
Good Warehousing Practice for bagged grains

African Standard under Review



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This African Standard was prepared by the ARSO Technical Committee on *Cereals, Pulses and Derived Products* (ARSO/TC 12).

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Good Warehousing Practice for storage of cereals and pulses

1 Scope

This Code covers warehouse and warehousing practices relevant to handling, and storage and transport of bagged cereals and pulses specifically for food consumption. It also considers the provisions of the Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP) to ensure food safety, quality of produce and worker's health, safety and welfare.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- i. ARS 1098:2023, *Agricultural Structures – Warehouses for the Storage of Bagged Grains*
- ii. CAC/RCP 1-1969, *Codex Recommended International Code of Practice General Principles of Food Hygiene*

3 Terms and definitions

For the purpose of this standard the following definitions shall apply.

3.1

contaminant

any biological, chemical or physical agent, or other substances not intentionally added to food that may compromise food safety or suitability

3.2

contamination

introduction or occurrence of a contaminant in the food or food environment

3.3

farm

any premise or area in which crops especially cereals and pulses are grown and harvested

3.4

fertilizer

any solid or liquid substance either organic or inorganic nutrient elements – singly or in combination with other materials, applied directly to the soil, foliage or plant for the purpose of promoting plant growth, increasing crop yield or improving product quality

3.5

food

substance, whether processed, semi-processed or raw, which is intended for human consumption, and includes drinks, chewing gum and any substance which has been used in the manufacture, preparation or treatment of "food" but does not include cosmetics or tobacco or substances used only as drugs

3.6

food safety

assurance that food will not cause adverse health effects to the consumer when it is prepared and/or eaten according to its intended use

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3.7

Good Agricultural Practices (GAP)

practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products

3.8

Good Manufacturing Practices (GMP)

quality assurance system aimed at ensuring that products are consistently manufactured, packed, repacked or held to quality standards appropriate for the intended use. It is thus concerned with both manufacturing and quality control procedure

3.9

cereals

food grains of plants, usually cultivated, belonging to the *Poaceae* family

3.10

hazard

biological, chemical, radioactive materials, or physical agent in, or condition of, food with the potential to cause an adverse health effect

3.11

pest

unwanted animals, insects or poisonous and/or obnoxious weeds that affect the quality and safety of grains

3.12

pesticide

substance or product, or mixture thereof, including active ingredients, adjuvants and pesticide formulations, intended to control, prevent, destroy, repel or mitigate directly or indirectly, any pest

3.13

pulses

dry seeds of leguminous plants which are distinguished from leguminous oil seeds by their low fat content

3.14

warehouse

building for storage of cereals and pulses meant for trade, exchange and food security programmes

3.15

warehousing practices

system or procedure of storing grains to ensure that these are always available, accessible and in good condition

3.16

corrective action

action to eliminate the cause of a nonconformity and to prevent recurrence

4 Site Location and Construction

Site location and construction shall comply with the requirements specified in ARS 1098:2023.

5 Warehouse design and specification

This section shall conform to the provisions of ARS 1098:2023, Agricultural Structures – Warehouses for the Storage of Bagged Grains.

6 Stacking

In addition to the requirements specified in ARS 1098:2023, stacking should be such that the stacks are geometric, well-constructed and mechanically strong so that handling and pesticide treatment are possible. The use of a regular stacking pattern will allow the bags to be easily counted.

Stacking around the pillars or against walls should be avoided, as this makes inspection and fumigation difficult, and it can damage the building.

Pathways should be wide enough (at least 1 m) to allow proper inspection and spraying. An inspection walkway shall always be left between stacks and the store walls.

The retention of impermeable sheets after fumigation prevents re-infestation but is not advised because of condensation problems.

