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Sludge, treated biowaste, and soils in the landscape – Sampling – Vocabulary

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Contents

Sommaire

	Seite		Page	Page
Vorwort		Foreword		Avant-propos
Einleitung		Introduction		Introduction
1 Anwendungsbereich		1 Scope		1 Domaine d'application
2 Begriffe		2 Terms and definitions		2 Termes et définitions
Literaturhinweise		Bibliography		Bibliographie

Vorwort

Foreword

Avant-propos

This European Standard (prEN ZZZZ) has been prepared by Technical Committee CEN BT TF151 'Horizontal', the secretariat of which is held by DS.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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1 Anwendungsbereich

1 Scope

This European Standard defines the principal terms used in the following documents for sampling of sludge, treated biowaste, and soils in the landscape:

NOTE The proposed vocabulary is intended also to be in agreement with a terminology usable for sampling of other materials, such as waste.

CSS99031 Sampling of sludge, treated biowaste, and soils in the landscape – Framework for the preparation and application of a sampling plan

CSS99058: Sludge, treated biowaste, and soils in the landscape – Sampling – Part 1: Guidance on selection and application of criteria for sampling under various conditions

CSS99057: Sludge, treated biowaste, and soils in the landscape – Sampling – Part 2: Guidance on sampling techniques

CSS99032: Sludge, treated biowaste, and soils in the landscape – Sampling – Part 3: Guidance on sub-sampling in the field

CSS99059: Sludge, treated biowaste, and soils in the landscape – Sampling – Part 4: Guidance on procedures for sample packaging, storage, preservation, transport and delivery

CSS99060: Sludge, treated biowaste, and soils in the landscape – Sampling – Part 5: Guidance on

1 Domaine d'application

the process of defining the sampling plan

2 Begriffe

2 Terms and definitions

2 Termes et définitions

2.1

analytical error

collective term for the precision and bias associated with the analytical method

2.2

analytical laboratory

laboratory which is to undertake chemical, biological or physical analysis of samples

2.3

background information

information that is essential to understanding the context of sampling

NOTE 1 It consists, amongst other things, of information on the production process and nature of the material, policy aspects and compliance levels set in legislation.

NOTE 2 For soils, this includes information about previous applications of sludge or treated biowaste.

2.4

basic characterization

sampling that is intended to describe the character or quality of a population of material

2.5

characteristic

property, which helps to identify or differentiate between items of a given population

NOTE The characteristic can be either quantitative (by variables) or qualitative (by attributes).

2.6

coefficient of variation

positive random variable standard deviation divided by the mean

[ISO 3534-1:2006, definition 2.38]

EXAMPLE If the standard deviation is 0,99 and the mean is 0,995 the coefficient of variation is $0,99/0,995$, i.e. 0,994 97.

NOTE 1 The coefficient of variation is commonly reported as a percentage.

NOTE 2 The predecessor term 'relative standard deviation' is deprecated by the term coefficient of variation.

2.7

column sample

sample of constant diameter taken vertically or directionally through a liquid to a specified depth

NOTE A type of sample where sampling tubes or similar sampling equipment is used.

2.8

compliance

situation achieved when the sample values from a monitoring programme conform to a pre-defined set of criteria

NOTE 1 Non-compliance occurs when the sample values fail to conform to the predefined criteria.

NOTE 2 Examples of compliance criteria are:

- For compliance the estimated mean should be ≤ 20 mg/kg. An estimated mean > 20 mg/kg is non-compliance;
- For compliance fewer than 3 sample values out of 20 should exceed 50 $\mu\text{g/l}$. 4 or more sample values exceeding 50 $\mu\text{g/l}$ is non-compliance.

2.9

compliance testing

process of testing whether sample values conform to a pre-defined set of criteria

2.10

composite sample

two or more increments / sub-samples mixed together in appropriate proportions – either discretely or continuously – from which the average value of a desired characteristic may be obtained

[after ISO 11074:2005, definition 4.3.3]

2.11

confidence interval

interval within which the value of a particular population parameter can be stated to lie at a specific confidence level

NOTE The bounds of the confidence interval are termed the upper and lower confidence limits.

2.12

confidence level

value $100(1-\alpha)$ of the percentage probability associated with a confidence interval

2.13

constituent

property or attribute of a material that is measured, compared or noted

2.14

core sample

vertical or directional sample taken through the material whereby the integrity of the sub-population is maintained

NOTE A type of sample, more specifically related to the sampling of solids where augers, sampling tubes or similar sampling equipment is used.

