour

wheat flour of high extraction rate or white wheat flour to which pollard and or bran are blended

3.13

food grade packaging material

material which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product

3.14

foreign matter

organic or inorganic material other than wheat flour

3.15

diluent

a suitable, inert food-grade carrier for micronutrients

3.16

fortificant

Prescribed compound which provides the specified micronutrient

3.17

premix

Blend of fortificants and diluents formulated to provide specified and determinable amounts of micronutrients

4 ESSENTIAL COMPOSITION AND QUALITY FACTORS

4.1 Ingredients

4.1.1 Wheat grain complying with MS 55.

4.1.2 In addition to the ingredient given in **4.1**, self-raising flour shall contain the following:

4.1.2.1 Edible salt conforming to MS 188

4.1.2.2 Acid ingredients

The acid ingredients shall be one or any combination of the following:

- a) Sodium acid pyrophosphate;
- b) Mono acid calcium phosphate;
- c) Sodium aluminium phosphate; and
- d) Sodium bicarbonate shall be in sufficient amounts to provide not less than 0.45 of available carbon dioxide.

4.2 General quality requirements

4.2.1 All types of fortified wheat flour shall have the characteristic colour and shall be free from any objectionable flavours and odours.

4.2.2 The flour shall be free from insects, worms, fungal infestation, rodent contamination and other foreign matter.

4.2.3 The flour shall not contain flour from other cereals. However, the addition of malted barley flour not exceeding 1 % is permissible in the case of baker's flour.

4.2.4 All processing of the wheat including drying, milling or other treatment of wheat, intermediate milling products and the milled wheat flour shall be carried out in a manner that:

- a) Minimizes loss of nutritive value particularly protein quality;
- b) Avoids undesirable changes in technological properties of the wheat flour; and
- c) Avoids having unground grains and hull in wheat flour.

4.3 Specific compositional requirements

The types of fortified wheat flour shall comply with the specific requirements given in **Table 1** when tested in accordance with the test methods specified therein.

Table 1 – Specific compositional requirements for fortified wheat flour

Characteristic	Type of flour									Test Method
	White wheat flour	Baker's flour	Home baking flour	Biscuit flour	Cracker flour	Self-raising flour	Standard flour	Atta flour	Whole-meal flour	
Moisture content, max. %, m/m	14	14	14	14	14	14	14	14	14	ISO 6540
Crude fibre content max. % m/mon dry matter basis	1.0	1.0	1.0	1.0	1.0	1.0	1.5	2.0	2.0	ISO 5498
Total ash content max. % m/m on dry matter basis	0.7	0.8	0.8	0.8	0.8	3.0	1.1	2.0	2.0	MS 149
Residue on sieving through 180 micron sieve, max. %	0.5	0.8	0.8	0.8	0.8	0.8	30.0	55.0	30.0	ISO 2591-1
Protein content, min. %, m/m on dry matter basis	8.0	11.0	9.0	8.0	8.0	8.0	11.0	12.0	12.0	ISO 1871
Mixture of Acid ingredients and sodium bicarbonate added, max. %, m/m	N/A	N/A	N/A	N/A	N/A	4.5	N/A	N/A	N/A	N/A

4.4 Microbiological limits

Fortified wheat flour shall be free from pathogenic micro-organisms and shall conform to the microbiological limits in **Table 2**.

Table 2 – Microbiological limits for fortified wheat flour

S/N	Microorganism	Limit	Test method
1	Total plate count, cfu/g, max.	10 ⁵	ISO 4833
2	<i>Staphylococcus aureus</i> cfu/g max.	10 ²	ISO 6888
3	<i>Escherichia coli</i> , MPN, max	Absent	ISO 16649-2
4	<i>Salmonella</i> , per 25 g, max	Absent	ISO 6579
5	Yeasts and moulds, cfu/g, max.	10 ⁴	ISO 21527-2
6	Coliforms g (per 100g)	Absent	ISO 4832
7	Bacillus cereus, per 25g max.	Absent	ISO 7932

5 FORTIFICATION REQUIREMENTS

5.1 Required content of vitamins and minerals in fortified wheat flour

Fortified wheat flour shall contain vitamins and minerals at the levels specified in **Table 3**. These levels shall be applied during production of wheat flour and for imported wheat flour.

