
**Fertilizers and liming materials —
Sampling and sample preparation —**

**Part 3:
Sampling of static heaps**

*Engrais et amendements minéraux basiques — Échantillonnage et
préparation de l'échantillon —*

Partie 3: Échantillonnage des tas statiques

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Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Sampling plans and quantitative data	2
4.1 General	2
4.2 Characterization of the lot to be sampled	2
4.3 Sampling plan	2
4.3.1 General	2
4.3.2 Elements of the sampling plan	2
4.4 Determination of the volume/mass of the lot	4
4.5 Determination of sampling units and sampling points	4
4.5.1 Determination of the number and location of the sampling units	4
4.5.2 Minimum total number of sampling units	4
4.5.3 Determination of sampling units from which incremental samples shall be taken	4
4.5.4 Determination of the minimum number of sampling points from which sub-samples are to be taken	4
4.6 Quantitative data	4
4.6.1 Determination of the minimum mass of increments	4
4.6.2 Mass of increments	5
4.6.3 Aggregate/reduced and final samples	5
5 Incremental sampling methods	5
5.1 General	5
5.2 Sampling apparatus	5
5.3 Procedure	7
5.4 Aggregate and reduced samples	8
6 Final samples	8
6.1 Division into final samples	8
6.2 Practical arrangements for final (laboratory) samples	8
6.2.1 Final sample packaging materials	8
6.2.2 Dealing with final samples	8
7 Sampling report	8
Annex A (informative) Determination of mass/volume of a static heap	9
Bibliography	11

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

This first edition is based on EN 1482-3.

A list of all parts in the ISO 14820 series can be found on the ISO website.

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

The establishment of this document for methods of sampling and analysis is of utmost importance to guarantee a uniform application and control of fair trade. Standardized methods of sampling and analysis are essential elements in guaranteeing a high level of quality and safety of fertilizers for the benefit of purchasers. Competent authorities have limited resources for conformity assessment, and these resources are most efficiently deployed at the downstream end of the supply chain. Representative sampling is essential to achieve reliable analytical results.

The fundamental principle of representative sampling is that every particle has an equal chance of being sampled. This principle cannot easily be complied with in the case of bulk static heaps of solid fertilizers as a large proportion of the material cannot practically be reached by any sampling device. Wherever possible, this fertilizer should be sampled during transfer, during the building up of the heap, during dispatch or where it can practically be moved solely for sampling purposes. However, in some cases, sampling in the way described is not practicable. Sampling of static heaps should only be carried out when the product is not in motion.

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Fertilizers and liming materials — Sampling and sample preparation —

Part 3: Sampling of static heaps

1 Scope

This document is applicable to the sampling of mineral fertilizers and liming materials supplied or ready for supply to third parties, as a lot or in smaller lots, where such supply or readiness for supply is subject to legal requirements.

This document specifies plans and methods of sampling of a lot of solid fertilizer or liming material, if sampling in motion is not possible, to obtain samples from bulk static heaps in order to ascertain compliance with legal requirements, in particular in relation to the accuracy of compulsory or permitted statutory declarations. The methods specified in this document are not applicable to obtain samples for physical size analysis or for chemical analysis which may be altered by particle granulometric segregation.

This document is applicable to single nutrient fertilizers, to uniform complex fertilizers and to milled or granulated fertilizers and liming materials.

The methods described in this document are not suitable for sampling other types of fertilizer, for example blended fertilizers.

NOTE The term 'fertilizer' is used throughout the body of this document and includes liming materials unless otherwise indicated.

2 Normative references

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

ISO 14820-1:2016, *Fertilizers and liming materials — Sampling and sample preparation — Part 1: Sampling*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14820-1 and the following 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 fertilizer

solid inorganic material designated for use as a fertilizer including liming materials

3.2

sampling point

point in the sampling unit from which a sub-sample is taken

Note 1 to entry: For the definition of sub-sample/partial sample, see ISO 14820-1:2016, note in 3.5.

3.3

static heap

quantity of fertilizer stored in bulk in a single mass

4 Sampling plans and quantitative data

4.1 General

The objective of sampling is to acquire a representative sample of the lot to establish its composition and properties. The methods to be used for sampling static heaps are specified in the following clauses.

4.2 Characterization of the lot to be sampled

Before a sampling plan is determined, a description of the characteristics of the lot that is intended to be sampled shall be undertaken. In particular, the following physical characteristics shall be noted:

- kind/type (granular, powder, etc.),
- texture (round, pelleted, etc.),
- colour (red, green, brown, white, etc.),
- storage conditions (uncovered/covered),
- foreign matter (note if present/absent).

