

Desk study 33-1 "Sample pre-treatment for soil, sludge and biowaste"

ANNEX 1 – Tables

Table 1 – Project Horizontal – examined standards concerning the current practices on pre-treatment of soil, sludge and bio-waste samples prior to chemical analysis of inorganic constituents and physico-chemical measurements

Standard	Title	Suitable for
national standards		
DIN 19734 : 1999	Soil quality – Determination of chromium(VI) in phosphate extract	soil, soil material
DIN 19738 : 2004	Soil quality – Absorption availability of organic and inorganic pollutants from contaminated soil material	soil, soil material
DIN 38406-6 : 1998	German standard methods for the examination of water, waste water and sludge – Cations (group E) – Part 6: Determination of lead by atomic absorption spectrometry (AAS) (E 6)	water, waste water, sludge
DIN 38414-4 : 1984	German standard methods for the examination of water, waste water and sludge; sludge and sediments (group S); determination of leachability by water (S 4)	sludge
draft NEN 5709 : 2004	Soil – sample pretreatment for determination of organic and anorganic parameters in soil	soil
CEN standards		
CEN/TC 308/WG 1/TG 4 N0058	Sludge quality – pre-treatment of sludge for subsequent analysis (2003)	sludge, sediment
EN 1233 : 1996	Water quality – Determination of chromium – Atomic absorption spectrometric methods	water, sludge, sediment
EN 1744-3 : 2002	Tests for chemical properties of aggregates – Part 3: Preparation of eluates by leaching of aggregates	waste, soil material
EN 12457-4 : 2002	Characterisation of waste – Leaching – Compliance test for leaching of granular waste materials and sludges – Part 4: One stage batch test at a liquid to solid ratio of 10 l/kg for materials with particle size below 10 mm (without or with size reduction)	waste, sludge, soil, soil material
EN 12506 : 2003	Characterization of waste – Analysis of eluates – Determination of pH, As, Ba, Cd, Cl ⁻ , Co, Cr, Cr VI, Cu, Mo, Ni, NO ₂ ⁻ , Pb, total S, SO ₄ ²⁻ , V and Zn	waste, soil material
EN 12579 : 1999	Soil improvers and growing media – Sampling; German version EN 12579 : 1999	Soil improvers, growing media
EN 13037 : 1999	Soil improvers and growing media – Determination of pH	Soil improvers, growing media
EN 13040 : 1997	Soil improvers and growing media – Sample preparation for chemical and physical tests, determination of dry matter content, moisture content and laboratory compacted bulk density	Soil improvers, growing media
prEN 13346 : 2000	Characterization of sludges – Determination of trace elements and phosphorus – <i>Aqua regia</i> extraction methods	sludge, sludge products, sediment
EN 13657 : 2002	Characterization of waste – Digestion for subsequent determination of <i>aqua regia</i> soluble portion of elements	soil, waste, soil material

