



SLOVENSKI STANDARD oSIST prEN 15522-1:2020

01-december-2020

Prepoznavanje razlitij olj - Nafta in sorodni naftni proizvodi - 1. del: Vzorčenje

Oil spill identification Petroleum and petroleum related products Part 1: Sampling

Identifizierung von Ölverschmutzungen Rohöl und Mineralölerzeugnisse Teil 1:
Probenahme

Identification des pollutions pétrolières Pétrole et produits pétroliers Partie 1 :
Echantillonnage

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Ta slovenski standard je istoveten z: **prEN 15522-1**

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ICS:

13.020.40	Onesnaževanje, nadzor nad onesnaževanjem in ohranjanje	Pollution, pollution control and conservation
13.060.99	Drugi standardi v zvezi s kakovostjo vode	Other standards related to water quality
75.080	Naftni proizvodi na splošno	Petroleum products in general

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 15522-1

December 2020

ICS 13.020.40; 75.080

Will supersede CEN/TR 15522-1:2006

English Version

Oil spill identification Petroleum and petroleum related products Part 1: Sampling

Identification des pollutions pétrolières Pétrole et produits pétroliers Partie 1 : Echantillonnage

Identifizierung von Ölverschmutzungen Rohöl und Mineralölerzeugnisse Teil 1: Probenahme

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 19.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (prEN 15522-1:2020) has been prepared by Technical Committee CEN/TC 19 “Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede CEN/TR 15522-1:2006.

In comparison with the previous edition, the following technical modifications have been made:

- Added another design for a helicopter sampling device
- Removed ship designs, because this is only relevant for skilled sample takers that should know where to sample on a ship.

EN 15522 is composed of two parts that are described by the following CEN documents:

- EN15522-1 – Sampling, describing good sampling practice, detailing sampling equipment, sampling techniques and the handling of oil samples prior to their arrival at the forensic laboratory;
- EN15522-2 – Analytical Method, which covers the general concepts and laboratory procedures of oil spill identification, analytical techniques, data processing, data treatment and interpretation/evaluation and reporting of results.

A list of all parts in the EN 15522 series can be found on the CEN website.

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Introduction

This document describes a forensic method for characterizing and identifying the source of oils spills in the environment as a resulting from accidents or intentional discharges. The method may be used in support of the legal process as evidence for prosecuting offenders. This method is based on the experience gained with its former publications over the years.

Where an oil pollution incident has occurred, samples should be collected from both the spill and, wherever possible, the potential source of the pollutant, e.g. ship, shore side storage tank, pipeline or vehicle, in order to assist in the identification or confirmation of the source of the spill.

The aim of this document is to give guidance on the best current practice for taking such samples.

Part 1 of EN 15522 is meant to provide general guidelines for legal oil sampling¹. It does not contain details relating to all types of spill situation, however, by following these guidelines it should be possible to collect and provide legally valid samples that can be used in the process of identifying or confirming the source of the spill.

The issues addressed only cover the mechanics of sample collection. The command and control that may be put in place during incident response, the authorities who may request sample collection and the individuals who have the authority to collect samples, will vary from country to country and as a consequence these issues are not addressed.

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¹ Legal sampling (according to Interpol Pollution Crime Forensic Investigation Manual [2]): sampling that has been conducted in such a way that the results of its analysis can be used in a court of law. Procedures are followed to prove the chain-of-custody of the samples and to prove that they have not been tampered with.

1 Scope

This document provides guidance on taking and handling samples that are collected as part of an investigation into the likely source of a crude oil or petroleum product spill into a marine or aquatic environment. Guidance is given on taking samples from both the spill and its potential source.

Mostly, oil sampling is part of legal procedures and has to be treated like any other preservation of evidence (legal sampling).

WARNING - Taking samples may involve hazardous materials, operations and equipment.

This document is not intended to address all the safety and health aspects associated with the guidance given. It is the responsibility of the user to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

IMPORTANT - Most countries have special trained teams to take samples on board of ships. As police officer or law enforcer, don't take unnecessary risks and ask assistance from such a team when available.

NOTE For the sake of clarity, the word 'oil' is used throughout this document. It can equally refer to crude oil, a petroleum product or mixtures of such.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 15522-2:—,² *Oil Spill Identification – Petroleum and petroleum products – Part 2: Analytical method and interpretation of results*

EN ISO 3170, *Petroleum liquids – Manual sampling (ISO 3170)* 3-78c6-45a9-9378-67039c8eaebc/osist-pren-15522-1-2020

3 Terms, definitions and abbreviations

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 Terms and definitions

3.1

chain of custody

practice of ensuring security of the sample so that no one has an opportunity to tamper with or otherwise alter the sample or the results

Note 1 to entry: It includes chronological documentation that records the sequence of sample handling including sampling, sealing, storage, transfer, analysis and disposal to ensure that only documented sample handlers have direct access to the samples.

