

**LOW EXTRACTION FORTIFIED BAKERY WHEAT FLOUR**

**Specification**

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**Committee for technical regulation and metrology  
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(Gosstandard)**

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## **Introduction**

### **1 DEVELOPED AND ISSUED by:**

LLP «PO Kazakh Academy of Nutrition»:

Committee of Consumer Protection, Ministry of National Economy, Kazakhstan:

Department of medical care organization, Ministry of Health and Social Development, Kazakhstan:

Union of Grain Processors of Kazakhstan:

RSE "Kazakhstani Institute of Standardization and Certification", Kazakhstan:

### **2 APPROVED AND EFFECTIVE by:** The order

**3** This standard implements the provisions of Law of RK: «On technical regulation» dd. November 09, 2004 № 603-II, Technical Regulations of Customs Union (TR CU): «On safety of food products (TR CU 021/2011), «On safety of grain» (TR CU 015/2011), «On safety of package» (005/2011), « Food products in terms of their labeling» (TR CU 022/2011).

### **4 TERM OF FIRST INSPECTION INSPECTION FREQUENCY**

### **5 FIRST ISSUE**

Information about changes to this standard shall be published in the annually issued information index "Normative documents on standardization", and the text changes and amendments - in a monthly published information signs "National Standards". In case of revision (replacement) or cancellation of the standard will be published a notice in the information index "National Standards"

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# NATIONAL STANDARD OF THE REPUBLIC OF KAZAKHSTAN

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## LOW EXTRACTION FORTIFIED BAKERY WHEAT FLOUR

### 1 Application area

This standard applies to the fortified bakery wheat flour (hereinafter – fortified flour) produced from low extraction flour (refined or fine grinding,  $\leq 80\%$  of wheat flour) according to ST RK 1482 or GOST 26574, and fortified with vitamin-mineral premix or pre-mixture based on it, and intended for the production of bread, bakery, pastry and culinary products.

### 2 Regulatory references

To apply this standard are required the following regulatory references:

ST RK GOST R 51301-2005 Food products and food stock. Stripping voltammetry methods for determination of toxic elements (cadmium, lead, copper and zinc).

ST RK GOST R 51962–2005 Food products and food stock. Stripping voltammetry methods for determination of mass concentration of arsenic.

ST RK 1482 - 2005 Wheat flour. General specification.

GOST 4403-91 Sieve cloth of silk and synthetic thread. General specification.

GOST 9404-88 Flour and bran. Method of determination of moisture content.

GOST 8.579-2002 State system for ensuring the uniformity of measurements. Requirements to the number of packed goods in packages of any type in their manufacture, packaging, sale and import.

GOST 20239-74 Flour, groats and bran. Method of determination of metal magnetic admixture.

GOST 24297-2013 Verification of purchased products. Organization and methods of control.

GOST 26361-84 Flour. Method of determination of whiteness.

GOST 26574-85 Bread wheat flour. Specifications.

GOST 26791-89 Products of grain processing. Packing, labeling, transportation and storage.

GOST 26927-86 Food stock and products. Method of determination of mercury.

GOST 26928-86 Food products. Method of determination of iron.

GOST 26929-94 Food stock and products. Sample preparation. Mineralization for determination of toxic elements.

GOST 26930-86 Food stock and products. Method of determination of arsenic.

GOST 26932-86 Food stock and products. Method of determination of lead.

GOST 26933-86 Food stock and products. Method of determination of cadmium.

GOST 27493-87 Flour and bran. Method of acidity determination from washmill.

GOST 27494-84 Flour and bran. Method of ash content determination.

GOST 27495-87 Flour. Method of determination of autolytic activity.

GOST 27558-87 Flour and bran. Methods of determination of color, odor, taste and crunch.

GOST 27559-87 Flour and bran. Method of determination of grain products pests contamination and infestation.

GOST 27560-87 Flour and bran. Method of determination of flour grain.

GOST 27668-88 Flour and bran. Acceptance and sampling methods.

GOST 27669-88 Bread wheat flour. Method of test laboratory bread making.

GOST 27676-88 Grain and its products. Method of determination of falling number.

GOST 27839-88 Wheat flour. Method of determination of quantity and quality of gluten.

GOST 28795-90 (ISO 5530-4-83) Wheat flour. Physical properties of dough. Rheometric tests by alveograph

GOST 28796-90 (ISO 5531-78) Determination of wet gluten content.

