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Fertilizers and soil conditioners — Compound fertilizer — General requirements

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 134, *Fertilizers, soil conditioners and beneficial substances*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Compound fertilizers are the fertilizers having a declarable content of the two or more primary plant nutrients (nitrogen and/or phosphorus and/or potassium), obtained chemically or by blending, or both. Since the 1930s, the increase of crop yield has relied heavily on the amount of fertilizer usage and the development of fertilizer industry.

Compound fertilizers attracted more and more attention since it can enhance the efficiency of fertilizer, simplify the fertilization procedure, and reduce the frequency of fertilization. Since the 1980s, compound fertilizers have been widely used.

Fertilizers and soil conditioners — Compound fertilizer — General requirements

1 Scope

This document specifies general requirements for the testing, sampling and preparation of test samples and the marking, labelling, packaging, transport and storage of compound fertilizers.

This document is applicable to inorganic solid compound fertilizers.

This document is not applicable to controlled-release compound fertilizers.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 760, *Determination of water — Karl Fischer method (General method)*

ISO 5314, *Fertilizers — Determination of ammoniacal nitrogen content — Titrimetric method after distillation*

ISO 5315, *Fertilizers — Determination of total nitrogen content — Titrimetric method after distillation*

ISO 5317, *Fertilizers — Determination of water-soluble potassium content — Preparation of the test solution*

ISO 6598, *Fertilizers — Determination of phosphorus content — Quinoline phosphomolybdate gravimetric method*

ISO 7409, *Fertilizers — Marking — Presentation and declarations*

ISO 8157, *Fertilizers and soil conditioners — Vocabulary*

ISO 8397, *Solid fertilizers and soil conditioners — Test sieving*

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

ISO 14820-2, *Fertilizers and liming materials — Sampling and sample preparation — Part 2: Sample preparation*

ISO 15604, *Fertilizers — Determination of different forms of nitrogen in the same sample, containing nitrogen as nitric, ammoniacal, urea and cyanamide nitrogen*

ISO 15959, *Fertilizers — Determination of extracted phosphorus*

ISO 17318, *Fertilizers and soil conditioners — Determination of arsenic, cadmium, chromium, lead and mercury contents*

ISO 17319, *Fertilizers and soil conditioners — Determination of water-soluble potassium content — Potassium tetraphenylborate gravimetric method*

ISO 20620[1)], *Fertilzers and soil conditioners — Determination of total nitrogen by combustion*

1) Under preparation. Stage at the time of publication: ISO/FDIS 20620.

ISO 22018, *Fertilizers, soil conditioners and beneficial substances — Determination of EDTA soluble phosphorus content in inorganic fertilizers*

ISO 25475, *Fertilizers — Determination of ammoniacal nitrogen*

EN 15957, *Fertilizers - Extraction of phosphorus which is soluble in neutral ammonium citrate*

United Nations, Globally harmonized system of classification and labelling of chemicals (GHS)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8157 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
compound fertilizer
fertilizer having a declarable content of at least two of the primary plant nutrients (nitrogen, phosphorus, and potassium), obtained chemically or by blending, or both, including NP, NK, PK, and NPK product

[SOURCE: ISO 8157:2015, 2.2.7.1]

3.2
primary nutrient
elements nitrogen, phosphorus, and potassium only

Note 1 to entry: Macronutrient is also used. These include the following plant food: nitrogen (N), available phosphate (P_2O_5), and soluble potash (K_2O).

Note 2 to entry: The following definition is recognized by some specific countries/regions: macro nutrient is the sum of primary and secondary nutrients, such as N, P, K, and Mg, Ca, as well as S (Na, Si).

[SOURCE: ISO 8157:2015, 2.1.3.1]

3.3
total primary nutrient
sum of total nitrogen, *available phosphorus* (P_2O_5) (3.4), and water-soluble potash (K_2O) content, expressed as mass fraction in percent

[SOURCE: ISO 8157:2015, 2.1.36]

3.4
available phosphorus
sum of water soluble and citrated or EDTA-soluble phosphate

3.5
marking
statement, symbol, logo, picture, and/or information, that is present on the *label* (3.6) or package and identifies or implies a product and its quality, quantity, characteristic, usage, etc.