Standard	Title	Suitable for
CEN ISO standards		
EN ISO 5961 : 1995	Water quality – Determination of cadmium by atomic absorption spectrometry (ISO 5961:1994)	water, sludge, sediment
EN ISO 11885 : 1997	Water quality – Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy (ISO 11885: 1996)	water, sludge, sediment
EN ISO 15587-1 : 2002	Water quality – Digestion for the determination of selected elements in water – Part 1: <i>Aqua regia</i> digestion (ISO 15587-1:2002)	water
EN ISO 15587-2 : 2002	Water quality – Digestion for the determination of elements in water – Part 2: Nitric acid digestion (ISO 15587-2:2002)	water
EN ISO 17294-2 : 2004	Water quality – Application of inductively coupled plasma mass spectrometry (ICP-MS) – Part 2: Determination of 62 elements (ISO 17294-2:2003)	water
ISO standards		
ISO 5667-3 : 2003	Water quality – Sampling – Part 3: Guidance on the preservation and handling of water samples	water
ISO 5667-13 : 1997	Water quality – Sampling – Part 13: Guidance on sampling of sludges from sewage and water-treatment works	sludge
ISO 5667-15 : 1999	Water quality – Sampling – Part 15: Guidance on preservation and handling of sludge and sediment samples	sludge
ISO 10381-1 : 2002	Soil quality – Sampling – Part 1: Guidance on the design of sampling programmes	soil
ISO/FDIS 10381-8 : 2005	Soil quality – Sampling – Part 8: Guidance on the sampling of stockpiles	soil
ISO 10390 : 2005	Soil quality – Determination of pH	soil
ISO 10694 : 1995	Soil quality -- Determination of organic and total carbon after dry combustion (elementary analysis)	soil
ISO 11277 : 1998	Soil quality – Determination of particle size distribution in mineral soil material – Method by sieving and sedimentation	soil
ISO/FDIS 11464 : 2005	Soil quality – Pretreatment of samples for physico-chemical analyses	soil
ISO 11465 : 1993	Soil quality Determination of dry matter and water content on a mass basis – Gravimetric method	soil
ISO 11466 : 1995	Soil quality – Extraction of trace elements soluble in <i>aqua regia</i>	soil
ISO 13878 : 1998	Soil quality -- Determination of total nitrogen content by dry combustion ("elemental analysis")	soil
ISO 14507 : 2003	Soil quality – Pretreatment of samples for determination of organic contaminants	soil
ISO 14869-1 : 2001	Soil quality – Dissolution for the determination of total element content – Part 1: Dissolution with hydrofluoric and perchloric acids	soil, soil material
ISO 14869-2 : 2002	Soil quality – Dissolution for the determination of total element content – Part 2: Dissolution by alkaline fusion	soil, soil material
ISO 14870 : 2001	Soil quality – Extraction of trace elements by buffered DTPA solution	soil, soil material
ISO 16720 : 2005	Soil quality – Pretreatment of samples by freeze-drying for subsequent analysis	soil, sediment
ISO 16772 : 2004	Soil quality – Determination of mercury in <i>aqua regia</i> soil extracts with cold- vapour atomic spectrometry or cold-vapour atomic fluorescence spectrometry	soil
ISO/DIS 19730 : 2005	Soil quality – Extraction of trace elements in soils using ammonium nitrate solution	soil

Table 2a – Pre-treatment requirements given in most relevant existing standards – comparison of ISO/FDIS 11464, draft NEN 5709, ISO 5667-13, ISO 5667-15 and document CEN/TC 308/WG 1/TG 4 N0058

Clause	ISO/FDIS 11464	draft NEN 5709	ISO 5667-13	ISO 5667-15	CEN/TC 308/WG 1/TG 4 N0058
Scope	Specifies the <u>pre-treatments</u> required for <u>soil</u> samples that are to be subjected to <u>physico-chemical analyses of stable and non-volatile</u> parameters and describes the following five types of pre-treatment of samples: <u>drying, crushing, sieving, dividing and milling</u> .	This standard draft describes the <u>pre-treatment of soil</u> samples in the <u>laboratory</u> that precedes the determination of <u>organic and anorganic</u> parameters. The objective of the described pre-treatment methods is the preparation of a suitable test sample...	Gives guidance on the sampling of <u>sludges</u> from wastewater treatment works, water treatment works and industrial processes. It is applicable to all types of sludge arising from these works and also to sludges of similar characteristics, for example septic tank sludges.	Provides guidance on the procedures for preservation and handling of sewage and waterworks <u>sludges</u> , suspended matter, and saltwater and freshwater <u>sediments</u> for subsequent analysis.	This standard specifies the pre-treatment required for <u>sludge</u> samples that are to be subjected to physico-chemical analysis and describes the following types of pre-treatment of samples: storage, drying and sieving.
Principle	Soil samples are <u>dried in air</u> , or in an <u>oven</u> at temperature not exceeding 40 °C, or freeze-dried. If necessary, the soil sample is <u>crushed</u> while still damp and friable and again after drying. The soil is <u>sieved</u> and the fraction smaller than <u>2 mm</u> is divided into portions mechanically or by hand, to enable representative sub-sampling for analysis. If <u>small sub-samples</u> (< 2 g) are required for analysis, the size of the particles of the fraction smaller than 2 mm is further decreased. NOTE In this International Standard, it is generally assumed that at least <u>500 g of fresh soil</u> is available.	The objective of the described pretreatment methods is the preparation of a suitable test sample that contains a percentage of the compound(s) that is to be determined that, in turn, resembles as closely as possible the percentage in the original soil sample. The <u>method used for the pre-treatment will depend on the substances or the group(s) of substances</u> that are to be determined. A distinction is made in relation to the above between three categories: volatile compounds, moderately volatile compounds and non-volatile compounds. Test samples are taken of the <u>cored</u> sample ... The <u>sample is dried at 40 °C or 75 °C</u> and, next, pre-treated using one of the described techniques (9.4) to determine non-volatile compounds. The <u>integrated pre-treatment</u> method discussed in 9.5 is based on a <u>field wet</u> sample that is <u>pre-treated after refrigeration with liquid nitrogen</u> or fixed carbon dioxide after which it goes through a <u>grinding</u> process.			In the analysis of <u>sludges</u> , various and high <u>water contents</u> of the sludge may cause difficulties. As long as a sludge sample is <u>not proof (solid)</u> treat it like a <u>sludge</u> sample otherwise like a <u>soil</u> sample according ISO-CD 11464)
Procedure: General	The sample shall be rehomogenized after any separation, sieving, crushing or milling operation (that may have resulted in segregation of different sized particles) has been carried out.				

