Customer Guide to Sample Containers & Holding Times

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1. Introduction

The purpose of this guide is to clarify sampling requirements for soils and waters submitted to Eurofins Chemtest for chemical analysis. The areas of consideration are:

1. Sampling, storage, holding times.
   Deviating (or non-conforming) samples are defined as those which may have been compromised in some way during sampling, transportation, storage or analysis, and which may cause the integrity of the data to be questioned.
2. Sample volumes – to ensure that there is sufficient material for the required testing.

How to prevent samples from deviating upon receipt at the laboratory

- After sampling, samples should be kept cool and away from direct light using ice packs and cool boxes provided to minimize degradation and volatilization.
- Sample containers should be adequately packed with protective packaging materials to prevent damage during transit.
- To prevent sample deviation disclaimers on your test report please ensure you request and use the correct containers, supply a sampling date and forward a completed Chain of Custody (CoC) received in sufficient time that the test holding times are not exceeded (for specific requirements see section "***3. Sample requirements and holding times***" and section "***4. Sample requirements by test***".

Deviating Samples

When taking samples for chemical analysis, it is important to maintain sample integrity so that the levels of analytes at the point of testing are as representative as possible of the material at the point of sampling. Below are some examples which can lead to deviating results:

1. Using incorrect containers that may interact with the analytes that are to be measured, leading to inaccurate test results.
2. Some tests specifically require the container to be filled completely to exclude gaps of air (headspace). This is because volatile substances can diffuse from the sample and into the

headspace, thereby escaping once the lid is removed for analysis. Failure to do this will result in a deviating result.

3. It is important that the analysis is carried out within the stability period for each analyte, called the holding time. This is the maximum time for which an analyte can be considered stable. Samples analysed outside the holding time may produce unreliable results. For this reason, we require a sampling date for each sample to be provided on the chain of custody so we may determine this. Where this is not provided, we are unable to properly assess holding times and deviation will occur.
4. Other factors such as exposure to heat, direct sunlight or humidity; being damaged in transit or being supplied in insufficient quantity might compromise sample integrity prior to testing.
5. To ensure the integrity of samples from sampling to analysis, it is essential to use **cool boxes** and **include sufficient cooling blocks** during transportation to the laboratory. This prevents any deviation in sample quality.
6. It is a requirement to supply at least 2kg of sample for Waste Acceptance Criteria (WAC) testing as per BS EN 12457-3:2002 part 2 and 3 to enable a representative portion of sample to be taken for analysis.

Samples taken, stored, or tested outside of these requirements are referred to as “deviating” and, in accordance with the UKAS Technical Policy Statement 63 (TPS 63) accredited laboratories must identify deviating samples in their analytical reports.

Results for the affected analytes are flagged on the report with the appropriate **Deviation Code** as detailed below and as a result, the test result(s) are flagged as “may be unreliable”:

A – Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction);

C - Sample not received in appropriate containers;

D – Broken/damaged Container;

E – The required amount of sample for analysis was not received;

H – Appropriate cooling measures were not taken for sample transportation.

Sources of holding times

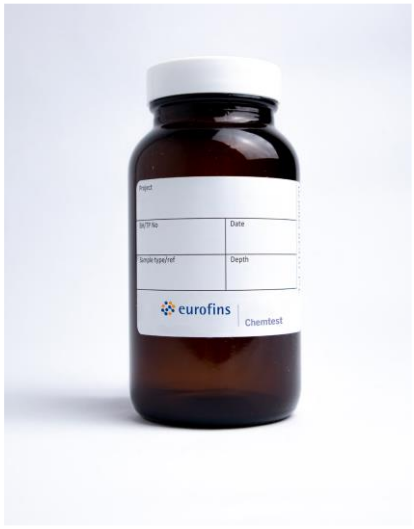
Our holding times have been drawn from a variety of published sources including APHA 2012, BS ISO 18512, NEPM 2013, ISO18400-105:2017, various EPA methods (EPA 8082 / 608, EPA 8270C, EPA 8310 etc) as well as our own in-house validations.

2. Types of sample containers

The various containers supplied by Eurofins Chemtest for soil and water samples are shown below with examples of the tests which they are used for.

