

Islamic Republic of Iran  
Iran National Standards Organization

INSO

The 5<sup>th</sup> Revision

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Cereal and cereal products -Wheat -  
Specification & Test methods

ICS:67.060

**In the name of God**  
**Introduction to Iran National Standards Organization**

According to Article 3 of the Law on the Amendment of the Rules and Regulations of the Institute of Standards and Industrial Research of Iran (approved in February 1993) the Institute of Standards and Industrial Research of Iran is the only official authority in the country that is responsible for determining, organising, and publishing national (official) standards of Iran.

The name of the Institute of Standards and Industrial Research of Iran has been changed to the Iran National Standards Organization according to the 152<sup>nd</sup> meeting of the High Administrative Council dated 20 Sep. 2011 and has been communicated in a letter No. 206/35838 dated 16 Oc. 2011 for implementation.

Developing standards are done in various fields under the supervision of technical commissions composed of organization experts, educated experts from scientific, research, production and economic institutes. It is an effort in line with national interests and in accordance with the conditions of production, technology and trade. All these are achieved from the informed and fair participation of the owners of rights and interests, including producers, consumers, exporters and importers, scientific and specialized centres, institutions, governmental and non-governmental organizations. The draft of national standards of Iran will be sent to the interested authorities and members of the relevant technical commissions for further assessment. After receiving comments and suggestions in the National Committee related to that specific field, and if it is approved as a national (official) standard of Iran, it will be printed and published.

Draft of the standards that are prepared by interested and competent institutions and organizations while adhering to the established criteria will be reviewed in the National Committee and, if approved, they will be published as the national standard of Iran. Accordingly, those standards that are prepared based on the provisions written in Iranian National Standard No. 5 and are approved by the National Standard Committee of the Iran National Standards Organization, will be regarded as national standards.

Iran National Standards Organization is one of the main members of the International Organization for Standardization (ISO), International Electrotechnical Commission (IEC) and International Organization of Legal Metrology (Organisation Internationale de Metrologie Legale) (OIML) and serves as the only Contact point of the Codex Alimentarius Commission (CAC) in the country. The latest scientific, technical, and industrial developments in the world as well as international standards are utilized in the preparation of national standards of Iran, while also adhering to general conditions and specific needs of the country.

With the approval of the High Council of Standards, the National Iranian Standards Organization can enforce some of Iran's national standards for domestic products and/or imported items in order to protect consumers and to maintain personal and public health and safety, and to ensure the quality of products as well as environmental and economic considerations while observing the envisaged principles within the law. In order to preserve the international markets for the country's products, the Organization can make the implementation of standard for exported goods and their gradation obligatory.

Also, to assure users of the services of organizations and institutions active in the field of consulting, training, auditing, and issuing certificates of quality management systems and environmental management, laboratories and calibration centers, Iran National Standards Organization evaluates such organizations and institutions based on the criteria of Iran's qualification verification system. If they have the necessary qualifications, they will be awarded a qualification certificate and their performance will be monitored by the Organization.

Other duties of this organization includes the promotion of the International System of Units (SI), calibration of measurement instruments, determination of precious metals, and conducting applied research to improve the level of national standards of Iran are.

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Cereals and its products, Wheat, Characteristics and test methods  
(Fifth Revision)**

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## Introduction

The standard of “cereals and its products - wheat- characteristics and test methods” was first developed in 1965. This standard was revised for the 5<sup>th</sup> time based on the submitted proposals, the assessment of the Iranian National Standards Organization, and the approval of the relevant commissions. It was approved at the 1188<sup>th</sup> meeting of the National Committee on Standardization of Food and Agricultural Products dated 15/10/2012. Based on the paragraph 1 of the amendment of laws and regulations of the Institute of Standards and Industrial Research of Iran, approved in February 1993, now this standard is being published here as the national standard of Iran.

In order to keep up with national and global developments and progresses in the field of industry, science and services, Iran’s national standards will be revised if necessary. Any proposals to amend and complement these standards will be considered when revising the relevant technical commission. Thus, always the latest revision of Iran’s national standards must be referred to.

This standard replaces Iranian National Standard No. 104 in the year 2007.