Clause	ISO/FDIS 11464	draft NEN 5709	ISO 5667-13	ISO 5667-15	CEN/TC 308/WG 1/TG 4 N0058
Centrifugation and Filtration					<p><u>Centrifugation</u> Sludge can be centrifuged in the centrifuge ... to achieve a lower water content. After centrifugation the remaining water can be removed.</p> <p><u>Filtration</u> To obtain a sample with a lower water content the samples can also be filtrated through a suction filter. The filter cake can be dried in the oven or by freeze drying afterwards. Some of the inorganic parameters can be analysed directly out of the remaining water.</p>
Drying: General	Dry the complete sample in <u>air</u> or in a ventilated drying <u>oven</u> from which the moist air is removed or in a <u>freeze dryer</u> .	Dry the sample in the <u>air</u> or in a <u>dessication stove</u> which will remove the wet air. A <u>freeze-drier</u> can also be used. The objective of the drying process is to obtain a sample that can be ground ...			Dry the sample in a drying <u>oven</u> or in a <u>freeze drier</u> .
Air drying	It is essential that <u>direct sunlight be avoided</u> and the temperature <u>does not exceed 40 °C</u> .	Spread the complete sample in a thin layer on a base that absorbs (soil) moisture as little as possible and does not release contaminants. REMARK <u>Avoid direct sunlight</u> .			
Oven drying	... dry at a temperature that is <u>not higher than 40 °C</u> .	Spread the complete soil sample in a thin layer on a tray and dry it in the dessication stove at <u>40 °C or 75 °C</u> .			Sludge samples are dried in an <u>oven</u> at a temperature <u>not exceeding 105 °C</u> until the mass constance is reached <u>or freeze dried</u> . After drying the sludge sample can be sieved.
Freeze-drying	Freeze-drying shall be performed according to <u>ISO 16720</u> .	Dry the complete soil sample in the freeze-drier according to <u>ISO/DIS 16720</u> or the available rules and regulations.			Dry the sludge in the freeze drier. If heavy metals shall be analysed, fill the sample into porcelain dishes and carry out the freeze drying.