GOST 30090-93 Bags and bag cloth. General specifications.

GOST 30178-96 Food stock and products. Atomic absorption method of determination of toxic elements.

GOST 30538-97 Food products. Methods of determination of toxic elements by atomic emission method.

GOST R 51766–2001 Food stock and products. Atomic absorption method of determination of arsenic.

NOTE: Using this standard it is advisable to check validity of reference standards and classifiers in annually published reference index «Regulatory standardization documents» as of the current year and according to appropriate monthly published reference indexes published in current year. If the reference document is replaced (amended), so using this standard it is advisable to be guided by the replacing (amended) document. If the reference document is cancelled without replacement, so the provision containing the reference on it shall be applied in part not affecting this reference.

### 3 Technical requirements

3.1 The fortified flour shall meet the requirements of this standard TR TS 021/2011 and be produced according to the recipe and process instruction in compliance with requirements [2] and sanitary norms and regulations approved in established procedure ST RK 1081.

#### 3.2 Characteristics

3.2.1 Wheat used for production of fortified flour shall comply with requirements of GOST ГОСТ 9353.

3.2.2 Wheat for milling shall comply with requirements given in table 1.

**Table 1**

Grain parameter	The acceptable level, %, not more than
The content of barley, rye grains and sprouted grains of these crops and wheat (in aggregate) including:	5.0
Sprouted grain	3.0
Corn cockle	0.1
Extraneous matters:	
Ergot	0.05
Creeping bitterling, <i>Sophora alopecuroides</i> , thermopsis lancet (in aggregate), including creeping bitterling and multicolored coronilla (in aggregate)	0.1
Coronilla	0.1
<i>Heliotropium dasycarpum</i>	0.1
<i>Trichodesma incanum</i>	Shall be absent
Smut grain (dirty, blue-eyed mold corn)	10.0
<i>Fusarium</i> grain	1.0
Note: Content of sprouted grain shall be determined on analysis results before treatment.	

3.2.3 Requirements to organoleptic and physical and chemical parameters of fortified flour are shown in table 2.

**Table 2**

Parameter	Description and standard
Color	White or white with cream shade, or white with yellow shade
Taste	Common to the wheat flour, without other tastes, not sour, not bitter
Odor	Common to the wheat flour, without other odors, not stale*
Moisture content, %, maximum	15.5
Presence of mineral impurities	No crunch by chewing
Metal magnetic admixture, mg per 1 kg of flour; size of individual particles in maximum linear dimension 0.3 mm and/or weight of no more than 0.4 mg, maximum	3.0**
Grain products pests contamination (insects, mites)	Shall be absent
Grain products pests contamination (insects, mites), total contamination density	Shall be absent
Contamination of bread with potato disease agents (36 hours after test laboratory baking)	Shall be absent
Weight ratio of vitamins and minerals, mg/kg:	
B <sub>12</sub> (given background value)	0.002-0.006
B <sub>9</sub> (given background value)	0.7-1.9
B <sub>1</sub> (given background value)	1.5-4.1
B <sub>2</sub> (given background value)	2.0-5.2
B <sub>3</sub> (given background value)	11.0-29.0
Mass content of iron (given background value): NaFeEDTA	16.0-32.0
Mass content of zinc (given background value)	26.0-50.0
Qualitative reaction of iron content	positive
* the fortified flour may have a faint smell of vitamins and additives; Note- Moisture content in fortified flour for long storage shall not exceed 14.5%.	

3.2.4 The fortified flour shall meet the quality requirements specified in the table 3.

**Table 3**

Parameter	Description and standard
Ash content on dry matter, %, no more than	0,55-0,75

Parameter	Description and standard	
Whiteness, conventional units of RZ-BPL device, not less than	36,0-55,0	
Weight fraction of wet gluten, %, not less than	28,0-30,0	
Wet gluten quality, s.u. of IDK device	Not lower than II group	
Fineness of grind,%, no more than: - Residue on sieve, on GOST 4403, no more than	5 of silk fabric №43 or polyamide fabric №45/50 PA or 2 of silk fabric №35 or polyamide fabric number 36/40 PA	
- Passage through a sieve on GOST 4403	-	- Passage through a sieve on GOST 4403
Falling number, «FN», s, not less than	185	
<p>Note:</p> <p>1. Parameter “whiteness” replaces the parameter “ash content” on mills equipped with laboratory devices and machinery according to GOST 26361.</p> <p>2. Parameter “Falling number” – FN is determined according to GOST ГОСТ 27676, upon customer’s request.</p> <p>3. To determine the grain of flour is allowable to use other mesh with equivalent sieving capacity.</p>		

3.2.5 In terms of content of toxic elements, pesticides, mycotoxins and of microbiological parameters the fortified flour shall not exceed levels permitted by requirements [2].