The resources used in the preparation of this standard are as follow:

1. National Standard of Iran 104: 2007 Wheat - Characteristics and Test Methods
2. Dastmanchi, Farnaz, Study of Characteristics of Imported and Internal Wheat, Standard Research Institute, 2011-2012
3. A Survey of domestic and imported wheat characteristics from 2003 to 2010, Cereal Research Centre, Ministry of Commerce.
4. Study of wheat production characteristics of the country in 2011, Seed and Plant Improvement Institute, Ministry of Agricultural Jihad.
5. GTA(Grain Trade Australia), Wheat Trading Standards , 2011.
6. <http://www.grainscanada.gc.ca>

## Grains and its products – Wheat, Characteristics and test methods

### 1 Purpose

The purpose of this standard is to determine the characteristics, grading, sampling and test methods of wheat.

### 2 Scope of Application

This standard applies to normal wheat (*Triticum aestivum* triticum L.) including domestic and imported products.

### 3 Required References

The following required documents contain the regulations that are referred to in the context of this Iranian National Standard.

Thus, those provisions are part of this Iranian national standard.

If a document is referred while mentioning the date of publication, any subsequent amendments and revisions will not be considered by the national standard of Iran. In case of documents referred to without mentioning the date of publication, the last revision and subsequent amendments are always considered.

The use of the following references is required for this standard.

3-1 Iranian National Standard No. 2705: method of measuring the moisture of cereals and their products - normal method.

3-2 Iranian National Standard No. 13535: method of sampling the grain

3-3 Iranian National Standard of Iran No. 3004: Method of determining the amount of **blackness [bunt?]** (sedimentary method)

3-4 Iranian National Standard No. 3106: Grain and its products - Determination of volume weight of the grain

3-5 Iranian National Standard No. 3736: Cereals and legumes, Detection of hidden insect contamination - Quick method

3-6 Iranian National Standard No. 3985: Cereals and legumes - Fast detection of hidden contamination with **hexapoda** using the method of floating the grain

3-7 Iranian National Standard No. 4175: Measurement of Falling Number

3-8 National Standard No. 7310: Cereals and its products - **Sieves Testing** Cereal Grain-characteristics

3-9 Iranian National Standard No. 13120: Pesticides - Maximum residual boundary of pesticides - Cereals

3-10 Iranian National Standard No. 5925 and a-5925: Human -livestock- Feed **Maximum Tolerance of Mycotoxins**

3-11 Iranian National Standard No. 12968: Human -livestock- Feed, **Maximum Tolerance of Heavy Metals**

3-12 Iranian National Standard No. 3003: Method of measuring wheat pest

3-13 Iranian National Standard No. 6872: Human and Animal Feed - Measurement of Group Aflatoxins B G by **high-efficiency liquid chromatography and purification based on the immunoaffinity column** - Test method



3-14 Iranian National Standard No. 9239: Cereals and its products - Zearalenone measurement by using the method of high-efficiency liquid Chromatography and purification based on the immunoaffinity column - Test Method

3-15 Iranian National Standard No. 9238: Cereals - Determination of the amount of Dioxynivalenol - Purification based on Immunoaffinity column by high-efficiency liquid chromatography - Test Method

3-16 National Standard No. 10215: Cereals and their products - Measurement of nivalenol by using the method of high-efficiency liquid chromatography and purification of solid-phase column- Test Method

#### **4 Terms and Definitions**

In this Standard, the following terms and definitions apply:

4-1

##### **Wheat Grain**

Triticum aestivum is a plant product of the family Graminae.

4-2

##### **Pest**

All alive damage factors such as insects, mammals, fungi, and nematodes (at each growth stage), rodents and birds that reduce the quality and quantity of the product.

4-3

##### **Seeds damaged by pests [or pest- stricken seeds]**

Damaged seeds that are visible without suing any eyewear; and damaged seeds by rodents, insects, ticks, worms and other pests (see Information on Appendix D).

4-4

##### **Drop**

Any factor that reduces the purity and quality of wheat, including useful and non-useful drop.

4-4-1

##### **Useful Drop**

A kind of damage that reduces the wheat quality, this damage includes broken seeds and wrinkles, in a way that the wheat passes thought he sieve with  $20 \times 2$  mm pores, also discoloured seeds at the bud site (embryo), immature, sprouted, insect-stricken and other grains such as barley and rye.