Clause	ISO/FDIS 11464	draft NEN 5709	ISO 5667-13	ISO 5667-15	CEN/TC 308/WG 1/TG 4 N0058
Chemical drying					Drying with sodium sulphate / Drying with sodium sulphate can only be used, if the dry content is bigger than 85%.
Separation of stones, etc.	Before crushing ... <u>extraneous matters such as stones, fragments of glass and rubbish should be removed</u> from the dried sample. This process may be facilitated by the use of a <u>2 mm sieve</u> and by hand picking. Determine and record the mass of any matter removed at this stage.	<u>Only the parts that cannot be ground need be removed</u> and weighed in relation to breaking. Determine the mass of the sample that is ground and of the parts that cannot be ground to 0.1 g			
Crushing	If a <u>2 mm sieve</u> has been used to facilitate removal of extraneous matter, any <u>large dried particles</u> remaining on the 2 mm sieve <u>should be crushed</u> (using suitable apparatus) to less than 2 mm. If a <u>2 mm sieve</u> has not been used to facilitate removal of extraneous matter, then the dried sample should be sieved through a 2 mm sieve. <u>Any large dried particles remaining on the 2 mm sieve should be crushed</u> (using suitable apparatus) to less than 2 mm.	<u>Non-volatile compounds</u> Make the <u>dried</u> soil fine until you obtain particles that are no larger than <u>2 mm</u> . The required device must be adjusted or used in such a way that the <u>original particles that are smaller than 2 mm are made smaller as little as possible</u> . <u>Integrated method (non-volatile and moderately volatile compounds):</u> Add a coolant, for example, liquid nitrogen or fixed carbon dioxide, if moderately volatile compounds are also being determined, Stir the coolant through the sample before starting the grinding treatment. Make the wet field soil particles smaller to <u>$D_{95} < 2 \text{ mm}$</u> . Make smaller to <u>$D_{95} < 500 \mu\text{m}$</u> , if also moderate volatile substances are being determined, it must take place below 0 °C [140 g]	<u>particle size</u> For some types of liquid sludge, particularly raw sewage sludge, gross atypical solids, such as rags, may be removed by passing the sample through a stainless steel or plastics screen of aperture size not less than 5 mm.		Sieving and crushing is applied to dried samples. With the help of a sieve (2 mm) sieve the dried sample. Remove alien elements (f.e. glass, .) from the fraction remaining on the sieve.
Sub-sampling: General	Sub-sampling is necessary when the sample cannot be stored. For the preparation of a <u>laboratory sample</u> , divide the dried, crushed and sieved sample (now < 2 mm) into representative portions of 200 g to 300 g For the preparation of a test sample, split up the laboratory sample into representative portions until the required sizes of samples are obtained. NOTE In case of larger sample masses sub-sampling methods according to <u>ISO 10381-8</u> shall	Sample division is necessary when the sample cannot be stored or cannot be treated as a whole due to its size (division into a test sample). Divide the dried and ground sample ... in order to obtain a sub-sample/test sample. A calculation of the <u>minimum quantity sample as a function of the particle size</u> is given.	sample of <u>sludge cake</u> : Sample size reduction is, therefore, best carried out in the field <u>by coning and quartering</u> . Sludges that have a <u>gelatinous appearance</u> <u>Mixing, such as that employed for the hand or</u>		