3.2.6 Quantity of vitamins and microelements added to the fortified flour shall be monitored in the production process by laying, in accordance with formula regulating the weight of premix or pre-mixture to be added per unit mass of the flour stream to be fortified.

### 3.3 Requirements to the raw materials

3.3.1 The primary products of domestic and foreign production used for manufacturing of fortified flour shall:

- comply with requirements of regulations in the sphere of technical regulations, sanitary rules, standards, other regulations approved in established order, as well as with purchasing contracts for imported products;
- be authorized for use by the authorized body in the sphere of sanitary and epidemiological welfare.

3.3.2 For production of fortified flour use the following primary products:

- wheat flour of first and supreme grades according to the GOST 26574;
- vitamin and mineral premixes.

3.3.3 When manufacturing the fortified flour for export the list of vitamins and minerals for fortification and rates of their application shall be agreed in supply contracts and can be accompanied by indication and name of standard or other regulation of the importing country.

### 3.4 Package

3.4.1 Packaging and materials of domestic and foreign production used for packing the fortified flour shall comply with requirements [1], regulating and technical documents establishing

possibility of their contact with food products, provide safety and appearance of products by transportation and storage, and approved for use by authorized body in established order.

3.4.2 Packing the flour – according to GOST 26791.

3.4.3 Bags – according to GOST 30090.

3.4.4 Deviations of net weight of each packing unit from nominal amount shall not exceed regulations of GOST 8.579.

3.4.5 Transport containers shall be clean, dry, without any odors.

### **3.5 Labeling**

3.5.1 The bags, packs and labels inserted into package shall be labeled according to the requirements of [3]:

- products name;
- name and location of manufacturer (legal address including country, and if not match the legal address – address of the mill) and organization in the Republic of Kazakhstan authorized by manufacturer to accept claims of consumers on its territory (if any);
- trade mark (if any);
- net weight (g, kg);
- information of ingredients in decreasing order by weight or percentage;
- manufacturing date and expiry date;
- storage conditions;
- nutrition and energy value;
- batch numbers (if any);
- bar code (if any);
- standard marks;
- common commercialization mark for countries members of Customs Union.

3.5.2 Additionally the following labeling is required:

- large print the word “fortified”;
- standard logo of fortified products approved in established order, attachment B [4];
- registered trade name of the premix or pre-mixture (if any) used for flour fortification, and the regulating document according to which they have been produced.

3.5.3 The multipack shall be labeled with details listed above, and additionally indicate the number of consumer packages.

3.5.4 Transport labeling according to GOST 14192.

3.5.5 Information may be placed in one or several point convenient for reading. The information can be applied by any method and shall be clear and easy to read.

3.5.6 Text and labels shall be applied in state and Russian languages or in customer’s language according to the contract.

### **4 Acceptance procedure**

4.1 Acceptance procedure according to GOST 27668.

4.2 The primary products used for production of fortified flour are controlled by incoming inspection according to GOST 24297.

4.3 Organoleptic, and physical and chemical parameters, packing and labeling shall be monitored in each batch.

4.4 The toxic elements, pesticides, mycotoxins and microbiological parameters shall be monitored in accordance with the order established by manufacturer in agreement with the authority of sanitary and epidemiological welfare.

4.5 Control and monitoring frequency for content of all vitamins and minerals to be added to the fortified flour shall be performed one a year in duly accredited test laboratories (centers).



For monitoring take an average sample of at least 500 g combining and thoroughly mixing single samples taken each 2 hours within at least one shift.

4.6 In case of unsatisfied results of tests at least by one parameter take a double sampling and perform all tests again. The results of the last test apply to the entire batch and are final.

4.7 Arbitration analysis in the event of differences in quality assessment shall be made in duly accredited centers (test laboratories).

