

DRAFT EAST AFRICAN STANDARD

**Code of Practice for Handling, Storage and Disposal of Bagged
Fertilizers or Fertilizer supplements**

EAST AFRICAN COMMUNITY

Copyright notice

This EAC document is copyright-protected by EAC. While the reproduction of this document by participants in the EAC standards development process is permitted without prior permission from EAC, neither this document nor any extract from it may be reproduced, stored or transmitted in any form for any other purpose without prior written permission from EAC.

Requests for permission to reproduce this document for the purpose of selling it should be addressed as shown below or to EAC's member body in the country of the requester:

© East African Community 2015 — All rights reserved
East African Community
P.O.Box 1096
Arusha
Tanzania
Tel: 255 27 2504253/8
Fax: 255 27 2504481/2504255
E-mail: eac@eachq.org
Web: www.eac-quality.net

Reproduction for sales purposes may be subject to royalty payments or a licensing agreement. Violators may be persecuted

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

In order to achieve this objective, the Community established an East African Standards Committee mandated to develop and issue East African Standards.

The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 020, *Agriculture and agrochemicals*.

Code of Practice for Handling, Storage and Disposal of Bagged Fertilizers or Fertilizer supplements

1 Scope

This draft East African standard lays down recommended code of practice for handling, storage and disposal of fertilizers or fertilizer supplements packed in bags, with or without a plastics liner.

2 Normative reference

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

ISO 8157, *Fertilizers soil conditioners and beneficial substances — Vocabulary*

ISO 14820-1, *Fertilizers and liming materials - Sampling and sample preparation - Part 1: Sampling*

3 Terms and Definitions

For the purpose of this standard, the terms and definitions given in ISO 8157 and the following apply;

3.1 user

farmers, growers, application contractors and all those organizations or individuals responsible for the end-use of Fertilizer.

3.2 supplier

importers, distributors, merchants, haulers or other organizations or individuals who store or supply the user with fertilizer

3.3 manufacturer

any organizations or individuals who manufacture, mix or blend solid fertilizers for use in agriculture or horticulture, whether for their own use or for use by others.

3.4 fertilizer warehouse

characteristic building for storing large quantities of fertilizers

3.5 bagged fertilizer

fertilizers packed in bags

3.6 corrosive fertilizers

fertilizers which have effect of gradual destruction of materials especially when in contact with water

3.7 hazardous fertilizers

fertilizers that are likely to cause harm to human, plant or animal life on decomposition, through corrosion or release of volatile substances.

3.8 damaged bag

one from which the contents are bleeding, contaminated, mixed, spoiled / burnt, wet, stained by oil, or the contents of which have either caked or are in flowing condition.

3.9 dunnage

base on which bags of fertilizers are stacked so that they are not in direct contact with the floor.

3.10 caking

formation of a coherent mass from a fertilizer material

3.11 critical Relative Humidity

relative humidity of the atmosphere at which the material begins to absorb moisture from the atmosphere and below which it will not absorb atmospheric moisture.

3.12 hygroscopic fertilizers

fertilizers with moisture absorption property under specific conditions of humidity and temperature.

4 Warehouse Structure

4.1 Fertilizer warehouse site (General)

- a) The fertilizer warehouse shall be located away from homes, highly populated areas, drinking water sources and areas liable to flooding.
- b) The fertilizer warehouse shall be located in a clean and tidy site with arrangements provided for destruction and/or disposal of waste.
- c) The site shall have no evidence of rodent activity and will have a good drainage and flood water disposal.
- d) The site shall be installed with gadgets/equipments to monitor temperature and humidity of the warehouse

4.2 Permanent Warehouse

- a) fertilizer storage structures should be made of concrete, tile or steel
- b) The construction of the warehouse or storage go-down shall be climatically suitable and damp-proof. In go-downs having low plinth, mud walls and galvanized iron sheet roofs or cement sheets, the effects of variation in temperature and humidity of atmosphere are pronounced
- c) go-downs in which fertilizers are stored should be such that it protects the fertilizer from atmospheric deterioration effects