4-4-2

##### **Un-Useful drop**

It is a damage that makes the seed unusable and includes impurities, weed seeds (toxic and non-toxic), poisonous and harmful seeds, blackness [bunt?] in seeds, ergot, damaged by pests (except insect-stricken), mouldy seeds and heated seeds.

4-5

##### **Impurities**

Materials such as rock, dust, sand, straw and culm, remnants of birds, insects, ticks and excrements and other external materials

4-6

##### **Broken seeds**

Wheat grains that can be seen in the endosperm

4-7

##### **Wrinkled Seeds**

Wrinkled wheat grains that pass through the sieve with  $20 \times 2$  mm pores.

4-8

#### **Sprouted seeds**

Wheat in which the embryo is grown and at least the roots can be easily visible.

4-9

#### **Discoloured seeds in bud**

Wheat grain with brown or brown-blackish colour in the husk or the bud part of it (the embryo) and there is no sign of sprouting in them

4-10

#### **Heated seeds**

Wheat grains with a change in the colour of more than half of the grain surface due to the heat

4-11

#### **Mouldy Seeds**

Wheat grains in which the presence of mold is visible.

4-12

#### **Blackened[bunt?] seeds**

Grains of wheat that have deformation and change of colour; and if they are pressed over the shell, black powder comes out of it and if the presence of spores is identified in any of the following fungi:

*Tilletia controversa*, *T. tritici* (= *T. caries*), *T. indica*, *T. laevis* (= *T. foetida*), *Ustilago nuda-tritici*

4-13

#### **Aphis -stricken seeds**

Grains of wheat stung by the **aphis** insect and the presence of a black dot with bright halo is seen it's the appearance, there might be some wrinkles on it as well.

4-14

#### **Weed seeds**

Seeds of unwanted plants except other grain seeds

4-14-1

#### **Non-toxic weed seeds**

Non-toxic seeds are unwanted plants except for grain seeds (see Appendix A).

4-14-2

#### **Poisonous weed seeds**

Poisonous seeds are unwanted plants except for grain seeds (see Appendix B).

4-15

#### **Residue of pesticides**

Any specific substance in food, agricultural products and livestock feed is considered to be as a result of the application of pesticides. It also contains any pesticide derivatives, such as any converted products, substances from dissolution of pesticides and impurities that have toxic features.

4-16

#### **Fungal toxins (mycotoxin)**

Natural toxins derived from the biological activity of some fungi that are created under special conditions.

4-17

#### **Ergot**

*Claviceps purpurea* caused by fungus

4-18

#### **Seeds of other cereals**

Seeds of other cereals such as barley, corn, sorghum, millet, rye, rice, oats, agricultural Avena sativa and triticale

4-19

### **Volumetric weight**

The weight of a given volume of wheat, it usually measures 100 litres per kilogram

It is called hectoliter weight.

4-20

### **Falling number**

It is a criterion for determining the activity of  $\alpha$ -amylase enzyme that is measured by the falling number and with the unit of seconds is shown.

## **5 Features**

### **5-1 Humidity**

The moisture of wheat should not exceed 14%.

### **5-2 Alive pests**

Wheat should not contain any live pests.

### **5-3 Residue of pesticides**

Pesticide residue in wheat should be in accordance with national standard of Iran No. 13120, pesticides - Maximum pesticide residual boundary-

### **5-4 Fungal toxins**

The maximum boundary of fungal toxins should be in accordance with Iranian National Standard No. 5925 and -5925a, "Man and livestock Feed - Maximum tolerance of mycotoxins"

### **5-5 Aphis-stricken**

The rate of **Aphis-stricken** in wheat should not exceed 2% by weight.

### **5-6 Alpha amylase activity**

The minimum falling number ( $\alpha$ -amylase activity) should not be less than 200 seconds.

### **5-7 Heavy metals**

The maximum heavy metals should be in accordance with Iranian national standard No. 12968, "Man and livestock feed – Maximum tolerance of heavy metals"

### **5-8 Other Features**

The other characteristics of wheat should be in accordance with Table 1.