If the owner of the material is applying the same description and statutory information to the whole lot, sampling should proceed in accordance with this document. Only if there is evidence of deterioration or contamination should consideration be given to the dividing of the lot into parts from which separate samples should be taken.

4.3 Sampling plan

4.3.1 General

The sampling plan shall be determined after the characteristics according to 4.2 have been considered. Any variations from the stated sampling plan shall be documented in written form.

The sampling plan shall define the course of the sampling process, and associated provisions, in reproducible manner.

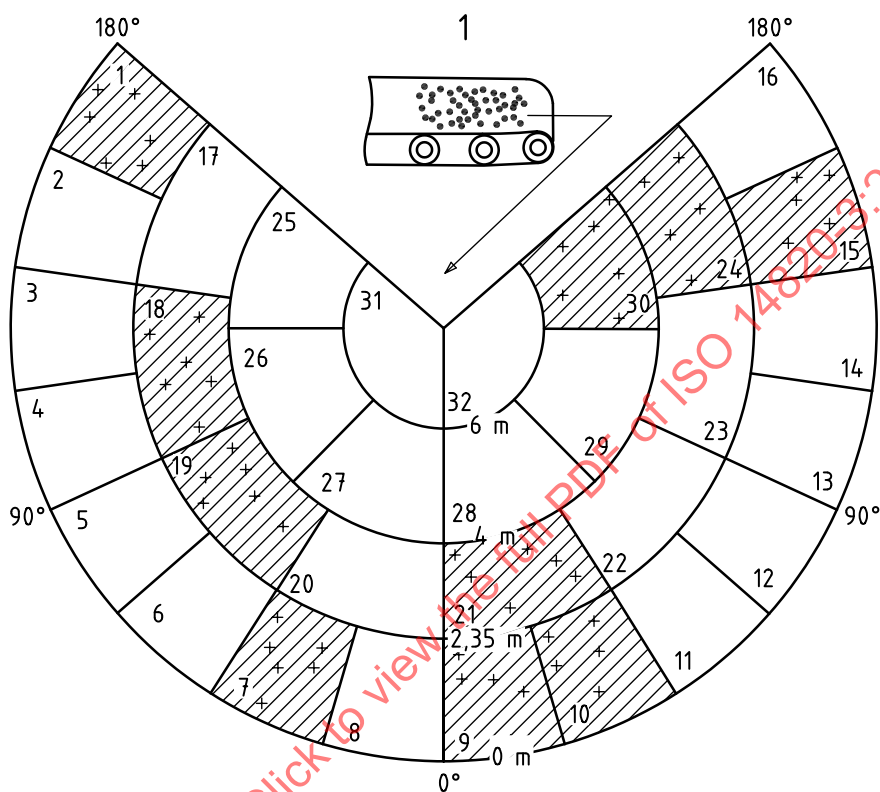
Sampling only around the base of the heap or from a single part of the heap does not supply a representative sample.

4.3.2 Elements of the sampling plan

Within the sampling plan, the following elements shall be stated:

- boundary of the lot,
- determination of the volume/mass of the lot,
- determination of the number and location of sampling units,

- determination of sampling units from which the increments shall be taken,
- if necessary, preparation of a sketch-map of the sampling areas (see [Figure 1](#)),
- determination of the minimum number of sampling points from which sub-samples are to be taken to form the incremental sample,
- determination of minimum volume/mass of increments.



Key

1

conveyor belt

1 to 32

number of sampling units of equivalent surface



10 random selected sampling units for sampling

+

sampling points (random distribution in the sampling unit)

top ring

2 sampling units (180° each)

second ring

6 sampling units (60° each)

third ring

8 sampling units (45° each)

fourth ring

16 sampling units (22,5° each)

Characteristics of the heap:

angle of repose:

36°

base diameter:

12 m

height:

5,3 m

circumference:

37,70 m

ridge:

8 m

volume:

200 m³

Figure 1 — Example of sampling plan for a conical heap (developed)

4.4 Determination of the volume/mass of the lot

The volume/mass of the lot should either be determined by reference to production/purchase/sales records of the owner or, if this is not possible, shall be estimated by the methods described in [Annex A](#).