Clause	ISO/FDIS 11464	draft NEN 5709	ISO 5667-13	ISO 5667-15	CEN/TC 308/WG 1/TG 4 N0058
	be achieved to reduce the initial sample size.		<u>mechanical preparation of cement mortar</u> , may be more appropriate. Division into sub-samples can still be achieved by the combination of diametrically opposed quarters.		
Sub-sampling by hand (quartering)	Mix the soil sample thoroughly using a suitable mechanical mixer and spread it into a thin layer on a tray of a type which will not influence the composition of the sample. Separate the soil into four equal portions (quadrants). Combine two of the four portions diagonally, rejecting the other two. Repeat this procedure until the desired amount of soil is obtained.	Mix the soil sample as best as is possible and, next, scatter it in a thin layer on a base that will influence the composition of the sample as little as possible (for example, paper or plastic). Next, divide the soil in four equal parts (quadrants) and combine the parts that are diagonally opposite to each other. After the division, the mass of the two sub-samples must fall in the interval (50 ± 10) % of the initial quantity for all quartering steps. <u>Integrated method (non-volatile and moderately volatile compounds):</u> The soil sample is treated while (field) wet in relation to this method. Take at least 140 g of sample material from the original sample with a core sampler as the sample to be pre-treated. Take at least ten random cores over the complete height of the sample.			
Mechanical subsampling	A variety of appropriate equipment for sub-sampling is available, often manufactured according to national standards. These may be used for sub-sampling in accordance with the appropriate national standard and the manufacturer's instructions.	<ul style="list-style-type: none"> - Dividing with a sample divider - Rotation divider - Static slotted divider - Sampling with one handful - Dividing with a core sampler 			
Milling	If a test sample of less than 2 g is to be taken for the analysis, it is preferable that the whole sub-sample be milled to a particle size < 250 µm prior to further sub-sampling for analysis. Mill a representative sub-sample of the dried, crushed and sieved soil. Milling shall be continued until the complete sub-sample just passes through a sieve of 250 µm or a size otherwise specified in the test method. NOTE 1 For the determination of some parameters based on chemical extractions, milling is not permitted because it increases the surface area of the sample and thus the reactivity of the sample.	Grind a representative subsample ... of the dried soil that has been made fine using one of the mentioned grinding devices until you obtain the required D ₉₅			

Clause	ISO/FDIS 11464	draft NEN 5709	ISO 5667-13	ISO 5667-15	CEN/TC 308/WG 1/TG 4 N0058
preservative storage	none	<p>Preserve samples through refrigeration. Keep the samples between sampling and analysis at 2 °C to 5 °C in the dark. The maximum storage period for a sample under these conditions will depend on the parameters to be determined.</p> <p>Observe the following maximum periods in relation to the above:</p> <ul style="list-style-type: none"> - Volatile compounds: Four days after sampling; - Moderately volatile compounds: Seven days after sampling; - Non-volatile compounds: Unlimited. <p>The following storage periods also apply to a number of specific provisions:</p> <ul style="list-style-type: none"> - Dry substance: Seven days after sampling; - Lutite (fraction < 2 µm): Unlimited; - pH Seven days after sampling; - Fluoride, chloride and bromide: Seven days after sampling; 	<p>Samples should be identified, packed, stored and transported wherever possible at 4 °C ± 2 °C to avoid the possibility of loss of volatiles and to minimize biologically induced change. Storage in the dark should be maintained to avoid stimulation of biological activity.</p>	<p>Refrigeration at 2 °C to 5 °C is the recommended basic preservation method. All means of preservation, if practical, should be carried out in the field prior to transportation.</p>	

Note: The International Standard ISO 14507 specifies three methods for the pre-treatment of soil samples in the laboratory prior to the determination of organic contaminants.

Table 2b – Requirements on sample pre-treatment in ISO/FDIS 10381-8 Soil quality – Sampling – Part 8