**NOTE** – In case of grade 4 wheat (wheat for livestock and poultry), the rate of **aphis** and activity of alpha-amylase will not be tested.

## **6 Sampling**

Sampling of wheat should be done in accordance with national standard of Iran No. 13535, grain and its products.

## **7 Test Methods**

**7-1** Humidity measurement should be done according to Iranian National Standard No. 2705 2010, the method of measuring the humidity of cereals and its products - the normal method.

**7-2** **Drop measurement** should be in accordance with national standard of Iran No. 3003 Year 2012, **Drop** measurement method should be done on the wheat.

**7-3** Measurement of pests in wheat should be in accordance with national standard of Iran No. 3736 Year 2010, cereals and beans - detection of hidden insect contamination – Fast and

Iranian National Standard Method No. 3985: Year 1997, Cereals and Beans - fast detection of hidden contamination to hexapoda using the method of floating the grain

7-4 while the national standard of Iran is not prepared, the measurement of pesticides should be carried out in accordance with the following method:

BS-EN 15662:2008, Food of plant origin: Determination of pesticide residue using GC-MS and/or LC-MS/MS following acetonitrile extraction/portioning and clean up by dispersive SPE (QuEChERS-Method)

7-5 Measurement of alpha amylase activity should be done based on the national standard of Iran No. 4175 Year, 2007, falling number should be measured.

7-6 Measurement of the volume weight of wheat should be done in accordance with the national standard of Iran No. 3106, 1990, grains and its products- the volume weight of cereals should be determined.

7-7 Measurement of the degree of blackness [bunt?] should be done in accordance with the national standard of Iran No. 3004 Year, 1995, the method of measuring the amount of blackness [bunt?] (sedimentary method) should be performed.

7-8 Measurement of aflatoxin levels should be in accordance with Iranian national standard No. 6872 : Year 2011- Human and livestock feed - Determination of Aflatoxin Group B and G by high-efficiency liquid chromatography and Purification with immunoaffinitis column-test method.

7-9 Measurement of the amount of zearalenone should be in accordance with Iranian National Standard No. 9239: Year, 2011 Cereals and its products- measuring the Zearalenone should be done by high-efficiency liquid chromatography and Purification with Immunoaffinity Column is performed by the test method.

7-10 Measurement of the amount of doxynivalenol should be in accordance with Iranian National Standard No. 9238: Year 2007, Cereals-Determination of Doxynivalenol- Purification by Immunoaffinity Column with Liquid Chromatography high-performance test method should be performed.

7-11 Measurement of the amount of nivalnol should be in accordance with the national standard of Iran No. 10215: year, 2011 Cereals and its products- Nitronol Measurement should be done by high efficiency liquid chromatography and phase column purification Solid, test method should be done.

Table 1 - Other Characteristics of Wheat

Characteristics Grade	Minimum volume weight in kilograms per hectolitre	Maximum <sup>1</sup> Useful Drop					Allowed Maximum Useful Drop	Minimum Un-useful Drop							Percentage of protein based on dry matter	
		Seeds of Other Grains	Broken and Wrinkled Seed	Sprouted Seed	Seed with Discoloured sprout	Insect-stricken Seed (Excluding aphid-stricken)		Weed Seeds		Errot	Seeds with blackness [bunt?]	Mouldy seeds	Heated Seeds	Impurities		
								Non-poisonous Seeds	Poisonous Seeds							
Grade 1	79	2	3	1	1	0.1	5	0.1	0	0	0	0	0	0	1	Minimum 12
Grade 2	76	4	5	2	2	0.2	8	0.5	0.2	0.025	0.05	0.5	0.2	1/5	Minimum 11	
Grade 3	73	7	8	4	3	0.3	12	1	0.3	0.05	0.1	1	1/5	2/5	Minimum 9.5	
Grade 4	60	Minimum 7	Minimum 8	Maximum 10												Maximum 9.5

1. All values for useful and un-useful drop in wheats grade 1 to 3 are maximum.

**Note 1** -Wheat with grade 1,2,3 is for “human” and grade 4 wheat is for “livestock and poultry” feed only.

**Note 2** - The amount of carnal bunt in wheat for all grades of wheat should be zero.

**Note 3** - The characteristics of imported wheat should not be lower than the grade 2 wheat in Table 1.

**NOTE 4** – the amount of aphis-stricken in imported wheat should be zero

**NOTE 5-** The competent authority for the diagnosis of poisonous and non-toxic seeds is the Ministry of Agricultural Jihad, Plant Protection Organization and Institute for Plant Protection.