4.5 Determination of sampling units and sampling points

4.5.1 Determination of the number and location of the sampling units

The total minimum number of sampling units depends on the size of the lot. Each sampling unit will be represented by approximately the same surface area.

4.5.2 Minimum total number of sampling units

The total number of sampling units into which the lot has to be divided shall be determined in accordance with [Table 1](#).

Table 1 — Number of sampling units that the lot needs be divided into

Lot size t	Minimum number of sampling units
25 or less	10
More than 25 and up to 400	The nearest whole even number above the square root of 4 times the quantity, in tonnes, present
More than 400	40

4.5.3 Determination of sampling units from which incremental samples shall be taken

Select randomly a minimum of 10 sampling units from the total number of sampling units determined in accordance with [4.5.2](#) using random number tables or a random number generator. Incremental samples shall be taken from the selected sampling units.

4.5.4 Determination of the minimum number of sampling points from which sub-samples are to be taken

The number of sub-samples to be taken from the material in the selected sampling units shall be determined by reference to the minimum quantity of the incremental sample required according to [4.6.2](#) and the quantity of material delivered on each occasion by the sampling device.

Sub-samples shall comprise a quantity of material taken at randomly selected points in each selected sampling unit. These shall be mixed to form the incremental sample from that unit.

EXAMPLE Minimum quantity of incremental sample 250 g. Sampling device delivers approximately 100 g from each point. Sub-samples to be taken from three randomly selected points in the unit.

4.6 Quantitative data

4.6.1 Determination of the minimum mass of increments

One incremental sample shall be taken from each selected sampling unit.

All increments shall have approximately the same mass.

The required size of each incremental sample shall be considered when choosing the sampling device and the sampling method.

4.6.2 Mass of increments

The incremental sample from any one sampling unit should be at least 250 g. For liming materials coarser than 80 % passing 0,315 mm the mass of each increment should be at least 500 g.

4.6.3 Aggregate/reduced and final samples

Incremental samples from the static heap should be dealt with in accordance with 4.3.2 to 4.3.4 of ISO 14820-1:2016.

5 Incremental sampling methods

5.1 General

All sampling operations should be carried out in such a way as to minimize changes to sample properties, such as moisture content.

In every case, the objective shall be to gain a sample that is representative of the lot with regard to the chemical composition.

An assessment should be carried out to determine any safety measures that should be taken.

5.2 Sampling apparatus

The sampling apparatus shall be clean, dry and inert (i.e. fabricated of materials that will not affect the characteristics of the fertilizers to be sampled).

The sampling apparatus shall be suitable to remove the required volume/mass.

The design of the apparatus for sampling should ensure that

- a complete discharge is possible;
- no contamination of the test material occurs;
- the width of the opening should not be less than three times the size of the largest particle of the fertilizer.

Increments from static heaps can be taken by the following sampling apparatus:

- sampling spear (with or without compartments) (see [Figure 2](#));
- for wet liming materials a tube shovel can be used (see [Figure 3](#)), or other suitable device.