- d) warehouses, should, be well-ventilated and situated away from places of fire hazards. it should be noted that ammonium nitrate fertilizers when stored in an enclosed space without ventilation may give rise to hazards of explosion and fire if exposed to carbonaceous material
- e) Ventilators are also necessary in go-downs used for storing fertilizers that give out volatile substances on storage
- f) Where the level of water table is high or there is a chance of local flooding, a plinth of 1m high shall be used. Decision on plinth height may be made keeping in view the convenience of loading and unloading of bags into tracks or railways wagons
- g) The go-downs should have concrete flooring. Where it is intended to store fertilizers having a corrosive action on concrete, it is necessary to provide a protective coating to the floor with sodium silicate, or linseed oil based coating, or bitumen or some other protective material. However, these protective coatings can be substituted by appropriate dunnage
- h) It is desirable that the floors and walls up to a height of 0.5m are coated with bitumen in case some of the fertilizer packed in bags bleeds out during handling and storage, which may damage the floor and adjacent portions of walls

4.3 Temporary Warehouse

The provisions stated for permanent warehouse may not always be feasible, in that case a temporary warehouse is to be utilized. However, it is essential that this should have minimum facilities like doors and ventilators and freedom from seepages of water on to the floor and walls. Adequate dunnage stated in 4.4 is also essential.

4.4 Ante-Room and Compartmentalization

When it is intended to store hygroscopic fertilizers and where it is also required to open the godown frequently, it is necessary to protect the hygroscopic fertilizers from the atmosphere when the godown is opened for any purpose. With this objective, an ante-room should be provided. If this is not possible, the godown should be so designed as to provide a series of compartments, of suitable size. Another alternative to ante-room is to provide two successive doors for entering the godown.

4.5 Doors and Ventilators

The godowns/warehouse may be provided with doors and ventilators, if required, which can be closed airtight whenever so desired. For storage of large quantities of hygroscopic fertilizers over prolonged periods, storage structures with dehumidification facilities will be ideal.

5 Storage of fertilizer

5.1 Storage of Fertilizers-General

Care and attention shall be given to the type of the fertilizer to be stored in the warehouse that is, consideration shall be made as to whether the fertilizer is hygroscopic, corrosive, gives out volatile substances, explosive or none of these properties

5.2 Storage of Hazardous fertilizers

- a) Fertilizer containing nitrate-nitrogen when stored at high temperatures are capable of decomposition with explosion and fire.
- b) It shall, therefore, be ensured that these fertilizers are stored on a clean floor and a well-ventilated structure and in readily accessible space.
- c) The hazardous fertilizers shall be stored in a separate warehouse from other fertilizers or when it is not possible to do so, store them in a separate area (stored separately) so that they shall reasonably be away from any stored materials and heat sources.
- d) Materials such as bags when allowed to dry after impregnation with nitrate-nitrogen based fertilizers may quickly ignite if they are exposed to elevated temperatures and shall be destroyed or thoroughly washed.
- e) Provision of Fire Fighting equipment's — Although fertilizer stocks by themselves are not posing fire hazard but the nitrate containing fertilizers when stored with carbonaceous material may also lead to fire hazards.
- f) In regard to firefighting methods in fertilizer godown it is advised to use dry powder type firefighting extinguishers and fire buckets with dust. Use of water will damage the stocks and hence may be avoided.

6 Mode of Stacking

6.1 All bags in a stack should be of uniform size and weight. The contents should be of the same grade or variety. An ideal stack when built is stable, perfectly cuboid in shape, having all bags in one plane, with no face of the stack bulging outward or inward at any point.

6.2 Damaged Bags — As soon as the bags are received for storage, the damaged bags shall be sorted out from the sound bags and kept separately. For this purpose, a damaged bag shall be one from which the contents are bleeding or which is wet or stained by oil, or the contents of which have either caked or are in a flowing condition.