Containers for Soils

500ml plastic tub
Uses: asbestos and inorganics e.g., metals, BRE, cyanide



250ml glass jar
Uses: non-volatile organics e.g., TPH, SVOC, PCB, Phenols

60ml VOC jar
Uses: VOC inc. BTEX & MTBE

Containers for Waters

1l plastic bottle
Uses: inorganics e.g., pH, metals, anions, BOD, COD

1l glass bottle
Uses: non-volatile organics e.g., TOC, TPH, Phenols

40ml glass vial
Uses: VOC inc. BTEX & MTBE

3. Sample container requirements

Sampling requirements for different soil and water suites are listed below. Because these suites include different tests with a variety of holding times, we have included the shortest for each suite under "Shortest Holding Time".

Soil Suite	Container Type	Shortest Holding Time
General contamination suites (without asbestos)	1x plastic tub, 1x 250ml glass jar, 2x VOC jar*	14 days
General contamination suites (with asbestos) - ICE (UK Specification for Ground Investigation) Suite E	2x plastic tub, 1x 250ml glass jar, 2x VOC jar*	14 days
BRE suites	1x plastic tub	28 days
Asbestos	1x separate plastic tub***	Indefinite
Volatiles	2x VOC jar*	14 days
BS 3882:2015 (Topsoil)	3kg in plastic	28 days
UKWIR specification	1x 250ml glass jar, 2x VOC jar*	14 days
Waste Acceptance Criteria (WAC) testing as per BS EN 12457-3:2002	2kg – 4x plastic tubs, 1x 250ml glass jar, 2 x VOC jar*	14 days

Water Suite	Container Type	Shortest Holding Time
General contamination suites - ICE (UK Specification for Ground Investigation) Suite F	1x plastic bottle, 1x glass bottle, 2x glass vial*	14 days**
BRE suites	1x plastic bottle	14 days
Inorganics only	1x plastic bottle	14 days**
Organics only	1x glass bottle, 2x glass vial*	14 days

*** - provide two VOC container per test, filled with no headspace, one extra jar as spare.**

**** - 72 hours if the suite includes chromium (VI), 48 hours if the suite includes BOD.**

***** - For asbestos in soil, it is recommended that a separate tub containing 1kg of soil is provided. Smaller quantities can be taken if required, please contact us to discuss further.**

4. Sample requirements and holding Times by test

We realise that on some occasions, it is not possible to follow the above guidelines for one reason or another. The following pages detail specific sample volumes and holding times for individual tests so that you can assess whether a limited sample will be sufficient for the required analyses.

There is some overlap in the form of tests which are prepared from the same aliquots, and we have grouped these together accordingly.

In addition to the sample sizes listed on the following pages, please note the below general guidelines:

- Please add at least 50% to the total sample volume to allow for any repeat analyses.
- **For Asbestos in soil testing, it is a requirement that a separate tub containing 1kg of soil is provided.** Smaller quantities can be taken if required, please contact us to discuss further.
- **For WAC testing, a minimum of 2kg of soil is required. Failure to comply will result in a deviation code E applied to the results (see page 6).**
- It is a requirement to provide a spare **VOC container** where VOC tests are required. **Failure to comply will result in a deviation code being applied where reanalysis is required.**
- For Total Solid Particles testing, it is required that a separate 1L Plastic bottle is provided which will be dedicated to carry out the testing in its entirety.
- For **Loss on Ignition (HMRC LFT1) testing** a minimum of 1kg of sample is required. Failure to comply will result in testing to be aborted and this will be reported as insufficient sample (I/S).