2.15

decision maker

party that makes a decision based on the results of the testing programme

2.16

delivery

transfer of custody of the sample

2.17

directional sample

portion of material, usually a one dimensional geometric sample (2.20), which is taken in the direction of the single principal axis of variability of the larger quantity of material from which the sample is taken

NOTE Column samples (2.7) and core samples (2.14) are directional samples, often taken in the vertical direction.

2.18

field sample

quantity (mass or volume) of material obtained through sampling without any sub-sampling

2.19

fundamental variability

inherent variability shown by a material at the smallest scale of measurement

2.20

geometric sample

portion of material of specific shape, with dimensions related to one or more principal axes of variability of the larger quantity of material from which the sample is taken

2.21

heterogeneity

degree to which a constituent is not uniformly distributed throughout a quantity of material

NOTE 1 A material can be homogeneous with respect to one constituent or property, but heterogeneous with respect to another.

NOTE 2 The degree of heterogeneity is the determining factor in sampling uncertainty.

2.22

homogeneity

degree to which a constituent is uniformly distributed throughout a quantity of material

2.23

increment

individual portion of material collected by a single operation of a sampling device which will not be analysed / investigated as a single entity, but will be mixed with other increments in a composite sample

NOTE Whenever the portion of material collected by a single operation of a sampling device is analysed individually, the obtained material is called a sample. In such a situation the quantity of material has to fulfil both the criteria for the size of an increment as well as for a sample.

2.24

involved parties

individuals, groups and / or institutions involved in the (iterative) process of defining and executing the sampling programme

[ISO 11074:2005, definition 4.4.13]

NOTE Such parties include, for instance, the sampler, the analyst, the client, the regulator and the producer of the material.

2.25

judgemental sampling

sampling using methods identified by prior agreement with all involved parties, without sampling in accordance with probabilistic sampling (2.43). Sampling locations are chosen according to the judgement of an expert

NOTE Although, in general, agreement of all parties should be sought, in specific situations the opinions of some parties are to be considered more important than others. Whenever there is a hierarchical relation between the different parties, this should be taken into account when no general agreement can be established.

[after ISO 11074:2005, definition 4.2.4]

2.26

laboratory analyst

person or persons conducting the analysis of the laboratory sample

2.27

laboratory sample

sample intended for laboratory inspection or testing

[ISO 11074:2005, definition 4.3.6]

NOTE 1 The laboratory sample may be further prepared by subdividing, mixing, drying, crushing, grinding, etc., or by combinations of these operations, to produce the test sample. When no preparation of the laboratory sample is required, the laboratory sample is the test sample.

NOTE 2 The laboratory sample is the final sample from the point of view of sample collection but it is the initial sample from the point of view of the laboratory.

NOTE 3 Several laboratory samples may be produced by sub-sampling and sent to different laboratories or to the same laboratory for different purposes.

2.28

mean

arithmetic mean

sum of random variables in a random sample divided by the number of terms in the sum

[after ISO 3534-1:2006, definition 1.15]

NOTE For example, the arithmetic mean of the five values 12; 4; 11; 9 and 6 is 8,4.

2.29

mixing

combining of components, particles or layers into a more homogeneous state

[ISO 11074:2005, definition 4.6.3]

2.30

nominal top size

the size corresponding to the 95 percentile on the cumulative size distribution curve of a material, i.e. the smallest sieve size on which 95 % of the material passes through the sieve

[after ISO 1213-2:1992, definition 3.191]

2.31

objective

underlying motivation for investigating a material

2.32

on-site verification

procedure used to establish if the material received is the type of material expected

2.33

overall population

entire volume of material about which information is required

2.34

packaging

act of placing a sample into an appropriate sample container for transport and/or storage

2.35

particle size reduction

crushing or cutting the sample in order to reduce the particle size of the whole (sub-)sample without reducing the sample size (mass)

NOTE During test sample preparation, particle size reduction might be carried out in the laboratory by crushing and/or grinding.

2.36

percentile

P-percentile of a population is the value below which P% of the values in the population fall, and hence is exceeded by (100-P)% of the population

NOTE For example, if 95 % of the values in a population are less than or equal to the 95-percentile, and 5 % of the population values exceed it.