6.3 Haulage Alleyway — In arranging stacks of the fertilizer bags, a haulage alleyway of 1 m shall be provided.

6.4 Dunnage

Proper dunnage is essential to protect the packed fertilizer from damage due to moisture and also to protect the floor of the godown from damage by fertilizer. In the absence of dunnage, the bottom layers of bags are subjected to moisture due to seepage from floor. Even if the floors are given damp-proofing treatment, some water can condense on the floor from the atmosphere on account of the diurnal variation in temperatures.

6.4.1 An ideal dunnage is made from wooden pallets since it keeps the bags 10 cm above the floor level and also enables free circulation of air all-round the stack. The pallets of desired dimensions can be used. A layer of matting either above or below the pallet is given so that the fertilizer droppings do not come in direct contact with the floor and could be collected appropriately for disposal. Dunnage can also be made of concrete bars with a protective coating of bitumen, so arranged that they provide the necessary support to the bags while leaving enough gap between them and the floor.

6.4.2 An alternative dunnage consists of a sheet of plastics (polyethylene, PVC, etc.) of thickness 300 gauge sandwiched between two layers of hessian 305 to 427 g/m². The hessian-polythene laminate is prepared to the size of the godown in a single piece with minimum number of joints.

6.4.3 Where it is not found possible to adopt any of the dunnage given in 6.4.1 and 6.4.2, a dunnage of some locally available material (bamboo matting, paddy husk, paddy straw, etc) can be adopted. With these materials, one layer should be spread on the floor, then it should be overlaid with a sheet of plastics material of 300-gauge thickness and on it one more layer of the locally available material should be spread. It may however be noted that organic material like straw and paddy husk are dangerous if nitrate-containing fertilizers are stored; they may also lead to insect infestation. For nitrate-containing fertilizers, the wooden pallet is recommended for use and should be covered with 300-gauge polyethylene sheets.

6.5 Distance of stack from walls and Distance Between Stacks — Both these distances should not be less than 0.6 m.

6.6 Size of Stacks

Before the fertilizer stocks are received, a stack plan of the godown should be prepared, dividing the floor area into uniformly sized and serially numbered rectangular bases to build stacks, lines, 5 cm thick, in white or black paint will serve to mark the boundary of the stack. The size of the stack is matter of convenience depending upon the area of the godown.

6.7 Method of Stacking

- a) Proper stacking of fertilizer bags is necessary for its safe storage Stacking is an art and requires great care to be taken to build suitable stacks.
- b) A neat and solid stacking helps in proper accounting and preservation besides ensuring stability of the bags during storage.
- c) An ideal stack when complete, shall be stable and perfectly cuboid in shape having all bags in one plane with no face of the stack bulging outward or inward at any point.

- d) The stitched end of the bags shall always be kept inside the stack to avoid spillage on the floor due to bursting of bags.

The stack shall be constructed in any of the following manners:

I. Block Stacking

In block stacking, each layer has lengthwise and breadthwise bags alternating to form the block. In any two adjacent layers, this system of lengthwise and breadthwise tiers will be reversed. This type of stacking helps in having a neat and countable stack even after issuing out a portion of the stocks

II. Cross Stacking

In cross stacking, bags, are laid in complete lengthwise or breadthwise tiers in a herniate layers systematically. This is advantageous for long term storage because of marked stability of stacks

6.7.1 Arrangement of Bags in Stack

It should be kept in view that the mouth of all bags should be inside the stack and not be periphery. Different fertilizers shall be kept in separate stacks. Stack cards indicating the name of the fertilizer, date of receipt and issue when made, number of bags in the stack and other relevant information should be tagged to each stack at a convenient height. Further each stack shall be provided with a receptacle capable of being closed in which the spilling's and droppings may be collected every day and disposed of suitably.

