Technical Specifications for

MAIZE

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1. SCOPE

This specification applies to **Maize** grains purchased by WFP for countries where no specification (international, regional or national standard) of the commodity is required.

2. DEFINITION

Broken grains are all pieces of grains and/or grains which, after elimination of all the other components go through a 4.5mm round hole sieve.

Defective grains include discoloured, germinated, immature/shrivelled, mouldy, pest damaged, rotten& diseased, stained grains, or otherwise materially damaged, which specifically do not include broken grains.

> **Discoloured grains** are all grains materially discoloured by excessive heat, including that caused by excessive respiration (heat damage) and dried damaged grains. Grains may appear darkened, wrinkled, blistered, puffed or swollen, often with discoloured, damaged germs. The seed coat may be peeling or may have peeled off completely, giving grains a checked appearance.
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> **Germinated grains** are those grains showing visible signs of sprouting, such as cracked seed coats through which a sprout has emerged or is just beginning to emerge.
>
> **Immmature/Shriveled grains** are all grains which are underdeveloped, thin and papery in appearance.
>
> **Mouldy grains** are maize with visible mycelial growth on its tip or surface.
>
> **Pest damage grains** are all the grains eaten by insects or rodents**.**
>
> **Rotten& Diseased grains** are grains that are discoloured, swollen, soft and spongy as a result of decomposition by fungi, bacteria or other causes.
>
> **Stained grains** are all pieces of grains and/or grains whose natural colour has been altered by external factors. This includes ground or weather damaged grains which may have darks stains or discolorations with a rough external appearance.

Filth includes impurities of animal origin, excluding dead or live insects.

Foreign matter is all of organic and inorganic materials than maize, broken grains, other grains and filth**.**

Inorganic matter is defined as any inorganic component (stones, dust, ect.)

Organic matter is defined as leaf or cob materials from the maize plant, other vegetable materials such as grass, wood.

Other colour maize is defined as all maize grains whose colour is different than colour of designated maize (Yellow, White and Red) as per follow descriptions:

a/ Yellow maize grains which are yellow and/or light red in colour are considered to be yellow maize. Maize grains which are yellow and dark red in colour, provided the dark red colour covers less than 50% of the surface of the grain, are also considered to be yellow maize.

b/ White maize grains which are white and/or light pink in colour are considered to be white maize. White maize also means maize grains which are white and pink in colour, provided the pink colour covers less than 50% of the surface of the grain.

c/ Red maize grains which are pink and white or dark red and yellow in colour are considered to be red maize, provided the pink or dark red colour covers 50% or more of the surface of the grain.

Other grains are edible grains whole or identifiable brokens, other than maize, (i.e. cereals, pluses and other edible legumes).

3. REFERENCE

Codex Standard for Maize grains (Codex Stan 153-1995, rev. 1-1995).

Department of Agriculture of South Africa_ Regulation relating to the grading packing and marking of maize intended for sale in the republic of South Africa (ATC No.119 of 1990).

East African standard for Maize (ES 2:2005).

Quality control of cereals and pulses. SGS, 2004.

Malawi standard for maize (MBS 32:1998).

4. PRODUCT SPECIFICATION

4.1 General requirements

- Organoleptic: Natural state, smell and colour
- Moisture: **13.5%** w/w max.
- Other colour maize: **5.0%** w/w max.
- Pest damage grains: **3.0%** w/w max.
- Rotten& diseased grains: **4.0%** w/w max.
- Discoloured grains: **1.0%** w/w max.
- Immature/shrivelled grains: **2.0%** w/w max.
- Total defective grain: **5.0%** w/w max.
- Inorganic matter: **0.5%** w/w max.
- Foreign matter: **1.0%** w/w max.
- Other grains: **2.0%** w/w max.
- Filth: **0.1%** w/w max.
- Live insect: **Nil**
- Dead insect: max **10 dead insects** per kg
- Broken grains: **4.0%** w/w max.

If required by recipient country, **Maize** needs to be obtained from non-genetically modified varieties.

4.2 Toxic or noxious seeds

Maize shall be free from the following toxic or noxious seeds in amounts which may represent a hazard to human health.

– Crotolaria (*Crotalaria* spp.), Corn cockle (*Agrostemma githago* L.), Castor bean (*Ricinus communis* L.), Jimson weed (*Datura* spp.), and other seeds that are commonly recognized as harmful to health.

4.3 Contaminants

4.3.1 Heavy metals

Maize shall be free from heavy metals in amounts which may represent a hazard to health.

4.3.2 Pesticide residues

Maize shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

4.3.3 Mycotoxins

Maize shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

Particularly, Total Aflatoxins (B1+B2+G1+G2) shall not exceed 20ppb

4.4 Hygiene

4.4.1 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the *Recommended International Code of Practice – General Principles of Food Hygiene* (CAC/RCP 1-1969), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to these products.

4.4.2 To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.

4.4.3 When tested by appropriate methods of sampling and examination, the product:

– shall be free from micro-organisms in amounts which may represent a hazard to health;

– shall be free from parasites which may represent a hazard to health; and

– shall not contain any substance originating from micro-organisms in amounts which may represent a hazard to health.