Note: Factories should aim at fortifying the products at the recommended factory level to ensure the product conforms to the regulatory levels throughout the distribution chain.

5.2 Fortificants

All fortificants shall be of acceptable standard and conform to the following standards: United States Pharmacopoeia (USP), British Pharmacopoeia (BP), Food Chemical Codex (FCC), Merck Index (MI), United States National Formulary (NF), European Pharmacopoeia (Ph Eur) and Codex Alimentarius Commission (CAC).

Table 3 – Fortification requirements at production and during importation

Nutrient	Fortification compound	Factory addition level mg/kg	Tolerable range at factory or site of import (mg/kg)		
			Minimum	Average	Maximum
Iron	Ferrous fumarate	40 ± 10	30	40	50
	NaFeEDTA	30 ± 10	20	30	40
Vitamin B ₁₂	Vitamin B12 0.1 % WS	0.02 ± 0.009	0.011	0.020	0.029
Vitamin B ₂	Riboflavin	6.6 ± 3.0	3.6	6.6	9.6
Vitamin B ₁	Thiamine mononitrate	9.8 ± 4.4	5.4	9.8	14.2
Vitamin B ₉ (Folate)	Folic Acid	2.3 ± 1.0	1.3	2.3	3.3
Zinc	Zinc oxide	80 ± 20	60.0	88.0	116.0
Vitamin A	Retinyl Palmitate	1.0 ± 0.4	0.6	1.0	1.4
Vitamin B ₃ (Niacin)	Niacinamide	60 ± 27	33	60.0	87

Table 4 – Fortification requirements during marketing

Nutrient	Fortification compound	Amount (mg/kg)		Label claim (mg per 100g)
		Minimum	Maximum	
Iron	Ferrous fumarate	30	50	4.0
	NaFeDTA	20	40	3.0
Vitamin B ₁₂	Vit B-12 0.1 % WS	0.011	0.029	0.002
Vitamin B ₂	Riboflavin	3.6	9.6	0.6
Vitamin B ₁	Thiamine mononitrate	5.4	14.2	0.9
Vitamin B ₉	Folic acid	1.1	3.3	0.2
Zinc	Zinc oxide	60	116	8.8
Vitamin A	Retinyl Palmitate 250,000 IU/g (dry)	0.5	1.4	0.1
Vitamin B ₃	Niacinamide	30	87	5.8

5.3 Premix

5.3.1 The fortificants may be mixed with diluents or carrier as appropriate to form a premix. Diluents or carriers shall conform to USP, BP, Ph. Eur, NF, MI, FAO/WHO CAC or FCC.

5.3.2 The premix shall be made in such a way that at a given rate of addition to the product, the product shall conform to the requirements in **Table 3** and **4**.

5.3.4 Where the premix is made using ferrous fumarate as a source of iron, the addition rate shall be 500 g of premix per metric tonne of wheat flour. Where the premix is made using NaFeEDTA, the addition rate shall be 600 g of premix per metric tonne of wheat flour.

5.3.5 The premix shall be labelled with the addition rate (that is the amount of premix to be added to the wheat flour) in grams of premix per metric tonne of wheat flour and dilution factor.

Note: This premix formulation in **Table 5** is designed with minimum nutrient composition and does not take into consideration factory overages in the preparations of the premix.

Table 5 – Specification of fortification premix formulation

Nutrient	Fortification compound	Amount of fortificant in premix, g/kg	Amount of nutrient in premix, g/kg
Iron	Ferrous fumarate	250.0	80
	NaFeDTA	461.5	60
Vitamin B ₁₂	Vit B-12 0.1 % WS	40	0.04
Vitamin B ₂	Riboflavin	12.0	12.0
Vitamin B ₁	Thiamine mononitrate (Activity 81 % min)	22.2	18
Vitamin B ₉	Folic acid (activity 100% min)	4.4	4
Vitamin B ₃	Niacinamide (Activity 99% min)	101.0	100
Vitamin B ₆	Pyridoxine (activity 82 %, min)	14.6	12
Zinc	Zinc oxide (Activity 80% min)	93.8	75
Vitamin A	Vitamin A ¹ Palmitate Spray Dried or equivalent (0.075 % retinol,min)	26.7	2