6.8 Height of Stacks

For purposes of height of stack, fertilizers may be divided into two broad categories. Fertilizers that are hygroscopic or corrosive or explosive shall be stacked to a height of 4 m while fertilizers other than those falling in this category shall be stacked to a height of 5 m. In all cases adequate ventilation should be allowed, 0.6m distance between the stacks height and the roof.

7 Classification of fertilizers based on their characteristics shall be as follows;

i. Hygroscopic, Corrosive and Explosive fertilizers

- a) Ammonium Nitrate
- b) Calcium ammonium nitrate
- c) Potassium nitrate
- d) Single Superphosphate
- e) Triple superphosphate
- f) Urea

- g) Ammonium sulphate nitrate
- h) Ammonium phosphate sulphate

ii. Non-explosive, non-hygroscopic and/or non-corrosive fertilizers

- a) Ammonium sulphate
- b) Ammonium chloride
- c) Bone-meal
- d) Diammonium phosphate
- e) Dicalcium phosphate
- f) NPK
- g) Monoammonium phosphate
- h) Potassium chloride
- i) Potassium sulphate
- j) Rock phosphate (ground)

8 Aeration of godowns/Warehouse

- a) During periods of high humidity, the ventilators and doors of the godown shall be kept closed.
- b) The stacks of hygroscopic fertilizers may also be covered with polythene sheets or tarpaulins or gunny sheets during such periods.
- c) But when the humidity of the atmosphere is not high, the doors and ventilators should be kept open and free aeration of the godown should be allowed, Since the water absorption capacity of fertilizers vary, due considerations should be given to the critical relative humidity of the fertilizers.

The following table indicates the critical relative humidity of some of the fertilizers;

Table 1: Critical relative humidity of the fertilizers

Critical relative humidity (CRH)	
Fertilizer	CRH at 30 °C
Potassium sulphate	96.6
Single Super Phosphate	94.0
Triple super phosphate	93.6
Diammonium phosphate	84.0
Muriate of potash	84.0
Monoammonium phosphate	82.5

Ammonium sulphate	79.2
Urea	75.2
Ammonium chloride	72.2
NPK	70.0
Ammonium nitrate	59.4
Calcium ammonium nitrate	55.6
Calcium nitrate	46.7

8.1 All stocks in a warehouse should be frequently inspected for leakages, caking of powders, pulverization of granules, change in colour due to oxidation, dampness of packages and corrosion or deterioration of bags or bins. All leakages should be treated as being hazardous.

8.2 Always strictly follow the rule “First-in First-out” this means new stocks should be moved to the rear

9 Handling Recommendations

9.1 Precautions with hazardous fertilizers

Fertilizers based on ammonium nitrate may decompose slowly at temperature above 130 °C under the influence of fire or heat. In the case of some of these fertilizers, the decomposition stops when the heating stops, but in the case of some others, a slow decomposition reaction may propagate throughout the mass of fertilizer and temperatures between 50°C and 500°C may result (self-sustaining decomposition). This decomposition is accompanied with evolution of dense, yellowish-brown, pungent, toxic fumes. Further, if as a result of failure to observe these precautions, a zone of show decomposition develops, emergency action laid down in clause 10 shall be taken immediately.

9.2 Storage warehouses, trucks and rail cars shall be carefully cleaned before receiving the fertilizer. Coal dust, Sulphur, oil other combustible materials, acids and chemicals shall be kept away from the fertilizer.

9.3 In places where fertilizers are stored or handled, smoking and the use of fire and naked flames shall be forbidden. A prominent board to this effect shall be displayed at every warehouse.

9.4 Care shall be taken not to expose fertilizers to external sources of heat. For example, the fertilizers shall not come into contact with steam pipes (even though insulated), heated oil tanks, hot bulkheads, electric cables, electric motors or lighting equipment, whether fixed or with trailing leads. Fertilizers shall not be exposed to frictional heat from the operation of mechanical equipment (for example conveyors).

9.5 Due caution shall be taken in using vehicles powered by petrol or diesel oil, particularly in regard to spillages of the fuel.