Soils (Inorganics)

Analysis	Method	Minimum Quantity	Container Type	Holding Time	Reference
Asbestos					
ID of ACM and fibres in soil	SOP 2192 PLM	1kg	Plastic tub	Indefinite	AS4964-2004
Gravimetric quantification of ACM	SOP 2192	1kg	Plastic tub	Indefinite	AS4964-2004
Fibre quantification in soils	SOP 2192 PCOM	1kg	Plastic tub	Indefinite	AS4964-2004
ID of ACM (bulk ID)	SOP 2185 PLM	50p coin size	Plastic tub	Indefinite	AS4964-2004
Metals/Metalloids					
Boron (water soluble)	Aqueous extract, ICP-OES	30g	Plastic tub	28 days	NEPM 2013
Chromium (hexavalent)	Colorimetry	30g	Plastic tub	30 days	BS ISO18512:2007
Metals (bioavailable - PBET)	Physiologically based extraction	20g	Plastic tub	28 days	NEPM 2013
Metals (bioavailable - UBM)	Unified BARGE method	20g	Plastic tub	28 days	NEPM 2013
Metals (total/acid soluble)	Acid digest, ICP-MS	5g	Plastic tub	180 days	BS ISO 18512:2007
Mercury	Acid digest, ICP-MS	5g	Plastic tub	28 days	USEPA SW-846
Electrochemical					
Cation exchange capacity	Cation analysis & calculation	30g	Plastic tub	28 days	NEPM 2013
Electrical conductivity	Conductivity meter	30g	Plastic or glass	7 days	BS ISO18512:2007
pH value	pH meter	30g	Plastic or glass	7 days	BS ISO18512:2007

Combustion Analyses					
Calorific value	Calorimeter	5g	Plastic or glass	30 days	BS ISO18512:2007
Loss on ignition (550ºC)	Combustion, gravimetry	30g	Plastic tub	30 days	BS ISO18512:2007
Loss on ignition (HMRC LFT1)	Combustion, gravimetry	1kg	Plastic tub	30 days	BS ISO18512:2007
Carbon Analyses					
Fraction of organic carbon	Combustion/IR	5g	Plastic or glass	28 days	NEPM 2013
Organic matter content	Calculated from TOC	5g	Plastic or glass	28 days	NEPM 2013
Total carbon (TC)	Combustion/IR	5g	Plastic or glass	28 days	NEPM 2013
Total organic carbon (TOC)	Combustion/IR	5g	Plastic or glass	28 days	NEPM 2013
Anions and Aggressivity					
Sulphate (acid soluble/total)	Acid digest, ICP-OES	5g	Plastic tub	28 days	NEPM 2013
Sulphate (water soluble)	2:1 aqueous extract, ICP-OES	30g	Plastic tub	28 days	NEPM 2013
Sulphur (total)	Combustion/IR	5g	Plastic tub	28 days	NEPM 2013
Water soluble anions (chloride, fluoride, nitrate, nitrite, phosphate)	2:1 aqueous extract, colorimetry	30g	Plastic tub	28 days	NEPM 2013
Other Inorganics					
Ammoniacal nitrogen	Colorimetry	20g	Plastic or glass	28 days	Barth et al (1989)
Cyanide/Thiocyanate	Continuous flow colorimetry	10g	Plastic tub	14 days	NEPM2013, EPA 9010B/9012,
Moisture content	Gravimetry	100g	Plastic tub	14 days	NEPM 2013

Other Inorganics (continued)					
Nitrogen (total)	Combustion/IR	5g	Plastic tub	30 days	BS ISO18512:2007
Sulphur (elemental)	HPLC	10g	Plastic tub	30 days	BS ISO18512:2007
Sulphide	Distillation, colorimetry	20g	Plastic tub	28 days	NEPM2013

Soils (Organics)

