HAZARDOUS WASTE IDENTIFICATION GUIDE

ANNEX 5
LABORATORY TESTING METHODS

1. Sampling of waste

Where sampling and/or chemical analyses are required, this Annex presents a brief overview on waste sampling according to European standards, mentioning the basic concepts. For more details please refer to the presented standards. In addition, this Annex contains a section with more information and references to specific issues of chemical analyses of waste.

Sampling

Poor sampling is one of the factors that undermine reliable classification of waste. Hence it is strongly recommended that sampling for the purpose of waste classification should be conducted in accordance with the available CEN standards, as they are presented below.

4.1.1. *Sampling framework*

The European Committee for Standardization (CEN), through its technical committee TC 292 has developed several standards, Technical Reports/Specifications, and state of the art documents for the characterisation of waste. Available documents need to be considered in a coordinated manner. The following list contains relevant standard documents on the characterisation of waste and sampling of waste materials:

— **EN 14899** Framework for the preparation and application of a sampling plan;

— **CEN/TR 15310-1:2006** Guidance on selection and application of criteria for sampling under various conditions;

— **CEN/TR 15310-2:2006** Guidance on sampling techniques;

— **CEN/TR 15310-3:2006** Guidance on procedures for sub-sampling in the field;

— **CEN/TR 15310-4:2006** Guidance on procedures for sample packaging, storage, preservation, transport and delivery;

— **CEN/TR 15310-5:2006** Guidance on the process of defining the sampling plan.

To obtain accurate and representative results, a testing programme needs to be set up before the first sample is taken. This way it is ensured that all necessary factors are considered to enable representative conclusions for the whole waste based on sample(s). EN 14899 describes this testing programme in detail.

Alternative sampling procedures are acceptable if they have considered the relevant factors identified in the standards listed above and produce an equally reliable result.

2. Laboratory testing methods for determining the composition of waste

Ref. No	Title
Leaching Tests	
CEN/TS 16660:2015	Characterization of waste. Leaching behaviour test. Determination of the reducing character and the reducing capacity
EN 15863:2015	Characterization of waste. Leaching behaviour test for basic

	characterization. Dynamic monolithic leaching test with periodic leachant renewal, under fixed conditions
EN 14997:2015	Characterization of waste. Leaching behaviour test. Influence of pH on leaching with continuous pH control
EN 14429:2015	Characterization of waste. Leaching behaviour test. Influence of pH on leaching with initial acid/base addition
EN 14429:2015	Characterization of waste. Leaching behaviour test. Influence of pH on leaching with initial acid/base addition
EN 14997:2015	Characterization of waste. Leaching behaviour test. Influence of pH on leaching with continuous pH control
CEN/TS 15364:2006	Characterization of waste. Leaching behaviour test. Acid and base neutralization capacity test
CEN/TS 14405:2004	Characterization of waste. Leaching behaviour tests. Up-flow percolation test (under specified conditions)
EN 12457-1:2002	Characterization of waste. Leaching. Compliance test for leaching of granular waste materials and sludges. Part 1: One stage batch test at a liquid to solid ratio of 2 l/kg for materials with high solid content and with particle size below 4 mm (without or with size reduction)
EN 12457-2:2002	Characterization of waste. Leaching. Compliance test for leaching of granular waste materials and sludges. Part 2: One stage batch test at a liquid to solid ratio of 10 l/kg for materials with particle size below 4 mm (without or with size reduction)
EN 12457-3:2002	Characterization of waste. Leaching. Compliance test for leaching of granular waste materials and sludges. Part 3: Two stage batch test at a liquid to solid ratio of 2 l/kg and 8 l/kg for materials with a high solid content and with a particle size below 4 mm (without or with size reduction)
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)
Analyses of Compounds	
EN 16377:2013	Characterization of waste. Determination of brominated flame retardants (BFR) in solid waste
EN 16192:2011	Characterization of waste. Analysis of eluates
EN 15216:2007	Characterization of waste. Determination of total dissolved solids (TDS) in water and eluates
Total Organic Carbon (TOC)	
EN 13137:2001	Characterization of waste. Determination of total organic carbon (TOC) in waste, sludges and sediments
Digestion	
EN 13656:2002	Characterization of waste. Microwave assisted digestion with hydrofluoric (HF), nitric (HNO_3), and hydrochloric (HCl) acid mixture for subsequent determination of elements
EN 13657:2002	Characterization of waste. Digestion for subsequent determination of aqua regia soluble portion of elements

Hydrocarbons C10 to C40	
EN 14039:2004	Characterization of waste. Determination of hydrocarbon content in the range of C10 to C40 by gas chromatography
Dry Matter	
EN 14346:2006	Characterization of waste. Calculation of dry matter by determination of dry residue or water content
Inorganic Compounds	
EN 14582:2007	Characterization of waste. Halogen and sulfur content. Oxygen combustion in closed systems and determination methods
EN 15192:2006	Characterisation of waste and soil. Determination of chromium (VI) in solid material by alkaline digestion and ion chromatography with spectrophotometric detection
Organic Compounds	
EN 15308:2008	Characterization of waste. Determination of selected polychlorinated biphenyls (PCB) in solid waste by using capillary gas chromatography with electron capture or mass spectrometric detection
EN 15527:2008	Characterization of waste. Determination of polycyclic aromatic hydrocarbons (PAH) in waste using gas chromatography mass spectrometry (GC/MS)
Elemental composition	
EN 16424:2014	Characterization of waste. Screening methods for the element composition by portable X-ray fluorescence instruments
EN 15309:2007	Characterisation of waste and soil. Determination of elemental composition by X-ray fluorescence