2.37

physical sampling error

error attributable to the activity of taking the sample

2.38

population

totality of items under consideration

[ISO 3534-1:2006, definition 1.1]

2.39

portion

each of the discrete, identifiable portions of material suitable for removal from a population as a sample or as a sub-sample of a sample, and which can be individually considered, examined, tested or combined

[after ISO 11074:2005, definition 4.1.31]

2.40

precision

closeness of agreement between independent test/measurement results obtained under stipulated conditions

[ISO 3534-2:2006, definition 3.3.4]

NOTE 1 Precision depends only on the distribution of random errors and does not relate to the true value or the specified value.

NOTE 2 The measure of precision is usually expressed in terms of imprecision and computed as a standard deviation of the test results. A lower precision is reflected by a larger standard deviation.

NOTE 3 Quantitative measures of precision depend critically on the stipulated conditions. Repeatability conditions and reproducibility conditions are particular sets of extreme stipulated conditions.

2.41

preservation

procedure used to stabilize a sample in such a way that the properties under examination are maintained stable

[after ISO 11074:2005, definition 4.4.20]

2.42

probabilistic sampling

sampling to ensure that each particle or element in the population has an equal chance of being part of the sample

[after ISO 11074:2005, definition 4.2.10]

NOTE Probabilistic sampling results in boundary conditions for the type of sampling equipment used, the method of sampling (where, when, how) and the minimum size of increments and (composite) samples.

2.43

probability

real number in the scale 0 to 1 attached to a random event

NOTE An event with a probability close to zero is likely to happen infrequently. For example, the probability of obtaining 'heads' in each of 10 consecutive spins of a coin is about 0,001. Conversely, an event with probability close to 1 is likely to happen frequently. For example, the probability of obtaining at least one 'six' when rolling 25 dice is about 0,99.

2.44

probability distribution

function giving the probability that a random variable takes any given value or belongs to a given set of values

NOTE The probability distribution is a mathematical description of the relative frequencies with which different values arise in the population. It is commonly represented graphically, and can be thought of as the curve that the histogram of random sample values would tend towards as the number of samples becomes indefinitely large.

2.45

random sample

sample of n increments taken from a population in such a way that each of the possible combinations of n increments has an equal (known) probability of being taken

2.46

random sampling

process of taking a random sample

2.47

reliability

collective term for the degree of precision and confidence achieved by a given sampling scheme, as distinct from uncertainty of measurement

2.48

representative sample

sample in which the characteristic(s) of interest is (are) present with a sampling reliability appropriate for the purposes of the testing programme

2.49

riffling

separation of a free-flowing sample into (usually) equal parts by means of a mechanical device composed of diverter chutes

[ISO 11074:2005, definition 4.6.7]

2.50

sample

portion of material selected from a larger quantity of material

NOTE 1 The manner of selection of the sample should be described in a sampling plan.

[after ISO 11074:2005, definition 4.1.16]

NOTE 2 The use of the term 'sample' should be supported with a preceding word as far as possible as it does not indicate to which step of the total sampling procedure it is related when used alone e.g. field sample, laboratory sample.

2.51

sample division

process of selecting one or more sub-samples from a sample of a population

[ISO 11074:2005, definition 4.6.9]

2.52

sample size

number of items or the quantity of material constituting a sample

[ISO 11074:2005, definition 4.4.21]

2.53

sampler

person or a group of persons carrying out the sampling procedures at the sampling locality

NOTE Tools and other devices to obtain samples are sometimes also designated 'samplers'. In this case the term 'sampling devices' or 'sampling equipment' should be used.

[after ISO 11074:2005, definition 4.1.17]

2.54

sampling error

that part of the total error (the estimate from a sample minus the population value) associated with using only a fraction of the population and extrapolating to the whole, as distinct from analytical or test error

NOTE It arises from a lack of homogeneity in the investigated population.

[ISO 11074:2005, definition 4.1.20]

2.55

sampling pattern

system of predetermined sampling points designed to monitor one or more specified sites

[ISO 11074:2005, definition 4.2.14]

2.56

sampling plan

predetermined procedure for the selection, withdrawal, on-site pretreatment, preservation, and transportation of a laboratory sample

[after ISO 11074:2005, definition 4.1.22]

2.57

sampling record

report which serves as a check list and which provides information about the sampling techniques applied at the site and any additional important observations

[after ISO 11074:2005, definition 4.4.26]

2.58

sampling technique

all appropriate procedures and sampling devices used to obtain and describe samples of material, either in the field or during transportation and in the laboratory

NOTE The manner of selection of the sampling techniques should be described in a sampling plan.