Analysis	Method	Minimum Quantity	Container Type	Holding Time	Reference
Petroleum Hydrocarbons					
TPH (total)	Solvent extraction, GC-FID	20g	Glass jar	14 days (40 days after extraction)	NEPM 2013
TPH (banded)	Solvent extraction, GC-FID	20g	Glass jar	14 days (40 days after extraction)	NEPM 2013
TPH (aliphatic/ aromatic split)	Solvent extraction, GCxGC-FID & headspace GCxGC-FID	20g + full VOC jar	Glass jar & VOC jar*	14 days (40 days after extraction)	NEPM 2013
Semi-Volatile Organics					
PAH (total)	Solvent extraction, GC-FID or GC-MS	20g	Glass jar	14 days (40 days after extraction)	EPA SW-846
PAH (speciated)	Solvent extraction, GC-FID or GC-MS	20g	Glass jar	14 days (40 days after extraction)	EPA SW-846
SVOC (target list)	Solvent extraction, GC-MS	20g	Glass jar	14 days (40 days after extraction)	EPA SW-846
SVOC (target list + TICs)	Solvent extraction, GC-MS	20g	Glass jar	14 days (40 days after extraction)	EPA SW-846
Volatile Organics					
BTEX & MTBE	Headspace GC-MS	Full container	VOC jar*	14 days (chilled)	NEPM 2013
VOC (target list)	Headspace GC-MS	Full container	VOC jar*	14 days (chilled)	NEPM 2013
VOC (target list + TICs)	Headspace GC-MS	Full container	VOC jar*	14 days (chilled)	NEPM 2013
Polychlorinated Biphenyls					
PCB ICES 7	Solvent extraction, GC-MS	20g	Glass jar	365 days	USEPA 1613 & 1668
PCB WHO 12	Solvent extraction, GC-MS	20g	Glass jar	365 days	USEPA 1613 & 1668

Phenolics					
Phenols (total)	Solvent extraction, HPLC-ECD	20g	Glass jar	14 days (40 days after extraction)	EPA SW-846
Phenols (speciated)	Solvent extraction, HPLC-ECD	20g	Glass jar	14 days (40 days after extraction)	EPA SW-846
Phenols by GC	Solvent extraction, GC-MS	20g	Glass jar	14 days (40 days after extraction)	EPA SW-846
Other Organics					
Alcohols	Headspace GC-MS	Full container	VOC jar*	14 days	NEPM 2013
Glycols	Solvent extraction, GC-MS	20g	Glass jar	14 days	NEPM 2013
Pesticides	Solvent extraction, GC-MS	20g	Glass jar	14 days	NEPM 2013
Solvent extractable matter	Solvent extraction, gravimetry	20g	Glass jar	28 days	-

*** - provide one VOC container per test, filled with no headspace, plus one spare**

Waters (Inorganics)

Analysis	Method	Minimum Volume	Container Type	Holding Time	
Electrochemical					
Electrical conductivity	Conductivity meter	20ml	Plastic bottle	7 days	EPA 160.1
Ionic balance	Calculation[±]	-	Plastic bottle	28 days	-
pH value	pH meter	20ml	Plastic bottle	3 days	NMI 2010 SCA bluebook 2018
Redox potential	ORP meter	20ml	Plastic bottle	3 days	-
Metals/Metalloids					
Chromium (hexavalent)	Colorimetry	10ml	Plastic bottle	72 hours	BS EN ISO 5667-3:2018
Chromium (hexavalent) low level	IC	20ml	Plastic bottle	72 hours	BS EN ISO 5667-3:2018
Ferrous iron	Colorimetry	20ml	Plastic bottle	3 days	NMI 2010
Hardness	Calculation	50ml	Plastic bottle	30 days	BS EN ISO 5667-3:2018
Metals (dissolved)	ICP-MS	50ml	Plastic bottle	30 days	BS EN ISO 5667-3:2018
Metals (total)	Acid digest, ICP-MS	50ml	Plastic bottle	30 days	BS EN ISO 5667-3:2018
Silica	Colorimetry	20ml	Plastic bottle	72 hours	APHA
Anions					
Anions (chloride, fluoride, phosphate, sulphate)	Discrete analyser[D]	10ml	Plastic bottle	30 days	BS EN ISO 5667-3:2018
Anions (nitrate)	Discrete analyser[D]	10ml	Plastic bottle	7 days	BS EN ISO 5667-3:2018
Anions (nitrite)	Discrete analyser[D]	10ml	Plastic bottle	24 hours	BS EN ISO 5667-3:2018

