Zambian Standard

BLENDED (PHYSICAL MIXTURE) FERTILIZERS – Specification

ZAMBIA BUREAU OF STANDARDS
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ZAMBIA BUREAU OF STANDARDS


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TECHNICAL COMMITTEE RESPONSIBLE

The presentation of this Zambian Standard has been undertaken by the Chemistry and Health Division Technical Committee (CHD/13), upon which the following organizations were represented:

Avignon Fertilizers Limited
Bridgeway Commodities (Z) Limited
Environmental Council of Zambia
Greenbelt Fertilizers
Mount Makulu Research Station
Nitrogen Chemicals of Zambia Limited
Omnia Nutriology (Z) Limited
University of Zambia (Chairing)
Zambian Fertilizers
Zambia Bureau of Standards (Secretariat)

ZAMBIA BUREAU OF STANDARDS, P.O. BOX 50259, ZA 15101 RIDGEWAY, LUSAKA
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FOREWORD

This Zambian Standard has been prepared by the Technical Committee on Chemical and Health Division – Fertilizers (CHD/13) in accordance with the procedures of the Bureau.

The rise in the blending of fertilizers in Zambia prompted the development of this standard to ensure high quality of blended Fertilizers that are produced with integrity and (with suitable conditions like good soils, weather conditions) are able to deliver good results to the farmer.

Reference has been made to the following publications in the preparation of this standard:


*Agriculture, Fertilizers and the Environment, CABI publishing (1999), USA.*

*Es 395: 2000 Physical Mixture Fertilizers, Quality and Standards Authority of Ethiopia.*

COMPLIANCE WITH A ZAMBIAN STANDARD DOES NOT OF ITSELF CONFER IMMUNITY FROM LEGAL OBLIGATIONS.
1. **SCOPE**

This Zambian Standard specifies the requirements for blended fertilizers (or physical mixtures of fertilizers) intended for use as fertilizers.

2. **NORMATIVE REFERENCES**

The following standards are referred to in this standard. All standards are subject to revision and since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this standard are encouraged to ensure the use of the most recent editions of the standards indicated below.

- ZS 324 Part 17:2004, Determination of water soluble potassium content.
- ZS 605, 606, 607, 608, 609, 610, 612, 613, 614, 615 (Straight fertilizers).
- ZS 431:2004, Compound fertilizers - Specification

3. **DEFINITIONS**

For the purpose of this standard, the definitions given in ZS 325:2005 and the following shall apply.

3.1 **Blended fertilizers** - A product obtained by physical mixing of different fertilizer ingredients or stock materials and containing more than one of the major plant nutrients; namely, nitrogen, phosphorus and potassium and/or are simple mixtures of more than one fertilizer in which chemical interaction does not take place and they may be mixed in different proportions.

3.2 **Compatibility** – Non-chemical reaction of two or more fertilizer ingredients (materials) when mixed.
3.3 **Crop** – Plants for which the particular blended fertilizer shall be used to provide nutrients in field for a particular crop season.

3.4 **Filler** – A substance added to fertilizer materials to provide bulk, prevent caking, or serve some purpose other than providing essential plant nutrients.

3.5 **Ingredients (source)** – Materials, usually straight fertilizers used as sources of particular nutrients in the blended fertilizer. (see annex A)

3.6. **Segregation** – Non-uniformity of composition throughout a blended fertilizer lot.

3.7 **Soil Testing** – Process of taking a representative sample from a field and testing it for available nutrients and other properties e.g. pH.

4. **REQUIREMENTS**

4.1 **General**

4.1.1 Blended Fertilizers shall be in the form of powder, crystals or granules and shall be non-caking, free flowing and free from visible impurities.

4.1.2 The blended fertilizer shall be properly mixed so that the ingredients are uniformly distributed and there is no segregation of the ingredients.

4.1.3 There shall be very negligible dust or fine particles settling at the bottom of the blended fertilizer (bags or bulk).

4.2 **Particle size**

4.2.1 The size range as well as the particle size distribution of the different ingredients of the blended fertilizers shall be compatible.

4.2.2 The particle size (sieve analysis) of blended fertilizers shall be such that a minimum of 90% shall pass through 1.5 mm –5.0 mm sieve and retained on 1.00 mm sieve for standard products.

4.3 **Chemical requirements**

4.3.1 **General**

Blended fertilizers shall be essentially a mixture of chemically compatible (see annex B) and physically homogenous constituents.

4.3.2 **Nutrient composition**

4.3.2.1 If a particular blended fertilizer has the same specification as any of the compound fertilizers in ZS 431:2004 (Compound fertilizers – Specification), it shall be required to meet the analysis of that particular compound fertilizer. Other blended fertilizers not contained in ZS 431 shall conform to the labelled nutrient composition upon laboratory testing.

4.3.2.2 Every ingredient (source) of the declared nutrients in the blended fertilizers shall be readily available to the particular crop for the particular crop season and no just past the period when the crop needs the nutrients. This may require that both the farmer and the supplier are aware of the soil characteristics through soil testing, (and any factor in the soil or weather conditions which
may affect the fertilizer performance) for which the particular blended fertilizer is being mixed so that good results are realised. This also means that the crop shall not show adverse deficiency of any nutrient of an efficiently and effectively applied blended fertilizer.

4.3.2.3 Elemental nutrient sources or ingredients if used shall also be readily available to the crop as stated in (4.3.2.2). Non-soluble elemental sources shall not be used in blended fertilizers.