Clause	Requirements
Scope	<p>This part of ISO 10381 defines the methods that should be applied when sampling soil from stockpiles. This part of ISO 10381 only includes the sampling of the soil material itself: the solid phase. ...</p> <p>This part of ISO 10381 therefore gives instructions on the various aspects that in total describe the sampling activity:</p> <ul style="list-style-type: none"> - the sample pre-treatment directly after sampling (when necessary); - the packing, preservation, storing, transport and delivery of the sample.
Principle	<p>In some cases the sampling will result in samples which are too large to take to the laboratory and sample pre-treatment in the field will be necessary. There are two basic conditions for pre-treatment in the field.</p> <p>Firstly, the sample should not be changed in a way that will affect the subsequent examination.</p> <p>Secondly, there should be no reduction in particle size ... particle size reduction is restricted to being a laboratory operation.</p>
Sampling plan Sample division in the field	<p>The project manager should select appropriate pre-treatment methods to reduce sample size for presentation to the laboratory. Particle size reduction ... is only allowed when laboratory conditions are met. A selection of pre-treatment techniques suitable for sample division in the field is given in clause 8.</p>
Sample pre-treatment General	<p>Sample pre-treatment is the process of sub-sampling, necessary to obtain a representative sub-sample for packaging and transport to the laboratory.</p> <p>In sample pre-treatment, two types of sample manipulation can be recognised:</p> <ul style="list-style-type: none"> - sample division: obtaining sub-samples of smaller size than the original sample without reducing the particle size of the individual particles; - particle size reduction: grinding the sample in order to reduce the particle size of the whole (sub-)sample without reducing the sample size (mass). <p>Sample pre-treatment 'in the field' can than be advisable in order to prohibit that these large samples have to be transported to the laboratory. In these situations sample pre-treatment 'in the field', directly after sampling is advisable.</p> <p>The requirements for sampling pre-treatment in the field are the same as for sample pre-treatment in the laboratory.</p> <p>Whenever volatile components are to be determined, the process of sample pre-treatment can result in a substantial loss of these components. Sample pre-treatment shall be omitted in these cases by taking specific samples for the determination of volatile components. These samples shall be sealed directly after sampling, cooled and analysed as soon as possible after sampling.</p>
Requirements	<p>The minimum size of the sub-sample is determined by the maximum size of the particles that are present in the sample. When the sample contains macro aggregates, the maximum size of the macro aggregates determines the minimum size of the sub-samples whenever the macro aggregates behave like individual particles during sample pre-treatment (that is when macro aggregates will not be cut in pieces by the (sub-)sampling equipment used).</p>
Procedure for macro aggregate reduction by hand	<p>In some cases the soil is strongly aggregated. Macro aggregates should be seen as individual "particles" when the method of sampling and sample pre-treatment is not able to sample part of an macro aggregate.</p>
Sub -sampling methods (Annex J)	<p>A sample can be divided into sub-samples or analytical samples either mechanically or manually. Potentially it is preferable to use a mechanical system for sub-sampling, since this results in more representative sub-samples.</p> <ul style="list-style-type: none"> - Long pile and alternate shovel method, Coning and quartering, Riffing, Application of Tyler divider, Application of mechanised turntable (rotating divider), see J.5.
Storage	<p>Storage of the sample as described in this standard deals only with the short-term storage of the sample between sampling and, when relevant, sample pre-treatment in the field and transport of the sample. As the preservation of the sample will in most situations be storing the sample in a dark and cool environment, storage and preservation are in practice often the same.</p> <p>The storage temperature should be 4 ± 2 °C</p>

Table 3 – Requirements on the pre-treatment of soil, sludge and waste samples given in several existing standards

