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Trdna alternativna goriva - Metode za vzorčenje

Solid recovered fuels - Methods for sampling

Feste Sekundärbrennstoffe - Verfahren zur Probenahme

Combustibles solides de récupération - Méthodes d'échantillonnage

Ta slovenski standard je istoveten z: EN 15442:2011

ICS:

75.160.10	Trda goriva	Solid fuels

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EUROPEAN STANDARD

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English Version

Solid recovered fuels - Methods for sampling

Combustibles solides de récupération - Méthodes d'échantillonnage

Feste Sekundärbrennstoffe - Verfahren zur Probenahme

This European Standard was approved by CEN on 22 January 2011.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 15442:2011) has been prepared by Technical Committee CEN/TC 343 “Solid recovered fuels”, the secretariat of which is held by SFS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2011, and conflicting national standards shall be withdrawn at the latest by September 2011.

This document supersedes CEN/TS 15442:2006.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document is one of a series of European Standards dealing with solid recovered fuel.

EN 15442, *Solid recovered fuels — Methods for sampling.*

EN 15443, *Solid recovered fuels — Methods for the preparation of the laboratory sample.*

EN 15413[1)], *Solid recovered fuels — Methods for the preparation of the test sample from the laboratory sample.*

This document differs from CEN/TS 15442:2006 mainly as follows:

a) results of interlaboratory tests supplemented as an informative Annex F;

b) whole document editorially revised.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1) To be published.

Introduction

The testing of solid recovered fuel enables informed decisions about their subsequent handling and use. In order to carry out a test on a solid recovered fuel a sample of the material is required. Before any sampling operation is devised it is important that the objectives for sampling are clearly identified and subsequently well executed to ensure that the expectations of any involved parties are recognized and satisfied. The identification of objectives helps to define the level of testing required, e.g. thorough examination or routine testing and in addition desired reliability of testing / assessment and frequency of testing. The sampling objectives, along with the sequence of operations required to fulfill them are detailed in an overall sampling plan. After a sampling plan has been prepared the sampling of solid recovered fuels (SRF's) itself can be implemented.

Figure 1 shows the links between the essential elements of a testing program.

Sampling procedures are provided for a range of process streams and common storage conditions. The sampling technique adopted depends on a combination of different characteristics of the material and circumstances encountered at the sampling location. The determining factors are:

— the type of solid recovered fuel;

— the situation at the sampling location / the way in which the material occurs (e.g. in a stockpile, on a conveyor belt, in a lorry);

— the (expected) degree of heterogeneity (e.g. monostreams, mixed fuels, blended fuels).

This European Standard is primarily geared toward laboratories, producers, suppliers and purchasers of solid recovered fuels, but is also useful for the authorities and inspection organizations.

Standards for sampling of solid biofuels are available from Technical Committee CEN/TC 335 “Solid biofuels” CEN/TR 14589:2003, CEN/TR 15018:2005 and CEN/TR 15310:2006 for the sampling for the purpose of the characterization of waste are available from CEN/TC 292.