[SOURCE: ISO 8157:2015, 2.1.40]

3.6
label
piece of paper or plastic, or a printed area of a package or container, marked with the necessary information to identify the product and make known its essential characteristics

[SOURCE: ISO 8157:2015, 2.1.59]

4 Requirements

4.1 Compound fertilizer shall be in conformance with all the requirements specified in Table 1 and shall have declared values on containers.

Table 1 — Requirements of compound fertilizer

Item		Requirement [d]
Mass fraction of total primary nutrient $(N+P_2O_5+K_2O)$[a, c],% ≥	NP, NK, PK product	18 %
	NPK product	20 %
Particle size (1,00 mm to 4,75 mm or 3,35 mm~5,60 mm)[b],% ≥		80

[a] For the mass fraction of each primary nutrients (3,11)[c], total nitrogen (N), available phosphorus (P_2O_5) or water-soluble potash(K_2O) shall not be less than 3 %, the allowance tolerance for declared nutrients content is ±20 % relative deviation of the declared value up to a maximum of 1,5 % in absolute terms for each primary nutrient. Total negative deviation from the declared value, for binary fertilizers shall be less than 1,5 %, and for ternary fertilizers shall be less than 1,9 %. The nutrient content of fertilizers shall conform with the tolerances, which are intended to allow for deviations in manufacture, sampling and analysis. The manufacturer shall not take systematic advantage of the tolerances.

[b] The particle size of special sized or large particle sized product can be negotiated between suppliers and buyers. Particle size numbers given herein are indicative. The related parameters, such as the diameter that are specified by other countries, shall be followed therein. Also, size guide number (SGN), uniformity index (UI) and granulometric spread index (GSI) values can be negotiated between suppliers and buyers (see ISO 8157).

[c] Regarding the total nutrient content, the ratio of water-soluble phosphorus to available phosphorus and the mass fraction of each primary nutrient, the related requirements shall be followed, e.g. requirements specified by the countries or regions.

[d] Moisture content of the compound fertilizer can be negotiated between suppliers and buyers, the maximum moisture content and the method for determination of moisture content shall be specified. For the limitation of the content of As, Cd, Pb, Cr and Hg, the related requirements shall be followed (see Annex A), e.g. requirements specified by countries/regions.

5 Analytical methods

5.1 Determination of the mass fraction of total nitrogen

Determine the total nitrogen content in accordance with ISO 5315 or any other recognized method of analysis, i.e. ISO 5314, ISO 15604, ISO 20620 and ISO 25475.

5.2 Determination of available phosphorus and water-soluble phosphorus

Determine the available phosphorus (3.6) and water-soluble phosphorus content in accordance with EN 15957 and ISO 15959; ISO 6598 or ISO 22018.

5.3 Determination of potassium

Determine the potassium content in accordance with ISO 5317 and ISO 17319.

5.4 Determination of water content

Determine the water content in accordance with ISO 760.

5.5 Determination of grain size

Determine the grain size in accordance with ISO 8397.

5.6 Determination of heavy metals (contaminants)

Determine the presence of heavy metals (contaminants) in accordance to ISO 17318.

6 Sampling and preparation of test sample

6.1 Sampling method

6.1.1 Products in bags

Carry out sampling operation by following the procedure described in ISO 14820-1. Care should be taken to avoid any damage to, or destruction of, the coating.

6.1.2 Products in bulk

Carry out sampling operation by following the procedure described in ISO 14820-1.

6.2 Reduction of samples

Reduction of samples shall follow the instruction given in ISO 14820-1. Each laboratory sample shall be labelled following the instructions given in ISO 14820-2. The label shall, at minimum, carry the following information:

a) the name of manufacturer;

b) the name of product and type;

c) the manufacturer's reference and batch number or production date (if available);

d) the lot size;

e) the date of sampling;

f) the place of sampling;

g) the signature of the sampler;

h) the signature and name of the person or his/her representative on whose premises the sample was taken;

i) the stated release period (days) and temperature (°C) defined by appropriate test procedures.

One of the containers is used for further quality analysis, while the other is kept for additional analysis in two months.

6.3 Test sample preparation

Test sample preparation shall follow the instruction as specified by ISO 14820-2.

7 Marking and labelling

7.1 Marking and labelling shall conform with ISO 7409 and the globally harmonized system of classification and labelling of chemicals (GHS).