² Under preparation. Stage at time of publication: prEN 15522-2:2020

prEN 15522-1:2020 (E)**3.2****mixing**

mixing of sources containing or consisting of petroleum (products) before, during or after the spillage

Note 1 to entry: Based on that the final spill can be heterogeneous (see 3.3).

3.3**sample heterogeneity**

non-representative or non-homogenous character of samples caused for example by variable degrees of stirring within a vessel, tank or oil slick

3.4**contamination**

changes in oil composition which take place during/after the spillage in either sample by addition of non-petroleum compounds from biogenic or anthropogenic sources

3.5**waterborne oil**

petroleum product borne by water or available in the water column from marine, estuarial and aquatic environments

Note 1 to entry: Aquatic environments include lakes and rivers, but exclude groundwater.

3.6**weathering**

changes in oil composition which can take place after the spillage, including evaporation, dissolution, emulsification, oxidation, biological decomposition, wax redistribution and burning

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3.7**bilge water**

mixture including water and oil collected in the bilge of the machinery space in a ship as a result of leakage, drainage, etc

3.8**slop**

mixture of water and oil residues from cargo tanks in oil tankers that may contain oil/water emulsions, wax, sediments and other tank residues

3.9**sludge**

deposits, generally from the purification of fuel and lubrication oils, consisting of mixtures including oil, wax, sand and water

3.10**tank washings**

tank washing water containing cargo tank residues including oil, wax, sediment and other foreign matter such as tank cleaning chemicals

3.11**background samples**

samples representing the background that can be expected in source or spill samples

Note 1 to entry: E.g. sample from the surface water close to but not contaminated by the spill, sample from the deck just next to a contaminated part of the deck of which a sample has been taken.

3.2 Abbreviations

PE	Polyethylene
Tefzel®	ETFE Ethylene-tetrafluorethylene
Teflon®	PTFE Poly-tetrafluorethylene
Nylon®	Polyamide

4 Principle

Samples form an important aspect of any investigation and care should be taken to ensure that they are as representative of both the spill and the potential source as possible.

When investigating a spill, samples are usually taken from:

- the water surface (sea, river, canal or lake);
- shoreline or banks (sand, shingle, rocks and oiled animals and vegetation);
- marine or river vessel's cargo tanks, fuel tanks, waste oil tanks, slop tanks, ballast tanks and bilges;
- land tanks and pipelines;
- road and rail vehicles.

For each type of spill specific instructions and materials are required or advised.

All spills and all potential sources of spills are sampled. Sampling takes place as soon as possible and before any cleaning operation is started. Samples from both the spill and the source are taken.

Samples are handled as legal evidence and are kept in a chain of custody until identification and possible legal procedure has been completed.

5 Sampling in general

5.1 Introduction

Sampling should take place as soon as possible and always before any cleaning operation is started. It is important to take samples from both the spill and the source even on such occasions where it seems quite clear from where the spill originates.

Sampling procedures, which are connected to liability investigations, shall be performed with great care and accuracy and every action shall be taken to prevent a decrease in the samples' value as evidence.

Sampling procedures and other recommendations in connection with sampling are briefly described in this clause. The information given is designed to assist the sample collector in obtaining samples, which may be used for identifying oil spills.

If samples are to be used in connection with legal proceedings, this document should be read in conjunction with any documents issued by the regulatory authorities in the country or countries in question where the spill has occurred.

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These recommendations do not contain details relating to all types of spill situations, but should merely be regarded as general guidelines. However, by following these guidelines it should be possible to collect and provide legally valid samples that can help to determine the source responsible for the spill.

As an aid to this operation it is recommended that photographs are taken of the site being sampled.

5.2 Sampling schedule

It is essential that all possible sources of a spill are sampled in order to determine its origin. It is also important that the samples are collected as soon as possible after the spill.

IMPORTANT —Unbiased spill samples shall always be taken before any cleaning operation takes place.

If a source sample is not obtained shortly after the spillage, it may be impossible to obtain a relevant sample at a later date. This can render the analyses of the spill samples useless with respect to the determination of the source responsible for the spill.

If any part of the spill differs in any respect from other parts, extra samples shall be taken to check if more than one spill has occurred in the area.

If the spill response operation continues for more than one day, samples should be taken every day to make it possible to determine the degree of weathering of the oil, as well as possible contamination by other oils.

If an oil sample is suspected to be contaminated with material already in the water, on the deck or on the hull etc., also take samples including the 'contaminant'. E.g. waters in harbours and estuaries may contain traces of various petroleum products and when spills in such waters are sampled it is therefore, important to provide the laboratory with background samples³ of the water.

5.3 Types of sample

The following types of oil or oily mixture can occur at spill sites and shall then be sampled:

- oil, oily water, heavily emulsified oil, tar balls or lumps on the water surface;
- mixtures of oil and sorbents or other materials which are soaked with oil;
- mixtures of oil and foreign materials on beaches;
- surfaces, rocks, quays, plants, sand and soil contaminated with oil;
- oiled animals on the water surface or on beaches.