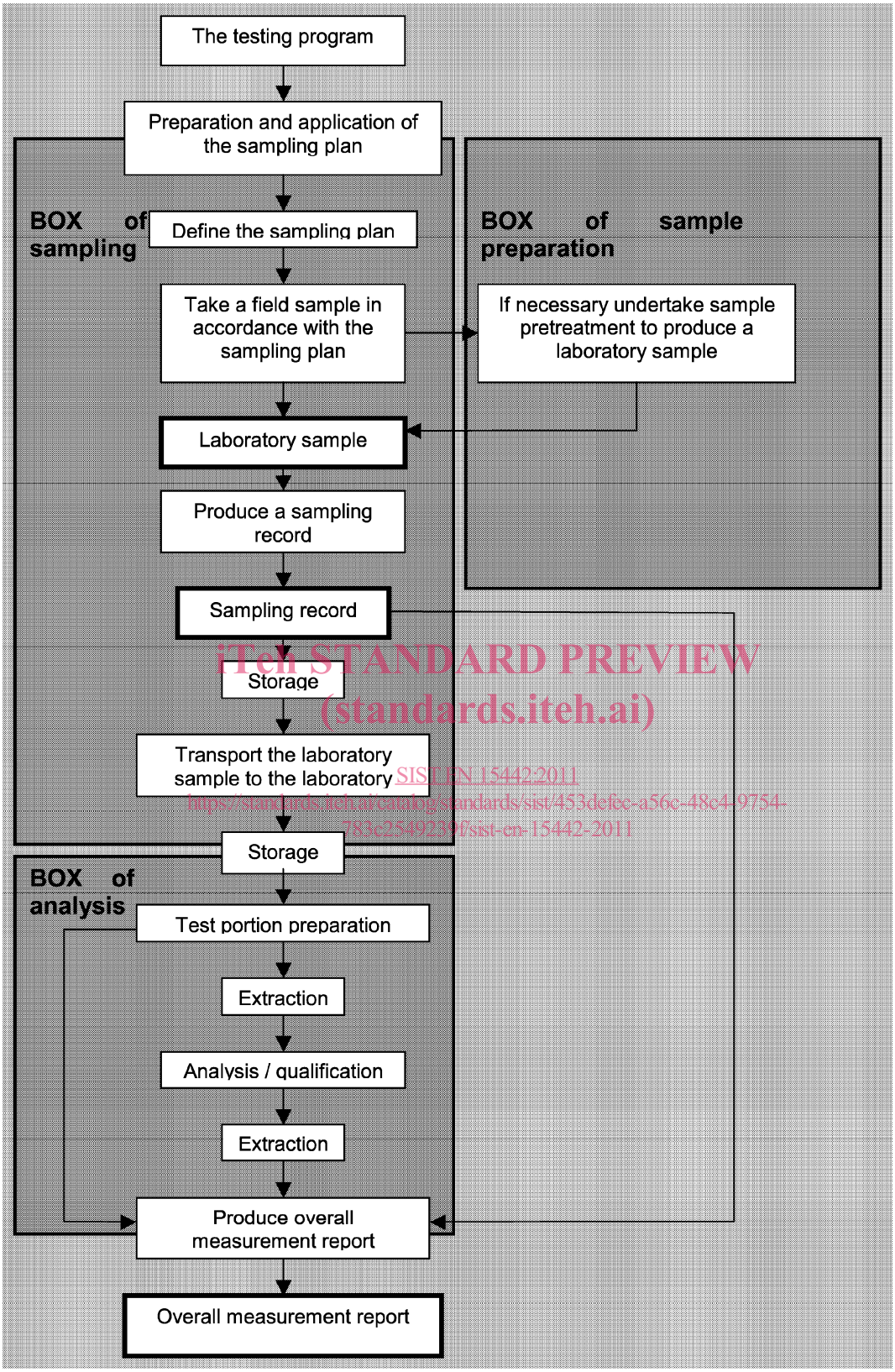

Figure 1 — Links between the essential elements of a testing program

1 Scope

This European Standard specifies methods for taking samples of solid recovered fuels for example from production plants, from deliveries or from stock. It includes manual and mechanical methods.

It is not applicable to solid recovered fuels that are formed by liquid or sludge, but it includes dewatered sludge.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 15357:2011, *Solid recovered fuels — Terminology, definitions and descriptions*

CEN/TS 15401:2010, *Solid recovered fuels — Determination of bulk density*

EN 15413[2)], *Solid recovered fuels — Methods for the preparation of the test sample from the laboratory sample*

EN 15415-1[2)], *Solid recovered fuels — Determination of particle size distribution — Part 1: Screen method for small dimension particles*

EN 15443, *Solid recovered fuels — Methods for the preparation of the laboratory sample*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15357:2011 and the following apply.

3.1
coefficient of variation
estimate of the standard deviation of a population from a sample of n results divided by the mean of that sample. Frequently stated as a percentage

NOTE Adapted from Eurachem/Citac Guide CG 4 [26].

3.2
duplicate sample
two samples taken under comparable conditions, whereby this selection can be accomplished by taking units adjacent in time or space

NOTE 1 Although the replicate samples are expected to be identical, often the only thing replicated is the act of taking the physical sample.

NOTE 2 A duplicate sample is a replicate sample consisting of two portions.

NOTE 3 The replicate sample is usually used to estimate sample variability.

3.3
effective increment size
minimum sample size divided by the number of increments

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2) To be published.

NOTE The effective increment size should never be smaller than the minimum increment size.

3.4
effective sample size
effective increment size multiplied by the number of increments

NOTE The effective sample size should never be smaller than the minimum sample size.