- 9.6** In circumstances in which work may generate heat (for example, cutting, welding, brazing) the fertilizers shall either be removed or effectively be protected from heat (for example covering with damp sheets of canvas). Hot welding debris shall not fall into the fertilizers. Further, such work shall be carried out only under continuous expert supervision. After completion of the work, the work-place and its surroundings shall be kept under observation for several hours for development of fire or slow decomposition.
- 9.7** Caked masses shall be broken up by mechanical means only. The use of explosives in the stores shall be forbidden.
- 9.8** Use of Hooks should be avoided as this damages bags as well as the fertilizers and is harmful to the environment.
- 9.9** Personnel working in the fertilizer warehouse should be given protective hand gloves, respirators and gum boots. The personnel should also be enlightened on the relevant safety precautions in the warehouse and the necessary emergency action to be taken in the event of an accident including those in clause 10.

10 Emergency Action

- a. If the zone of decomposition is still small and easily accessible, an attempt may be made to remove it from the main body of the fertilizer by the use of picks and shovels, and to cool it down by localized quenching with water.
- b. When it is impossible to remove the zone of decomposition, the fertilizer involved shall be soaked as rapidly as possible with a large quantity of water directed through high pressure jets against the center of decomposition. To fight the decomposition by other means (for example, foam, carbon dioxide, steam, covering with sand or fertilizer) is useless, and may even encourage the decomposition.
- c. If there is only a light evolution of fumes, the breathing apparatus used may be such as will give protection against nitrous gases. If fume evolution is heavy, independent breathing apparatus (for example, compressed air masks) shall be employed. Special care shall be taken when entering a fertilizer warehouse.

11 Disposal and recycling of fertilizer and waste Packaging

Suppliers of big consignments more than 50 tons of packaging per year have a recovery obligation under the provisions of the Pollutants Producer Responsibility to meet disposal Regulations prevailing under UNEP/NEMC Act applies for plastic materials. However, Farmers, who are excluded from this requirement, should ensure that all waste packaging is legally disposed of and not burnt. Use should be made of plastics recovery schemes or commercial waste disposal

11.1 Disposal and Recycling of Fertilizer

- Look for the appropriate label/symbols when recycling, Fertilizers with pesticides that are labeled with words like pre-emergent, weed preventer, weed and feed, insect control, or disease control should be disposed of as hazardous waste.
- Fertilizer without pesticides that contains only plant nutrients, take note on the nominal composition e.g. Contains N P K etc, these don't require special disposal instructions. If phosphorus fertilizer use is not restricted in by local laws or does not have some adverse ecological implications give or sell the fertilizer to someone who will use effectively.

11.2 Disposal and recycling of fertilizer waste packaging

Empty bags may be disposed of as non-hazardous material or returned for recycling. However, these could still bear traces of residues which are considered non-hazardous. Therefore, the following guidelines for recycling of packaging materials need to be considered:

- Minimize the amount of waste packaging by using a pack size appropriate to the quantity of product required.
- Do not reuse empty packaging (bags) for refilling with fertilizer.
- Fully empty out powder packaging.
- Segregate the emptied packaging material according to its type.
- Look for the appropriate symbols when recycling, as some plastics are considered relatively single use plastics, as they can release antimony and phthalates to the environment:



2: HDPE: High-Density Polyethylene

HDPE is slightly waxy and semi-rigid. It does not crack. It floats in water.



4: LDPE: Low-Density Polyethylene

LDPE is used in flexible bags. Recycled LDPE is often used to make grocery bags.



5: PP: Polypropylene

PP stretches into filaments and emits a chemical smell when burned.

Bibliography

- IS 5985, Code of Practice for Handling and Storage of bagged fertilizers
- ZS 666, Code of Practice for Handling and Storage of bagged and bulk fertilizers

DRAFT FOR COMMENTS ONLY

DRAFT FOR COMMENTS ONLY