[after ISO 11074:2005, definition 4.4.28]

2.59

scale

size, mass or volume for assessing the material

NOTE Variations occurring in the material on a finer size, mass or volume are deemed not to be of relevance. Consequently the lowest size, mass or volume for which variability is to be assessed, determines the scale of sampling.

2.60

scale of sampling

stated size, mass or volume that is considered appropriate for assessing the material

NOTE Variations occurring in the material on a finer size, mass or volume will not be determined.

2.61

seal

device or material designed to provide evidence of access

NOTE 1 A seal (sometimes called a tamper-indicating device) is fixed to the container so that it needs to be broken to gain access to the contents.

NOTE 2 A seal does not need to provide resistance to entry; it need only indicate that entry took place.

2.62

simple random sampling

sampling where a sample of n increments is taken from a population in such a way that all the possible combinations of n increments have an equal probability of being taken

[after ISO 3534-2:2006, definition 1.3.4]

2.63

spatial variability

general term for the variability between locations in the material to be sampled

2.64

spot sample

sample of a specified number or size taken from a specified place in the material or at a specified place and time in a stream of material and considered representative of its own immediate or local environment

[after ISO 11074:2005, definition 4.2.19]

NOTE Form of sampling in which each sample is individually analysed (in contrast to composite sampling).

2.65

standard deviation

positive square root of the variance

[ISO 3534-1:2006, definition 2.37]

NOTE This is the most commonly used measure of variability of a data set or statistical population. For example, the standard deviation of the values 3,7; 5,5; 2,8; 9,1 and 6,0 is 2,43.

2.66

storage

process and the result of keeping a sample available under predefined conditions for a (usually) specified time interval between collection and further treatment or analysis of the sample

[after ISO 11074:2005, definition 4.4.22]

2.67

stratified sampling

in a population which can be divided into mutually exclusive and exhaustive sub-populations (called strata), sampling carried out in such a way that specified proportions of the sample are drawn from the different strata and each stratum is sampled with at least one sampling unit

[ISO 11074:2005, definition 4.2.21]

NOTE The objective of taking stratified samples is to obtain a more representative sample than that which might otherwise be obtained by random sampling.

2.68

stratum

strata are mutually exclusive and exhaustive parts of a population. They are identified either because they are believed to be different from each other or for the purposes of sampling

2.69

sub-population

defined part of the population that will be targeted for the purposes of sampling

2.70

sub-sample

quantity (mass or volume) of material obtained by procedures in which the characteristics of interest are randomly distributed

NOTE 1 A sub-sample might be:

- a) portion of the sample obtained by selection or division; or
- b) individual unit of the sub-population taken as part of the sample; or
- c) final unit of multi-stage sampling.

NOTE 2 The term 'sub-sample' is used either in the sense of a 'portion of a sample' or as a synonym for 'unit'. In practice, the meaning is usually apparent from the context or is defined.

2.71

sub-sampling

process of selecting one or more sub-samples from a sample of a population

[ISO 11074:2005, definition 4.6.9]

2.72

systematic error

bias

difference between the expectation of a test result or measurement result and a true value

[ISO 3534-2:2006, definition 3.3.2]

NOTE Bias is a systematic tendency for the observations in a set of samples to be displaced above or below the true or accepted value.

2.73

systematic sampling

sampling according to a methodical plan

[ISO 3534-2:2006, definition 1.3.12]

2.74

technical goals

objectives of a testing programme translated into specific, measurable, action-oriented objectives

2.75

temporal variability

general term for variability through time

2.76

test sample

analytical sample

sample, prepared from the laboratory sample, from which test portions are removed for testing or for analysis

2.77

testing programme

total sampling operation, from the first step in which the objectives of sampling are defined to the last step in which data is analysed against the objectives

2.78

uncertainty

estimate attached to a test result which characterizes the range of values within which the true value is asserted to lie

NOTE In general, uncertainty of measurement or test comprises many components. Some of these can be estimated on the basis of the statistical distribution of the results of a series of measurements and can be characterized by standard deviations. Estimates of other components can only be based on experience or other information.

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