Vitamin A shall be added in the form of stabilized Vitamin A palmitate that has been spray dried or any equivalent form, containing 75,000 micrograms RE² activity per gram (0.075 % min). The vitamin A palmitate shall have storage stability such that no more than 20 % of its original activity will be lost when stored for 21 days at 45 °C in a well closed container at a level 2.5kg in wheat flour having moisture content in the range of 13.5 % to 14.5 %

Note: Diluent shall make up the premix to 1kg when either ferrous fumarate or NaFeEDTA is used.

² Retinol Equivalent (RE) = 1 microgram retinol = 3.33 IU

6 FOOD ADDITIVES

Only those food additives listed under this product in MS 237, may be used and only within the limits specified.

7 HYGIENE

Fortified wheat flour shall be manufactured in premises complying with the hygienic practices stipulated in MS 21.

8 CONTAMINANTS

8.1 Heavy metals

Fortified wheat flour shall comply with the maximum levels for contaminants that are specified for the product in MS 302.

8.2 Pesticide residues

Fortified wheat flour shall comply with those maximum residue limits in the latest database established by the Codex Alimentarius Commission.

8.3 Mycotoxins

Fortified wheat flour shall comply with those maximum mycotoxin limits in the latest database established by the Codex Alimentarius Commission.

9 PACKAGING

9.1 Fortified wheat flour shall be packaged in containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product.

9.2 The containers, including packaging material, shall be food grade.

9.3 When the product is packaged in sacks, these shall be clean, sturdy and strongly sewn or sealed.

10 LABELLING

10.1 Labelling of retail packages

In addition to the requirements of MS 19, MS 624 and MS 625, each package shall be legibly and indelibly marked with the following:

- a) Product name as "Fortified wheat flour";
- b) Type of wheat flour;
- c) Name, address and physical location of the manufacturer/ packer/importer;
- d) Lot/batch/code number;
- e) Net weight, in kg;
- f) The declaration "Food for human consumption";
- g) Storage instruction as "Store in a cool dry place away from any contaminants";
- h) Date of manufacture;

- i) Best before date;
- j) Instructions on disposal of used package;
- k) Country of origin; and
- g) The names and the amount of the nutrients added.

10.2 Labelling of non-retail packages

Information for non-retail containers shall either be given on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

11 SAMPLING AND METHODS OF ANALYSIS

11.1 Sampling

11.1.1 Sampling for food fortification.

Sampling shall be in accordance with international provision of AOAC and the ECSA manual for monitoring of wheat flour fortified with vitamins and minerals.

11.1.2 Sampling for physical and chemical requirements and microbiological limits

Sampling shall be in accordance with MS 145.

11.2 Methods of analysis

11.2.1 Methods of analysis for vitamins and minerals

Determination of the quantity of vitamins and minerals in fortified wheat flour shall be undertaken in accordance with the ECSA manual of laboratory methods for fortified foods.

11.2.2 Methods of analysis for microbiological limits

Determination of the microbiological limits in fortified wheat flour shall be undertaken in accordance with AOAC.

11.2.3 Methods of analysis for physical and chemical requirements

The methods of test shall be in accordance with the methods declared in this draft proposal or any other equivalent methods.

THE MALAWI BUREAU OF STANDARDS

The Malawi Bureau of Standards is the standardizing body in Malawi under the aegis of the Ministry of Trade and Industry. Set up in 1972 by the Malawi Bureau of Standards Act (Cap: 51:02), the Bureau is a parastatal body whose activities aim at formulating and promoting the general adoption of standards relating to structures, commodities, materials, practices, operations and from time to time revise, alter and amend the same to incorporate advanced technology.

CERTIFICATION MARK SCHEME

To bring the advantages of standardization within the reach of the common consumer, the Bureau operates a Certification Mark Scheme. Under this scheme, manufacturers who produce goods that conform to national standards are granted permits to use the Bureau's "Mark of Quality" depicted below on their products. This Mark gives confidence to the consumer of the commodity's reliability.