7 Good Warehouse-keeping

7.1 Warehouse maintenance

There should be a monthly scheduled inspection of roofs for the presence of any holes, leakages or damages in the roofing system. The Warehouse officer shall immediately act upon any report of leaks or damage. Structural defects in gutters and downspouts shall be immediately and properly repaired. In case of cracks and crevices, cement plaster shall be used to properly fill up the damage. Maintenance and inspection should cover the whole warehouse structure.

7.2 Warehouse hygiene and sanitation

Prior to storage, the warehouse and its immediate surroundings shall be thoroughly cleaned. The warehouse must be free from unnecessary materials like pieces of lumber and old machines. The entire warehouse structure must be cleaned and brushed down at least once a month to prevent contamination from dirt. Moreover, the surrounding areas of the warehouse should be weed-free.

A weekly cleaning of the periphery of the piles should be done to remove dust and webs and to eliminate the possible breeding place of rats, birds, and insects. Warehouse, as well as, pallets (used or unused) and machines must be cleaned immediately upon grain disposal to remove accumulated grain residues, dust, and cobwebs.

After cleaning, residual spraying shall be applied to the entire storage structure, which includes walls, floors and posts.

Torn or gnawed sacks should be immediately mended to avoid spillages, collapse of the pile, and further attack from pests. If possible, bags or containers should not be re-used since use of returned sacks is a serious source of insect infestation. Unserviceable empty sacks and totally damaged grains should be properly disposed.

A separate room should be provided for pesticides and cleaning materials. Sacks and pallets should be properly stored in a separate portion of the warehouse and stacked neatly and orderly and provided with a physical separator. Proper signage should be provided for all rooms. Moreover, no portion of the warehouse should be used as living quarters.

7.3 Stock maintenance and preservation

Representative samples shall be taken randomly from a batch of bagged grains and measured using calibrated moisture meters. Newly received grains with moisture content above 14% MC shall be temporarily stored and subjected to drying to 14% MC and below. Dried stocks may be grouped according to their varietal characteristics.

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Laborers shall be discouraged and prevented from using hook or “*gancho*” to maintain the integrity of the bags and avoid spillages. The spillages shall be immediately collected. These collected grains may either be placed into bags (sacks) and piled separately or cleaned and added to busted bags.

At least 100 g sample of every variety of stocks of milled rice or shelled corn stored in the warehouse should be maintained at the warehouse office for easy reference. It shall be packed in plastic containers or sample bottles with proper identification.

The recommended relative humidity (RH) for a warehouse is 65%. Thus, warehouse temperature/humidity as well as grain temperature must be checked and measured daily. Grain thermometer and thermohygrometer should be installed for monitoring purposes. Warehouse atmosphere must be controlled by either opening or closing windows/doors or installing ventilation fans. Windows and doors must be opened during daytime for proper aeration of stocks. All windows and other openings except doors must be screened to avoid pilferages and entry of pests.

Damaged grains that are no longer fit for consumption shall be disposed immediately. Daily inspection of stocks shall be done to detect signs of infestation so that pest control measures can be recommended and effected.

7.4 Pest control administration

A pest monitoring and inspection program must be in place to prevent harborage and breeding of pests on the grounds and within the warehouse facility. Whenever stocks are disposed and the warehouse is vacated, residual spraying of the whole or sections of the storage structure with chemical pesticides should be carried out after thorough cleaning. Space treatment (fogging) should be conducted at dawn or dusk when flying insects are most active. For crawling insects, external stock treatment consisting of spray application of pesticides to the four sides and the top surface of the pile should be conducted regularly. For heavily infested stocks, fumigation, conducted or supervised by certified fumigators only, should be done as a remedial measure to control internal infestation. Rodent control through the use of traps or poison baits should be carried out regularly.

Only pesticides for stored products approved by the competent authority shall be used. Monitoring of the efficacy of the treatment used should be done at least one week after the application.

Fumigators should be equipped with protective gear such as gas masks. Proper disposal of pesticides/fumigants should be practiced, especially on packaging material.