3.5
granular
more or less spherical or cubic

3.6
heterogeneity
degree to which a property or type of particle of a solid recovered fuel component is not uniformly distributed throughout a quantity of material

3.7
homogeneity
degree to which a property or a type of particle of a solid recovered fuel component is uniformly distributed throughout a quantity of material

3.8
increment
portion of fuel extracted in a single operation of the sampling device

3.9
lot
defined quantity of fuel for which the quality is to be determined

3.10
minimum increment size
minimum dimension or size of the increment that is taken from a lot, from the point of view of preserving its representativeness

NOTE The product of the minimum increment size and the number of increments to be taken should never be smaller than the minimum sample size.

3.11
minimum sample size
minimum sample size or dimension of the sample required during sampling and sample preparation from the point of view of preserving its representativeness

NOTE The minimum sample size is equal to the effective increment size multiplied by the number of increments, and is linked directly to the nominal top size.

3.12
nominal top size
d_{95}
aperture size of the sieve used for determining the particle size distribution of solid fuels through which at least 95 % by mass of the material passes

3.13
precision
closeness of agreement between independent test/measurement results obtained under stipulated conditions

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 or measurement results. Less precision is reflected by a larger standard deviation.

NOTE 3 Quantitative measures of precision depend critically on the stipulated conditions.

NOTE 4 Adapted from ISO 3534-2:2006.

3.14
random sampling
taking a sample at a random location within a specified range or from a specified lot. A random location is determined by lot

3.15
repeatability
precision under repeatability conditions

NOTE 1 Adapted from ISO 3534-2:2006.

NOTE 2 Repeatability can be expressed quantitatively in terms of the dispersion characteristics of the results.

3.16
reproducibility
precision under reproducibility conditions

NOTE 1 Adapted from ISO 3534-2:2006.

NOTE 2 Reproducibility can be expressed quantitatively in terms of the dispersion characteristics of the results.

NOTE 3 Results are usually understood to be corrected results.

3.17
sample
quantity of material, representative of a larger quantity for which the quality is to be determined

3.18
sample preparation
actions taken to obtain representative analysis samples or test portions from the original sample

3.19
sampling
process of drawing or constituting a sample

NOTE Adapted from ISO 3534-1:2006 [22].

3.20
sampling plan
predetermined procedure for the selection, withdrawal, preservation, transportation and preparation of the portions to be removed from a lot as a sample

NOTE Adapted from ISO 11074:2005 [23].

3.21
sampling record
report which serves as a check list and provides the investigator with all necessary information about the sampling techniques applied at the site and any additional important information

NOTE Adapted from ISO 11074:2005.

3.22
shape factor
factor that corrects the minimum sample size if the particles in a lot have not a regular shape (e.g. spherical or cubic)

3.23
static lot
lot that is not in motion during the sampling, or transported by a conveyor or alternative transport system

3.24
stratified sampling
sampling consisting of portions obtained from identified subparts (strata) of the parent population

3.25
stratified random sampling
sampling consisting of portions obtained from identified subparts (strata) of the parent population

NOTE Within each stratum, the samples are taken randomly.

3.26
test portion
sub-sample either of a laboratory sample or a test sample required for the specific measurement

3.27
trueness
closeness of agreement between the expectation of a test result or a measurement result and a true value

NOTE 1 Adapted from ISO 3534-2:2006.

NOTE 2 The measure of trueness is usually expressed in terms of bias.

NOTE 3 Trueness is sometimes referred to as "accuracy of the mean". This usage is not recommended.

NOTE 4 In practice, the accepted reference value is substituted for the true value.

NOTE 5 The determination of the exact trueness for waste and from waste derived materials such as solid recovered fuels is by definition not possible.

4 Symbols and abbreviated terms

For the purposes of this document, the following symbols and abbreviated terms apply.

b is the breadth of the flow, in m

cv is the coefficient of variation

d_{05} is the nominal minimum size (a mass fraction of 5 % of the particles are smaller than $\boldsymbol{d_{05}}$), in mm

d_{95} is the nominal top size of a particle (a mass fraction of 95 % of the particles are smaller than $\boldsymbol{d_{95}}$), in mm

g is the correction factor for distribution in the particle size

G is the conveyor load, in kg/m

λ_b is the bulk density of the solid recovered fuel, in kg/m^3

λ_p is the particle density, in kg/m^3

m is mass, in kg

n is the number of increments to be taken per lot

p is the fraction of the particles with a specific characteristic (such as a specific contaminant), in kg/kg, and is equal to 0,1

Φ_f is the bulk density of the flow, in kg/m^3

Φ_d is the drop flow, in kg/s

f is the shape factor, in m^3/m^3

V is volume, in m^3

v is conveyor velocity, in m/s

5 Principle

Every particle in the lot or sub-lot to be represented by the sample should have an equal probability of being included in the sample. When this principle cannot be applied in practice, the sampler shall note the limitations in the sampling plan.