4.3.2.4 If a micronutrient source in powder form is added as a coat on to the surface of the blend granules or crystals, an effective binder or coating agent (to enhance adherence) shall be used so that there is no segregation of the micronutrient onto the bottom of the blended fertilizer. It shall be noted that only micronutrient sources shall be in powder (fine) form.

4.3.2.5 The filler used in the blended fertilizer shall by no means substitute any of the declared nutrients.

4.3.2.6 The composition nutrients of blended fertilizer shall be declared in terms of total nitrogen, total phosphorous or water-soluble phosphorous and water-soluble potassium in accordance to ZS 324 Parts 3 or 13, ZS 324 Parts 2, or 12 and ZS 324 Part 17 respectively. The permissible limit of variation for these nutrients shall be as follows:

- The actual percentage nutrient content of each declared nutrient shall be within ± 2% of the fertilizer when determined in accordance with the declared content;
- The sum of actual percent nutrient content of all declared nutrients shall be within ± 2.5 % unit of the sum of the declared contents.

5. SAMPLING

Sampling shall be carried out in accordance with ZS 356: Part 1

6. PACKAGING

6.1 Individual container

6.1.1 Blended fertilizers shall be packed in suitable, clean, sound and moisture proof containers (packages).

Suitable packing materials include polypropylene, and high-density polyethylene bags with an inner loose tubular liner polyethylene film.

6.1.2 The quantity of blended fertilizers normally packed in a container shall be a minimum of a net mass of 50 kg.

6.2 Bulk container

The fertilizer may also be supplied in bulk. In such a case the bulk container shall be sound, clean, dry, and capable of protecting the product from adventitious contamination and moisture absorption.
7. **LABELLING AND MARKING**

7.1 **Individual container**

Each container of blended fertilizers shall be labelled indelibly with the following particulars.

a) name of the fertilizer;

b) the fertilizer shall also be labelled as “BLENDED”, conveniently in brackets;

c) the nominal percentage composition of the mixture as N: P$_2$O$_5$: K$_2$O and trace elements in elemental form;

d) the values of P (as P$_2$O$_5$);

e) traceability notation;

f) name and address of the manufacturer or supplier;

g) any other marking requirements laid down by the purchaser;

h) each container should carry relevant safety and environmental effect markings.

7.2 **Bulk container**

Where the fertilizer is supplied in bulk, the labelling information shall accompany the delivery notice.

8. **TEST REPORT**

8.1 The test report for the particular batch or lot of the blended fertilizer shall declare the source or ingredients and the proportions in which they were mixed for the particular nutrient composition stated.

8.2 If a binder or coating agent is used for the adherence of the micronutrients onto the fertilizer granules or crystals, it shall also be declared (name and quantity) in the test report.

8.3 Any filler (and its proportion) used in the blended fertilizer shall be declared in the test report.

9. **COMPLIANCE WITH THE STANDARD**

A lot of a blended fertilizer shall be deemed to comply with this Zambian Standard if upon inspection and testing the provision of clause 4, 6, 7 and 8 are satisfied.
ANNEX A
(Informative)

FERTILIZER MATERIALS AND THEIR ANALYSIS COMMONLY USED IN BLENDED FERTILIZER FORMULAE

<table>
<thead>
<tr>
<th>MATERIAL:</th>
<th>N</th>
<th>P₂O₅</th>
<th>K₂O</th>
<th>S</th>
</tr>
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<tbody>
<tr>
<td>DIAMMONIUM PHOSPHATE</td>
<td>18</td>
<td>46</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MONOAMMONIUM PHOSPHATE</td>
<td>11</td>
<td>52</td>
<td>0</td>
<td>0</td>
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<tr>
<td>AMMONIUM SULPHATE</td>
<td>21</td>
<td>0</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>AMMONIUM NITRATE</td>
<td>34</td>
<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>UREA</td>
<td>46</td>
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<td>0</td>
</tr>
<tr>
<td>TRIPLE SUPERPHOSPHATE</td>
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<td>0</td>
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<td>SULPHATE OF POTASH</td>
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<td>0</td>
<td>48</td>
<td>18</td>
</tr>
<tr>
<td>FILLER</td>
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</tr>
</tbody>
</table>

NOTE: Fertilizer materials (straight fertilizers) used in blended fertilizers, as sources of specific nutrients are not limited to the ones mentioned here. For more details, reference can be made to ZS 431 and straight fertilizer standards ZS 605, 606, 607, 608, 609, 610, 612, 613, 614 and 615.
ANNEX B
(Informative)

CHEMICAL COMPATIBILITY OF BLENDED MATERIALS

\[ \begin{array}{ccccccc}
& & & & & & \\
\text{Ammonium Nitrate} & & & & & & \\
\text{Urea} & & & & & & \\
\text{Ammonium Sulfate} & & & & & & \\
\text{Triple Superphosphate} & & & & & & \\
\text{Single Superphosphate} & & & & & & \\
\text{Diammonium Phosphate} & & & & & & \\
\text{Monosodium Phosphate} & & & & & & \\
\text{Potassium Chloride} & & & & & & \\
\text{Potassium Sulfate} & & & & & & \\
\end{array} \]

\(\square\) = Incompatible
\(\text{L}\) = Limited Compatibility (See Text)
\(\checkmark\) = Compatible