4.8 Confirmation tests of compliance and assessment of compliance confirmation shall be performed in accordance with requirements of the State technical regulation system of the Customs Union.

## **5 Monitoring methods**

5.1 Sampling and sample preparation according to GOST 27668.

5.2 Determination of organoleptic parameters according to GOST 27558. In case of discrepancies in quality assessment of the flour in terms of organoleptic parameters (odor, taste, mineral impurities) they shall be determined by tasting the bread baked from this flour.

5.3 Determination of harmful impurities, sprouted grain and rye and barley impurities in the wheat according to GOST 30483 (by acceptance of grain).

5.4 Determination of moisture content in flour according to GOST 9404.

5.5 Determination of flour grain according to GOST 27560.

5.6 Determination of ash w/w in the flour according to GOST 27494.

5.7 Determination of quality and quantity of gluten according to ST RK 1054 and GOST 27839, determination of wet gluten by export according to GOST 28796 (ISO 5531).

5.8 Determination of whiteness according to GOST 26361.

5.9 Determination of falling number according to GOST 27676.

5.10 Determination of metal magnetic admixture according to GOST 20239.

5.11 Determination of grain products pests contamination and infestation according to GOST 27559.

5.12 Determination of acidity according to GOST 27493.

5.13 Determination of volume yield of bread, shape stability and organoleptic parameters of bread according to GOST 27669.

5.14 Determination of toxic elements:

– mercury according to GOST 26927;

– arsenic according to GOST 26930, GOST R 51766, ST RK GOST R 51962;

– lead according to GOST 26932, GOST 30178, ST RK GOST R 51301;

– cadmium according to GOST 26933, GOST 30178, ST RK GOST R 51301;

as well as according to GOST 30538 or methods approved by authorities in established order.

5.15 Determination of pesticides, mycotoxins according to methods approved by authorities in established order.

5.16 Determination of mass content of fortificants (vitamins, iron and zinc) in fortified flour according to GOST 29138, GOST 29139, GOST 29140, GOST 26928, GOST 26934 and methods approved in established order. Quality reaction for presence of iron – according to methods specified in attachment B.

5.17 Acidity of flour, autolytic activity and physical properties according to GOST 27493, GOST 27495, GOST 28795.

## **6 Transportation and storage**

6.1 Transportation and storage according to GOST 26791.

6.2 The fortified flour may be transported by all means of transport in accordance with freight regulations applicable for relative transport, by presence of duly executed sanitary passport.

6.3 The fortified flour shall be stored in dry place, under temperature not higher than 25<sup>0</sup>C and average humidity not more than 70%, without direct sunlight.

**7 Manufacturer's guarantees**

7.1 Manufacturer guarantees the compliance of the fortified flour with requirements of this standard, if the consumer observes the storage and transportation requirements.

7.2 Shelf Life **12 months** from the date of production.

**Attachment A**  
*(reference)*

Nutrient and energy value of the fortified flour per 100 g of product

<b>Proteins, g</b>	<b>Fat, g</b>	<b>Carbohydrates, g</b>	<b>Energy value</b>
10.3-10.6	1.1-1.3	68.9-67.6	334-331 kcal 1398-1385 kJ

## Attachment – B

### QUALITATIVE METHODS OF DETERMINATION OF IRON IN FLOUR

#### A. PRINCIPLE

Ferric iron in acidic media reacts with potassium thiocyanate solution (KSCN) and forms the insoluble red color. Other types of iron like ferrous and elemental iron can also react similarly with oxidizing to ferric iron by means of hydrogen peroxide. Presence of electrolyte or reduced iron can be determined visually by placing a magnet in the flour sample and drawing of iron particles to it. Ferrous iron can be identified by creating insoluble light-blue color called Turnbull's blue or Berlin blue by reaction with ferrocyanide. Reaction occurs very quickly with ferrous sulfate, but can be slow or even not occur with ferrous fumarate due to low solubility of this salt in water. Reaction can also occur with electrolyte iron after oxidation of iron to  $Fe^{2+}$ , but the rate of reaction is very low.