6 Development of a sampling plan

6.1 Principle

From a pre-defined lot of solid recovered fuel, samples shall be taken representatively on the basis of a sampling plan that shall be drawn up before the sampling takes place. Annex A specifies how this sampling plan shall be made. Annex J specifies simplified sampling plans for three common situations according to this clause and Annex A. Figure 2 determines whether a simplified sampling plan can be used.

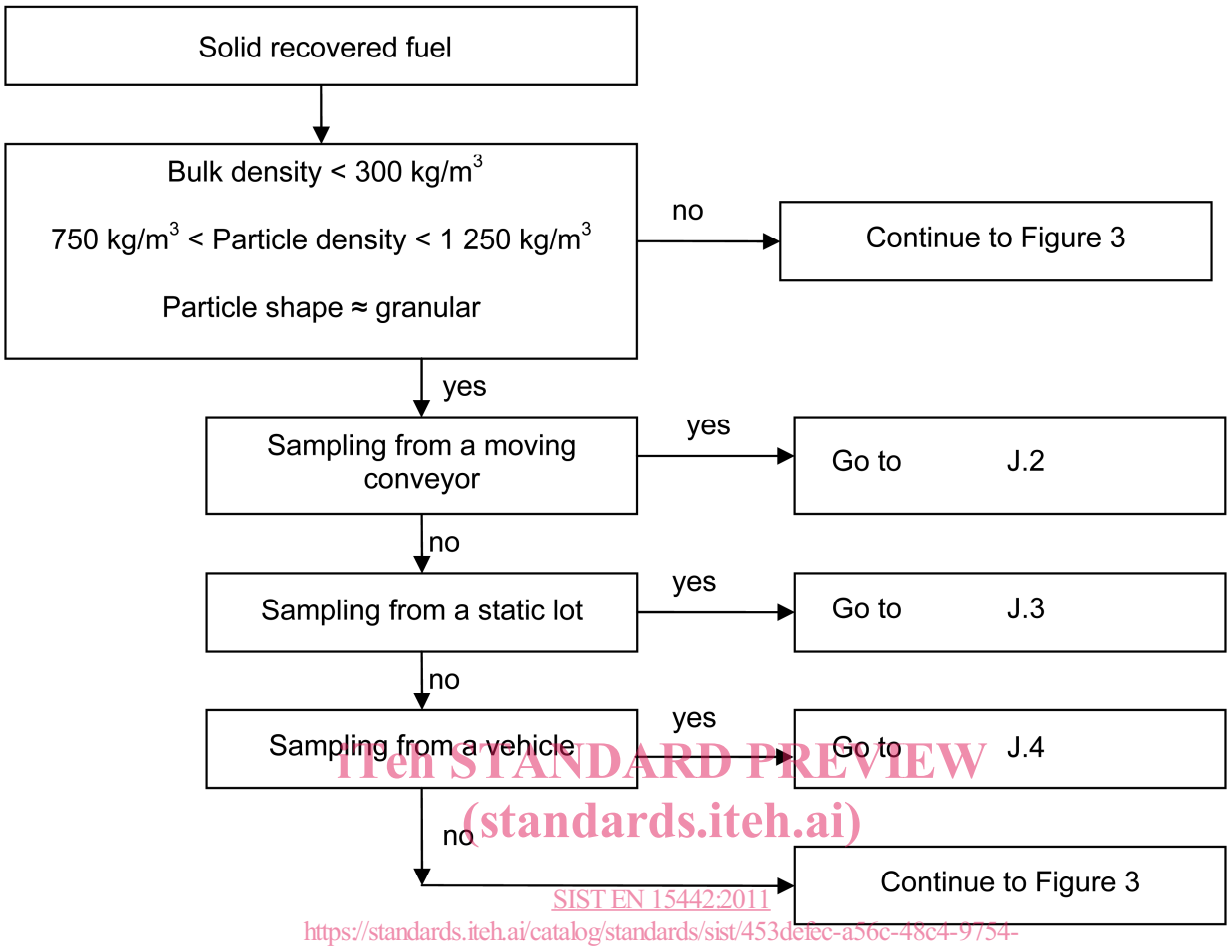

Figure 2 — Check for the standard sampling plan

The sampling plan shall be drawn up on the basis of the objective for the sampling process, using the available data on a solid recovered fuel and the accessibility of the lot, see Annex B. The sampling plan shall be completed. If certain estimates concerning specific parameters relating to the lot cannot be determined with sufficient certainty on the basis of the information available, these shall be verified in the field. If necessary, the sampling plan shall be adjusted in the field and the deviations shall be reported in the sampling record. Figure 3 shows the actions that are necessary for the development of a sampling plan.