7.5 Transport

The harvested grains or stored grains should be transported using clean vehicles or other appropriate mode of transportation. Transport vehicles should be cleaned before and after usage to avoid contamination and residual infestation. The vehicles should be dry to avoid increasing the moisture content of products, and have a covering for the consignment.

8 Hygiene, worker’s health, welfare and training

8.1 Personnel hygiene

There shall be a strict observance of the “no smoking”, “no spitting” and “no eating” policy inside the warehouse since these practices will induce contamination. Any person who has or appears to have an infectious disease, open lesion, including boils, sores, or infected wounds, or any other abnormal source of microbial contamination must be excluded from any operations. Hygienic practices through established/documented procedures including specific instructions should be made for all personnel.

Grain handlers should follow personal hygiene recommendations as indicated in the *Codex Recommended International Code of Practice General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 4-2003)* or the latest issuance. The following recommendations should include but not limited to:

Wearing of appropriate clothing and shoes applicable to the operation and can serve as protection for food contamination and an aid on the worker's health and welfare.

Wearing of appropriate masks during handling and transport of grain.

Washing of hands thoroughly and sanitizing, if necessary, in the appropriate hand- washing facility before the start of any handling operation, after each absence from the work station, and at any given time when possible contamination can be encountered by the worker.

8.2 Personnel training

Before a job is assigned, the personnel shall be trained on good warehousing practices. Training and re-orientation of the warehouse personnel should be done at least every two (2) years. The following trainings are recommended for the personnel specific on his/her assigned task:

- Inventory and warehouse management
- Acquisition and purchasing
- Supply chain and logistics
- Transportation and freight operations
- Personnel hygiene and food safety

9 Management and supervision

Grain operators should have adequate knowledge on food hygiene principles and practices to be able to assess potential risks, take appropriate preventive and corrective action, and ensure that effective monitoring and supervision is carried out. Formal training on food safety (Good Manufacturing Practices) is necessary and further trainings in Hazard Analyses and Critical Control Points (HACCP) are extremely helpful. Trainings on food safety for grains businessmen, grains operators and warehouse personnel should be conducted.

10 Documentation and records

All warehouse practices should be properly documented in a recommended form. Appropriate records from all warehousing practices should be kept and retained for a period that exceeds the shelf life of the product. Records should be to facilitate recalls and product safety investigations, if required.

Warehouses shall keep records of the:

- a) Origin, history of and volume of each lot of cereals and /or pulses kept;
- b) Laboratory tests carried out;
- c) Names of chemicals used for pest control;
- d) Names of employees and training undertaken;
- e) Authorization by the legal authority;
- f) Servicing and calibration of all equipment;

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- g) Cleaning; and
- h) Pest control detailing the pesticide used, the date and method of spray/dusting, person or company.

11 Traceability

Proper labeling and record keeping should be made to facilitate any forward or backward tracing of food products. Records of deliveries should be kept (delivery receipt, personnel coming in and out of the warehouse, date of delivery, and classification of goods delivered).

The labeling information shall contain the following:

- name of the grain
- classification;
- grade;
- variety (optional);
- net weight;
- name and address of owner; and
- date of milling (for rice);
- crop year
- date of delivery.

Geotagging of warehouses and farm site where the grain product came from should be considered.

12 Recall procedures

Warehouse operators should ensure that effective procedures are in place to deal with any food safety hazard and to enable the complete, rapid recall of any implicated lot of the bagged grains (finished food) from the market in case of complaint or issues regarding product quality and safety. Where a product is withdrawn because of an immediate health hazard, other products which are produced under similar conditions, and which may present a similar hazard to public health, should be evaluated for safety. The need for public warnings should be considered.

Recalled products should be held under supervision until they are destroyed, used for purposes other than human consumption, determined to be safe for human consumption, or reprocessed in a manner to ensure their safety.

13 Corrective action

It is recommended that the warehouse operators to establish the corrective action procedures for continuous improvements in case of non-conformities or hazard problems associated with the warehouse practices.