The following types of oil or oily mixture can occur at suspected sources and shall then be sampled:

- pure oil in ships, offshore constructions or land facilities;
- oily water in bilges and slop tanks on board ships;
- oily sludge in sludge tanks on board ships.

When relevant, the following types of additional samples should be sampled:

³ Background (according to Interpol Pollution Crime Forensic Investigation Manual [2]: Background (Control) sample: a sample of soil, water, air or other medium that is not believed to be impacted by the deleterious environmental discharge and is believed to represent a "clean sample".

- background samples from the engine, deck, hull, water, beach, etc. when possible.

A sample wiped with an ETFE net from a deck may contain contaminants from the deck. Therefore, an additional sample should be taken by wiping a “clean” part of the deck next to the spill location with a clean ETFE net.

- counter samples.

Laws can be different in European countries, but in general the potential offender has the right of defence and can ask for a second set of samples to be analysed in a laboratory of choice (see 9.3).

NOTE Witnessing can be agreed, as alternative for counter samples. Witnessing is common between commercial laboratories on request of assurance companies. There are, for example, many commercial laboratories specialized in the analysis of physical properties of petroleum or petroleum products, but not in oil spill identification. An analyst of such a lab can be asked to witness the unsealing, sample preparation, sample analysis and sample evaluation of an oil case. When everything is done according to protocol and the results are solid, the witness can indicate this, including remarks, on the final oil case report.

5.4 Sample volume

In general, samples should be taken from the thickest oil accumulations. Each sample should contain 10 ml to 100 ml of oil whenever possible to get a sufficient amount of representative material. However, if this is not possible, even extremely small amounts of oil should be considered for laboratory analysis, since analyses themselves require smaller volumes of oil.

IMPORTANT: While analyses can be carried out with very small samples, such samples can be overly affected by weathering and must be considered less representative. Therefore, taking sufficient sample material is important.

When samples are collected from very thin oil films on the water surface, it may sometimes be difficult to acquire even visible traces of oil in the sample.

When available ETFE nets for sampling of such oil films are strongly advised, because the spill material sticks to the net and can therefore be collected from a larger area.

When ETFE nets are not available water samples should be taken, even when in such cases the sample apparently consists of pure water. It should be emphasized that even such water samples with a sheen or a smell of oil may be useful for laboratory analysis.

5.5 Number of samples to be taken

It is strongly advised, when possible, to collect several samples in the spill area. Even in small spills at least two samples should be taken. In larger spills, the distances between the sampling positions should be decided for documenting the total range and distribution of the spill.

Be aware that the composition can have varied during the spillage or that more than one source can have caused the spill.

It is often sufficient to take only one source/spill sample from a single sampling point from a spill, on board of a ship or in the offshore or land-based installation. If necessary for administrative reasons (e.g. counter samples), more than one sample may be taken from each sampling point.

However, if there is any suspicion of sample inhomogeneity indicated by different texture / colours, e.g. on the water surface, on rocks and beaches, in bilges and sludge tanks, at least two, if necessary more, samples should be taken to cover the variance in composition of the samples.

Background samples should also be collected from background environments (engine, deck, hull, water, beach, etc.) whenever relevant, in order to determine whether the spilled oil has been contaminated by an earlier spill or other organic material.

6 Precautions and avoidance of contamination of samples during collection

6.1 General

It is critical to take precautions in order to prevent contaminating the samples during collection. Disposable nitrile gloves should be used and as far as possible, the sampling equipment should be disposable, since a thorough cleaning of oiled equipment is impossible in the field. If equipment is to be reused, great care needs to be taken to ensure that it is thoroughly cleaned and stored under clean conditions prior to further use.

If a spill has scattered and only thin sheens remain on the water surface, every possible effort should be made to take a sample of the spill material. No sample amount is too small and even samples that do not visibly show any traces of oil can provide useful data in analysis. The use of ETFE nets for thin sheen sampling is strongly advised, because the spill material sticks to the net and can therefore be collected from a larger area.

Sampling equipment shall be handled and stored in such a manner that its use cannot contaminate the samples being taken.

6.2 Potential sources of contamination

Avoiding contamination of the samples during sampling is essential. All the following possible sources of contamination should be considered and the appropriate control applied if necessary. These are:

- residue of earlier samples remaining on sampling containers, funnels, scoops, spatulas and other equipment;
- material from the site during sampling;
- residual water in or on ropes, chains or extension handles;
- dust or dirty water on the container closure;
- hands, gloves and general handling.

6.3 Controls

Contamination may be minimized by taking the following appropriate action:

- check that the equipment is clean;
- take care to avoid disturbance at the sampling site;
- store containers and closures in a clean environment;
- avoid touching the material to be sampled with fingers, hands or gloves.

If contamination is suspected this should be reported and if possible a fresh sample should be collected.