#### B. MATERIALS

- Filter Whatman paper № 1
- Hand sieve
- Watch glass

#### C. REAGENTS

- 2N HCl Hydrochloric acid solution. In 200 ml flask add 100 ml of distilled water. Then slowly add 17 ml of concentrated HCl, then add 83 ml of water.
- Hydrochloric acid solution- 0.003N (HCl). In 1 liter volumetric flask add 600 ml of distilled water, add 1.5 ml of 12N HCl- and make to volume with distilled water.
- Potassium thiocyanate -10%. Dissolve 10 g of KSCN in 100 ml of water. Before use mix 10 ml of this solution with 10 ml of 2N HCl.
- Hydrogen peroxide ( $H_2O_2$ ) - 3% (required if the fortification is being made with elemental iron). In 50 ml flask add 5 ml of concentrated 30%  $H_2O_2$  and make to volume of 45 ml with distilled water. To prepare daily, discard after finished tests.
- Potassium ferricyanide -10%. Dissolve 10 g of  $K_3Fe(CN)_6$  in 100 ml of water. Before use mix 10 ml of this solution with 10 ml of 0.003N HCl.

#### D. PROCEDURE

##### a. Determination of iron in samples containing elemental iron (electrolyte, reduced iron and other)

1. Take a magnet and put it into 1 kg flour sample.
2. Move the magnet inside the sample, and then remove it.
3. The presence of electrolyte or reduced iron is confirmed by presence of small particles of iron on the magnet.

##### b. Determination of iron in samples containing NaFeEDTA

1. Place the filter paper on a watch glass.
2. Wet the paper surface with potassium thiocyanate solution. The liquid shall infiltrate the paper.
3. By means of hand sieve sift a portion of flour sample so that a thin flour level cover the wet filter paper, remove the excessive flour.
4. Add to the flour surface the acidic solution of potassium thiocyanate, wait a few minutes until reaction.
5. Red spots indicate the presence of iron salt, particularly NaFeEDTA.

**c. Determination of other iron sources including elemental iron**

1. Put the filter paper on the watch glass.
2. Wet the paper surface with potassium thiocyanate solution. The liquid shall infiltrate the paper.
3. By means of hand sieve sift a portion of flour sample so that a thin flour level cover the wet filter paper, remove the excessive flour.
4. Over the flour add a few of acidic potassium thiocyanate solution, wait for some minutes.
5. Add a small quantity of  $H_2O_2$  solution, wait a few minutes until reaction (formation of iron (III)).
6. Red spots indicate the presence of added iron. (Note: If the result for electrolyte or reduced iron is negative in tests with magnet, so more likely is added the iron in form of ferrous salt).

**d. Demonstration of presence of ferrous salt (mainly ferrous sulfate)**

1. Place the filter paper on the watch glass.
2. Wet the surface of filter paper with potassium ferrocyanide solution-10% and 0.003 N-HCl. The liquid shall infiltrate the filter paper.
3. By means of hand sieve sift a portion of flour sample so that a thin flour level cover the wet filter paper, remove the excessive flour.
4. Add a few of acidic solution of potassium ferrocyanide over the flour.
5. Allow to stay a few minutes until reaction. Rapid reaction with clearly visible spots (during 2 minutes after addition of ferrocyanide) indicates the presence of ferrous sulfate. Ferrous fumarate and some types of elemental iron also can have this reaction, but slowly (6-7 minutes and more).
6. Elemental forms can be identified by procedure with magnet. For light brown-green spots the reaction for NaFeEDTA is positive.

**E. CLARIFICATION**

Number of spots and their homogenous distribution shows the concentration of iron and homogeneity of sample. For comparative evaluation use samples with known amount of the same type of iron as a control sample.



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## **Attachment D**

*(reference)*

### **REFERENCE LIST**

1. Technical regulation of the Customs Union «On safety of package» (TR CU 005/2011) approved by the Decision of the Customs Union Commission dd. August 16, 2011 № 769.
2. Technical regulation of the Customs Union «On safety of food production» (TR CU 021/2011) approved by the Decision of the Customs Union Commission dd. December 09, 2011 № 880.
3. Technical regulation of the Customs Union «Food products in terms of labeling» (TR CU 022/2011) approved by the Decision of the Customs Union Commission dd. December 09, 2011 № 881.
4. Certificate of trade mark of the Intellectual Property Committee of the Ministry of Justice RK №16162 dd. 12.12.2004 for goods of class 30 on ICGS (flour, baked goods, iodine-treated cooking salt).