5. PACKAGING AND MARKING

As per contractual agreement.

6. STORING

Maize must be stored under dry, ventilated and hygienic conditions.

7. SAMPLING REQUIREMENTS

Representative samples can be drawn according to international sampling method standards at the bagging section or in the warehouse.

For packed units, sampling frequency and reference method are showed in *table 2*. One laboratory samples of 10 kg is required by lot or sub-lot of 500MT maximum.

Table 2: Sampling rules

Lot or sub-lot size (MT)	Number of increment samples	Place of sampling	Reference
≤100	3 % of bags and minimum 50 bags (*e.g. 60 increment samples for a lot of 100 MT, packed in 50 kg bags*)	Warehouse or during production	GAFTA 124-2
101-500	3 % of bags *Example:* - *120 increment samples for a lot of 200 MT, packed in 50 kg bags* - *180 increment samples for a lot of 300 MT, packed in 50 kg bags* - *240 increment samples for a lot of 400 MT, packed in 50 kg bags* - *300 increment samples for a lot of 500 MT, packed in 50 kg bags*		

For the bulk (static and flowing), the sampling must follow the rules described in paragraph *5.2* of ISO 24333-2009.

8. ANALYTICAL REQUIREMENTS

The principal tests in table 3 must be performed in order to check if the quality of the **Maize** meets above requirements. Additional analyses shall be defined in case of further quality assessment.

Table 3: List of compulsory tests and reference methods

No	Analyses/tests	Limits	Reference methods *(or equivalent)*
1	Organoleptic	Natural state, smell and color	*Organoleptic examination*
2	Moisture	**13.5%** w/w max.	ISO 712-2009
3	Other colour maize	**5.0%** w/w max.	*Visual examination*
4	Pest damage grains	**3.0%** w/w max.	*Visual examination*
5	Rotten and diseased grains	**4.0%** w/w max.	*Visual examination*
6	Discoloured grains	**1.0%** w/w max.	*Visual examination*
7	Immature/shrivelled grains	**2.0%** w/w max.	*Visual examination*
8	Total defective grains	**5.0%** w/w max.	*Visual examination*
9	Filth	**0.1%** w/w max.	*Visual examination*
10	Inorganic matter	**0.5%** w/w max.	*Visual examination*
11	Foreign matter	**1.0%** w/w max.	*Visual examination*
12	Other grains	**2.0%** w/w max.	*Visual examination*
13	Live insect	**Nil**	ISO 6639-1, 2, 3 and 4
14	Dead insect	max **10 dead insects** per kg	*Visual examination*
15	Broken grains	**4.0%** w/w max.	ISO 5223-1995
16	Total Aflatoxins (B1+B2+G1+G2)	**20ppb** max	AOAC 972.26; AACC 45-16; ISO 16050
17	GMO (*only if required*)	Negative (<0.9% of GMO material as per EU regulation 1830/2003)	

Annex 1: Method for grading of maize grain

The grading shall be performed as follow:

- Draw a sub sample of about 200g by weighing from representative samples collected from the consignment.
- Place the sub sample on a 4.5mm round hole sieve and sieve it in such a manner that all the material on the sieve passes at least 20 times over the entire surface of the sieve.
- Remove defective grains and all other substances which would be retained by or passed through the sieve by hand picking and weighing (table 4). The grading results shall be calculated by following the manner presented in table 4.

Table 4: Distribution of defective grains, other substances and method for result calculation

	Distribution of defective grains and other substances after sieving	**Mass of categories** *(g)**	**Calculation of result**
Mass of sub sample (g)= M			
Other colour	*Retained by the sieve*	*a*	*= a × 100/ M*
Pest damage grains	*Retained by the sieve*	*b*	*= b × 100/ M*
Rotten and diseased grains	*Retained by the sieve*	*c*	*= c × 100/ M*
Discoloured grains	*Retained by the sieve*	*d*	*= d × 100/ M*
Immature/shrivelled grains	*Retained by the sieve*	*e*	*= e × 100/ M*
Other defective (e.g. germinated, stained…)	*Retained by the sieve*	*f*	
Total defective grain		*g*	*= (b+c+d+e+f) × 100/ M*
Broken grains	*Passed through the sieve*	*h*	*= h × 100/ M*
Inorganic matter	*May be present in materials retained by and /or passed through the sieve*	*i*	*= i × 100/ M*
Organic matter	*May be present in materials retained by and /or passed through the sieve*	*j*	
Foreign matter	*May be present in materials retained by and /or passed through the sieve*	*k*	*= (i+j) × 100/ M*
Filth	*May be present in materials retained by and /or passed through the sieve*	*l*	*= l× 100/ M*
Live insect	*May be present in materials retained by and /or passed through the sieve*	*m*	
Dead insect	*May be present in materials retained by and /or passed through the sieve*	*n*	*= n × 1,000/ M*
Other grains	*May be present in materials retained by and /or passed through the sieve*	*o*	*= o × 100/ M*

** For insect, m is the number of dead or live insect.*