Appendix A  
Information

List of dominant and non-toxic weeds in Iranian wheat fields  
Table 1 - List of dominant and non-toxic weeds in Iranian wheat fields

*Avena fatua*, *A. ludoviciana*  
*Bromus* spp  
*Cephalaria syriaca*  
*Cirsium arvense*  
*Convolvulus arvensis*  
*Galium tricornutum* *G. apparinae*  
*Glycyrrhiza glabra*  
*Hordeum* spp  
*Lathyrus* spp  
*Lolium persicum*, *L. rigidum*  
*Malva* spp  
*Melilotus indicus*, *Melilotus officinalis*  
*Phalaris minor*  
*Polygonum convolvulus* *P. aviculare*  
*Rapistrum rugosum*  
*Sinapis arvensis*  
*Turgenia latifolia*  
*Vaccaria grandiflora*  
*Veronica persica*  
*Vicia vilosa*

Appendix B  
Information

List of the most common poisonous weeds in wheat fields  
Table B1 List of the Most Common Poisonous Weeds in Wheat Fields

Scientific Term	English Name
<i>Acroptilon repens</i>	Russian Knapweed
<i>Agrostemma githago</i>	Corn - cockle
<i>Cassia occidentalis</i> *	
<i>Cassia obtusifolia</i> *	
<i>Conium maculatum</i> *	Spotted hemlock
<i>Coronilla varia</i>	Crown Vetch
<i>Crotalaria spp.</i> *	Crotalaria
<i>Datura fastuosa</i> *	Downy Thorn-apple Hoary Thorn-apple
<i>Datura stramonium</i>	Jimson weed
<i>Heliotrope spp</i>	Heliotropium
<i>Lolium temulentum</i>	Poison ryegrass, Darnel
<i>Phytolacca americana</i> *	Poke weed
<i>Ricinus communis</i> *	Costor- oil plant
<i>Sesbania macrocarpa</i> *	
<i>Sophora alopecuroides</i>	Stagger bush, Russian Centaury
<i>Sophora pachycarpa</i> *	Siberian Pachycarpa
<i>Thermopsis lanceolata</i> *	False Lupine, Gold Banner
<i>Thermopsis montana</i> *	Buffalo pen
<i>Trichodesma incanum</i> *	
<i>Xanthium strumarium</i> *	Cocklebur

\* Not available in the wheat fields in Iran



Appendix C  
 Information  
 List of Harmful Seeds in Wheat Fields  
 Table C-1 List of Harmful Seeds in Wheat Fields

Scientific Term	English Name
Allium spp	
Cephalaria syriaca	cephalaria
Melampyrum arvense*	Cow-Cockle
Melilotus spp.	Meliolt
Sorghum halepense	Johnson grass
Trigonella foenum – graecum*	Fenugreek

\* Not available in the wheat fields in Iran

Appendix D  
Information

List of larvae and insect and inadmissible ticks of stored grain

Acarus spp.  
Cryptolestes spp.  
Ephestia spp.  
Glycyphagus spp.  
Nemapagon granella L.  
Oryzaeophilus spp.  
Plodia interpunctella Hubn.  
Prostephanus truncatus Hom.  
Rhyzopertha dominica F.  
Rhizositophilus spp.  
Tenebroides mauritanicus L.  
Tribolium spp.  
Trogoderma spp.  
Latheticus oryzae

**Appendix D**  
**Information**

**List of larvae and insect and inadmissible ticks of stored grain**

Acarus spp.  
Cryptolestes spp.  
Ephestia spp.  
Glycyphagus spp.  
Nemapogon granella L.  
Oryzaeophilus spp.  
Plodia interpunctella Hubn.  
Prostephanus truncatus Hom.  
Rhyzopertha dominica F.  
Rhizotritophilus spp.  
Tenebroides mauritanicus L.  
Tribolium spp.  
Trogoderma spp.  
Latheticus oryzae