Standard	Drying	Particle size	General
DIN 38414-4 : 1984	The fresh sample is analysed;	< 10 mm	
EN 1233 : 1996	Sludge and sediment sample are kept cool or frozen after sampling. Dry the sample by dry-freezing. If the dry substance is used for analysis or alternative in an oven with $(105 \pm 2) ^\circ\text{C}$ for 24 h. Homogenize the dried sample. NOTE: Dried sludges and sediments are hygroscopic and should be dried again after long storage period.		
EN 12457-4 : 2002	If the laboratory sample cannot be crushed or sieved because of its moisture content, it is allowed, only in this case, to dry the laboratory sample. The drying temperature shall not exceed $40 ^\circ\text{C}$. NOTE Any drying step can change other properties of the waste. Care should be taken to minimise such changes. The whole test sample, complying with the size criterion in 4.3.2, shall not be further dried. The mass of the dry residue shall be determined at $105 ^\circ\text{C} \pm 5 ^\circ\text{C}$ according to ISO 11465 or for sludges according to EN 12880.	The tests shall be made on material with a grain size of at least 95 % (mass) less than 10 mm. Therefore the laboratory sample shall be sieved (4.2.6). If oversized material exceeds 5 % (mass) the entire oversized fraction shall be crushed with a crushing equipment (4.2.5). On no account shall the material be finely ground. Non-crushable material (e.g. metallic parts such as nuts, bolts, scrap) in the sample shall be separated and the weight and nature of the material shall be recorded. ... NOTE Fibrous materials and plastics can often be size-reduced after cryogenic treatment.	
EN 13346 : 2000	Weigh a representative amount of the wet sample, to give a sufficient dry mass for the method used, in a porcelain dish and prepare it according to EN 12880. NOTE Other methods of dried sample preparation are presented in annex A. (for wet, freeze-dried and partially air-dried or freeze-dried sludges)	Take the dried sample and grind with contaminant free pestle and mortar or mill. Keep the sample under dry conditions.	
EN 13657 : 2002	The test portion should be transferred into the vessel as it is without any pre-treatment if possible. This is applicable only if the test portion is representative for the laboratory sample and the effectiveness of the digestion is proven. If these conditions are not met a pre-treatment of the laboratory sample is necessary. This procedure shall not change the concentration of the elements of interest.	Pre-treatment should include drying or grain size reduction below a particle size of $250 \mu\text{m}$ for solid waste or homogenizing by use of a high speed mixer or sonification for liquid samples.	Pre-treatment should include drying or grain size reduction below a particle size of $250 \mu\text{m}$ for solid waste or homogenizing by use of a high speed mixer or sonification for liquid samples.
ISO 10381-1 : 2002	general informations	general informations	
ISO 10390 : 2005	Use the fraction of particles of air-dried soil samples, or soil samples dried at a temperature not higher than $40 ^\circ\text{C}$, ... NOTE Drying can influence the pH of the soil. In some soil samples, particularly those containing sulfides, drying can lower the pH substantially.	...which passes through a sieve with a 2 mm mesh size. For example, soil samples pre-treated according to ISO 11464 can be used.	
ISO 10694	air-dried sample	< 2 mm in accordance with ISO 11464	

Standard	Drying	Particle size	General
ISO 11277 : 1998	Sample pre-treatment according ISO 11464		
ISO 11466 : 1995	A representative part of the air-dried sample is pre-treated according ISO 11464 or, if required, milled and sieved to a particle size of 150 µm. Dry mass according ISO 11465.	< 2 mm and following milling to < 150 µm	
ISO 13878	Sample pre-treatment according ISO 11464	< 2 mm	
ISO 14507 : 2003	NOTE For the pretreatment of soil samples for the purposes of determining non-volatile inorganic compounds and physico-chemical soil characteristics, refer to ISO 11464.		
ISO 14869-1 : 2001	prepared according to ISO 11464	Mill a representative portion of the dried sample (prepared according to ISO 11464) as fine as possible in order to obtain a subsample of approximately 20 g. Use a portion of that milled sample to determine the water content in accordance with ISO 11465. NOTE Experience has shown that dissolution of sample can be considerably prolonged if the material is not ground below 250 µm.	Pre-treatments designed to oxidize organic matter (6.2) should be followed strictly to avoid explosions during the digestion procedure.
ISO 14869-2 : 2002	prepared according to ISO 11464	Mill a representative portion of the dried sample (prepared according to ISO 11464) as fine as possible in order to obtain a subsample of approximately 20 g. Use a portion of that milled sample to determine the water content in accordance with ISO 11465. NOTE Experience has shown that dissolution of sample can be considerably prolonged if the material is not ground below 250 µm.	
ISO 14870 : 2001	air-dry soil samples pre-treated in accordance with ISO 11464	< 2 mm	Use the fraction of air-dry soil samples pretreated in accordance with ISO 11464, which has passed through a 2 mm aperture sieve. Use a separate part of the sample to determine the water content in accordance with ISO 11465.
ISO 16772 : 2004	air-dry soil samples pre-treated in accordance with ISO 11464	< 2 mm obtained in accordance with ISO 11464 and ISO 11466
ISO/DIS 19730 – 2005	Extract soil samples from organic horizons (having more than 30 % by mass of organic matter (such as bog soil or top soil) and samples from reductomorphic horizons (horizons affected by backwater or ground water (such as coastal marsh soil or gley soil) in the freshly collected state and homogenize as described in A.5.	Use the fraction smaller than 2 mm of the soil sample dried and pretreated according to ISO 11464.	