Other Inorganics					
Ammonium	Discrete analyser[D]	10ml	Plastic bottle	21 days	BS EN ISO 5667-3:2018
Alkalinity	Discrete analyser[D]	10ml	Plastic bottle	14 days	BS EN ISO 5667-3:2018
Biochemical oxygen demand (BOD)	Colorimetry	10ml	Plastic bottle	48 hours	EPA-600/4-79-20
Chemical oxygen demand (COD)	Colorimetry	10ml	Plastic bottle	30 days (chilled)	BS EN ISO 5667-3:2018
Cyanide/Thiocyanate	Continuous flow colorimetry	20ml	Plastic bottle	7 days	BS EN ISO 5667-3:2018
Dissolved oxygen	DO meter	100ml	Plastic bottle	24 hours	EPA 360.1
Sulphide	Discrete analyser[D]	10ml	Plastic bottle	7 days	BS EN ISO 5667-3:2018
Suspended solids	Gravimetry	200ml	Plastic bottle	7 days	SM 2540
Chlorine (free/total)	Colorimetry	15ml	Plastic bottle	ASAP	SM 4500_Cl F
Turbidity	Nephelometer	15ml	Plastic bottle	48 hours	SM 2130 B
Colour	Colorimetry	15ml	Plastic bottle	48 Hours	APHA

[±] - calculated from metals (dissolved) and anions, see relevant tests for minimum volumes

[D] - analyses by discrete analyser can be run from the same 10ml aliquot so volumes do not need to accumulate

Waters (Organics)

Analysis	Method	Minimum Volume	Container Type	Holding Time	
Petroleum Hydrocarbons					
TPH (total)	Solvent extraction, GC-FID	500ml	Glass bottle	14 days	BS EN ISO 5667-3:2018
TPH (banded)	Solvent extraction, GC-FID	500ml	Glass bottle	14 days	BS EN ISO 5667-3:2018
TPH (aliphatic/ aromatic split)	Solvent extraction, GCxGC-FID & headspace GCxGC-FID	500ml + full glass vial	Glass bottle & glass vial*	14 days	BS EN ISO 5667-3:2018
Semi-Volatile Organics					
PAH (total)	Solvent extraction, GC-FID or GC-MS	500ml	Glass bottle	14 days	EPA 8310
PAH (speciated)	Solvent extraction, GC-FID or GC-MS	500ml	Glass bottle	14 days	EPA 8310
SVOC (target list)	Solvent extraction, GC-MS	500ml	Glass bottle	14 days (40 days after extraction)	EPA SW-846
SVOC (target list + TICs)	Solvent extraction, GC-MS	500ml	Glass bottle	14 days (40 days after extraction)	EPA SW-846
Volatile Organics					
BTEX & MTBE	Headspace GC-MS	Full container	Glass vial*	7 days	EPA SW-846
VOC (target list)	Headspace GC-MS	Full container	Glass vial*	7 days	EPA SW-846
VOC (target list + TICs)	Headspace GC-MS	Full container	Glass vial*	7 days	EPA SW-846
Polychlorinated Biphenyls					
PCB ICES 7	Solvent extraction, GC-MS	500ml	Glass bottle	14 days	EPA 8082
PCB WHO 12	Solvent extraction, GC-MS	500ml	Glass bottle	14 days	EPA 8082

Phenolics					
Phenols (total)	HPLC-ECD	15ml	Glass bottle	21 days	BS EN ISO 5667-3:2018
Phenols (speciated)	HPLC-ECD	15ml	Glass bottle	21 days	BS EN ISO 5667-3:2018
Phenols by GC	Solvent extraction, GC-MS	500ml	Glass bottle	21 days	BS EN ISO 5667-3:2018
Other Organics					
Alcohols	Headspace GC-MS	Full container	Glass vial*	7 days	EPA SW-846
Glycols	GC-MS	5ml	Glass bottle	7 days	EPA SW/1671
Uron herbicides	HPLC	5ml	Glass bottle	7 days (40 after extraction)	EPA SW-846
Pesticides	GC-MS	500ml	Glass bottle	14 days	EPA SW-846
Fats, Oil, & Grease	Solvent extraction, gravimetry	500ml	Glass bottle	28 days	BS EN ISO 5667-3:2018
Solvent extractable matter	Solvent extraction, gravimetry	500ml	Glass bottle	14 days	EPA SW-846
Dissolved organic carbon	Oxidation, IR	30ml	Glass bottle	7 days	EPA SW-846
Total organic carbon	Oxidation, IR	30ml	Glass bottle	7 days	EPA SW-846

*** - provide one VOC container per test, filled with no headspace, plus one spare**