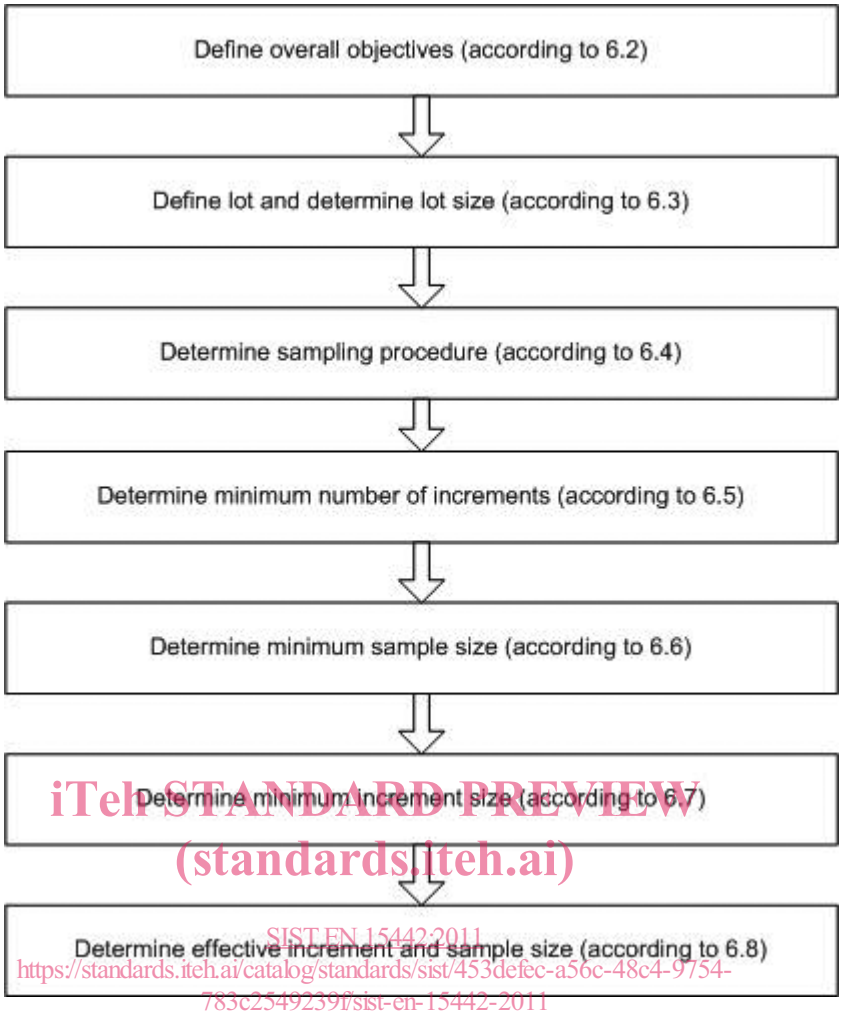

Figure 3 — Necessary elements for the development of a sampling plan

6.2 Definition of overall objectives

The sampling plan shall specify the objectives of the sampling program through consultation with all involved parties. These involved parties are e.g. the client, the producer of the solid recovered fuel, the sampler. The sampling plan shall specify the primary objectives of the sampling program. The sampling plan shall meet the requirements of objectives. If it is not possible to meet all requirements following the objectives for sampling in one single document sampling plan, two or more sampling plans shall be made in order to achieve adequate sampling plans for all objectives.

The sampling plan(s) shall identify any special precautions to be followed where the solid recovered fuel to be sampled is hazardous to human health.

6.3 Definition of a lot and determining lot size

6.3.1 General

The lot shall be defined on the basis of the way in which the material is or has been produced and/or is offered (upon delivery, upon acceptance, upon storage or in store, for instance). The lot size relates to a quantity of material delivered on the basis of one specification and production process. This material is agreed on by contract as a unit, and is identifiable as such. The maximum weight of a lot or sub-lot, for sampling purposes, shall be no more than $1{,}5 \times 10^6$ kg.