Figure 2 — Sampling spears

Dimensions in millimetres

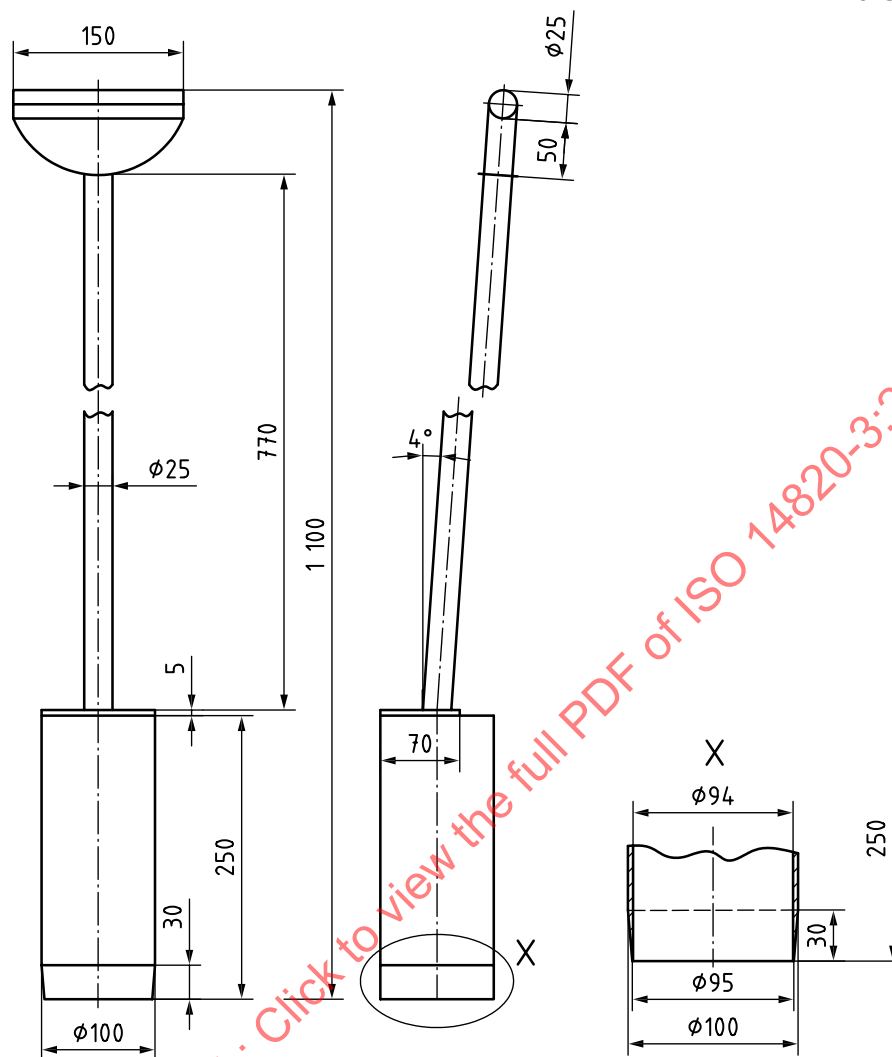


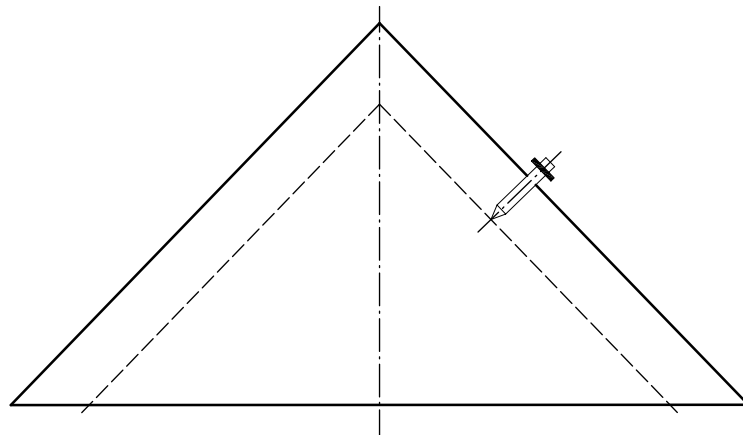
Figure 3 — Sampling tube shovel for wet liming materials

5.3 Procedure

When sampling loose bulk heaps, it is important to get increments not only from the surface layer. The uppermost layer of the heap shall be excluded from sampling if encrustations or other changes are visible that clearly deviate from the whole of the heap. Exclusion of such parts of the test material from sampling shall be documented.

If increments are taken using a sampling spear, insert the spear into the surface at an angle of 45° to the base of the static heap or at right angles to the surface layer (see [Figure 4](#)).

If increments are taken from wet liming materials using a tube shovel, insert the tube shovel into the surface at an angle of 45° to the base of the static heap or at right angles to the surface layer (see [Figure 4](#)).



NOTE The dotted line represents the depth the sampling device can practically reach.

Figure 4 — Sampling of a conical heap using a spear

5.4 Aggregate and reduced samples

All incremental samples shall be mixed together to form an aggregate sample which shall be dealt with in accordance with ISO 14820-1:2016, Clause 6.

6 Final samples

6.1 Division into final samples

Final samples shall be obtained by division of the aggregate sample in accordance with ISO 14820-1:2016, Clause 7.

6.2 Practical arrangements for final (laboratory) samples

6.2.1 Final sample packaging materials

The practical arrangements for final (laboratory) samples shall be in line with the requirements as specified in ISO 14820-1:2016, Clause 8.

6.2.2 Dealing with final samples

Final samples in containers shall be dealt with in accordance with ISO 14820-1:2016, 8.2, 8.3, 8.4, and 8.5.

7 Sampling report

The sampling report shall comply with ISO 14820-1:2016, Clause 9 as appropriate for bulk static heaps.

NOTE It can be advantageous to photograph the heap and include this with the report.