



SLOVENSKI STANDARD
oSIST prEN ISO 3170:2023
01-september-2023

Naftne tekočine - Ročno vzorčenje (ISO/DIS 3170:2023)

Petroleum liquids - Manual sampling (ISO/DIS 3170:2023)

Flüssige Mineralölerzeugnisse - Manuelle Probenahme (ISO/DIS 3170:2023)

Produits pétroliers liquides - Échantillonnage manuel (ISO/DIS 3170:2023)

Ta slovenski standard je istoveten z: prEN ISO 3170

<https://standards.iteh.ai/catalog/standards/sist/422a4141-3eea-4beb-ac5e-a93f1b9aabf8/osist-pren-iso-3170-2023>

ICS:

75.080

Naftni proizvodi na splošno

Petroleum products in
general

oSIST prEN ISO 3170:2023

en,fr,de

DRAFT INTERNATIONAL STANDARD

ISO/DIS 3170

ISO/TC 28/SC 2

Secretariat: **BSI**Voting begins on:
2023-06-22Voting terminates on:
2023-09-14

Petroleum liquids — Manual sampling

Produits pétroliers liquides — Échantillonnage manuel

ICS: 75.080

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN ISO 3170:2023](https://standards.iteh.ai/catalog/standards/sist/422a4141-3eea-4beb-ac5e-a93f1b9aabf8/osist-pren-iso-3170-2023)<https://standards.iteh.ai/catalog/standards/sist/422a4141-3eea-4beb-ac5e-a93f1b9aabf8/osist-pren-iso-3170-2023>

This document is circulated as received from the committee secretariat.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

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.

ISO/CEN PARALLEL PROCESSING



Reference number
ISO/DIS 3170:2023(E)

© ISO 2023

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN ISO 3170:2023](https://standards.iteh.ai/catalog/standards/sist/422a4141-3eea-4beb-ac5e-a93f1b9aabf8/osist-pren-iso-3170-2023)

<https://standards.iteh.ai/catalog/standards/sist/422a4141-3eea-4beb-ac5e-a93f1b9aabf8/osist-pren-iso-3170-2023>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	vi
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Safety	6
4.1 General.....	6
4.2 Safety aspects of equipment.....	7
4.3 Safety at sampling points.....	7
4.4 Entry into enclosed (confined) spaces.....	7
4.5 Electrical safety.....	9
4.5.1 Static Electricity.....	9
4.5.2 Electronic and electrical equipment.....	9
5 Sampling	9
5.1 General.....	9
5.2 Typical situations where samples need to be taken.....	10
5.2.1 Tanks and line sampling.....	10
5.3 Restricted opening / vapour trap sampling.....	10
5.4 Representative samples.....	10
5.5 Homogeneity.....	11
6 Equipment	11
6.1 General.....	11
6.2 Tank samplers.....	11
6.2.1 Spot samplers.....	11
6.2.2 Zone samplers / flow-through samplers.....	12
6.2.3 Running samplers.....	12
6.2.4 All level samplers.....	12
6.2.5 Bottom samplers.....	13
6.2.6 Dead bottom samplers.....	13
6.2.7 Residue samplers (sediment samplers).....	13
6.3 Open sampling devices.....	14
6.3.1 General.....	14
6.3.2 Sampling can/thief.....	14
6.3.3 Sampling cage and bottle.....	15
6.3.4 Dead bottom sampler.....	17
6.3.5 Zone/core sampler.....	19
6.4 Restricted and closed sampling devices.....	22
6.4.1 General.....	22
6.4.2 Sampler for vapour pressure analysis.....	24
6.4.3 Vapour control valves (VCV).....	24
6.5 Other sampling devices.....	24
6.5.1 Tank side samplers.....	24
6.5.2 Pipeline samplers.....	24
6.5.3 Drum samplers.....	25
6.5.4 Sludge/sediment samplers.....	26
7 Sample container	28
7.1 General container design consideration.....	28
7.2 Sample container material and type.....	29
7.2.1 Glass bottle.....	29
7.2.2 Plastic container.....	29
7.2.3 Metal cans.....	30
7.3 Sample closures, cleanliness, and sealing.....	30

ISO/DIS 3170:2023(E)

	7.3.1	Container closures	30
8		Procedures	30
	8.1	General sampling practices	30
	8.1.1	General principles of sampling	31
	8.2	Tank sampling procedures	32
	8.2.1	Shore tank sampling	32
	8.2.2	Sampling from ships	36
	8.3	Process and Pipeline Sampling	39
	8.3.1	Pipeline Sampling of Liquids	39
	8.3.2	Spot Sampling of High Vapour Pressure Liquids	39
	8.4	Sampling from railcars	45
	8.5	Sampling from road tankers	45
	8.6	Sampling from drums/intermediate bulk containers (IBC's)	46
	8.6.1	Tube sampling from drums	46
	8.6.2	IBC sampling	46
	8.6.3	Pump sampling	47
	8.6.4	Batch sampling	47
	8.7	Package sampling	47
	8.7.1	Statistical aspects of sampling packages	47
	8.7.2	Acceptable quality level (AQL)	48
	8.7.3	Inspection level	48
	8.7.4	Sampling Plan	48
	8.7.5	Procedures for sampling packages	49
	8.8	Sampling from dispensers (retail)	51
9		Requirements for specific products	52
	9.1	Crude Oil	52
	9.2	Naphtha's, Gasoline's and other Volatile Liquids	53
	9.3	Aviation Fuels	54
	9.4	Distillate Fuels (excluding Jet Fuel)	55
	9.5	Residual Fuel Oil (including Marine Bunker Fuels)	55
	9.5.1	Fuel Oil	55
	9.5.2	Marine Bunker Fuel (residual fuel and marine distillates)	55
	9.6	Bitumen	56
	9.7	Requirements for sampling for Microbiological Assay	56
	9.7.1	General recommendations for sampling fuel facilities	57
	9.7.2	Tank water phase sample	57
	9.7.3	Bulk fuel phase sample	57
	9.7.4	Sampling procedure	57
	9.7.5	Monitoring regimes for terminals and distribution systems	58
10		Sample Handling	58
	10.1	General considerations	58
	10.1.1	Sample transfer	59
	10.1.2	Labelling	59
	10.1.3	Sample transportation	60
	10.2	External influences	60
	10.2.1	Temperature	60
	10.2.2	Light	61
	10.2.3	Time	61
	10.2.4	'First test' requirements	61
	10.3	Homogenising samples	62
	10.3.1	None (no mixing)	62
	10.3.2	Shaking	62
	10.3.3	Power mixers	62
	10.4	Verification of mixing efficiency	63
	10.4.1	General	63
	10.4.2	Homogeneous liquids	63
	10.4.3	Non-homogeneous liquids	64

10.4.4	Mixing efficiency verification test for non-homogeneous oils (injection/ recovery test).....	64
10.5	Selection of sample mixing method.....	65
10.6	Compositing samples.....	66
10.7	Requirements for retained samples.....	67
Bibliography		68

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN ISO 3170:2023](https://standards.iteh.ai/catalog/standards/sist/422a4141-3eea-4beb-ac5e-a93f1b9aabf8/osist-pren-iso-3170-2023)

<https://standards.iteh.ai/catalog/standards/sist/422a4141-3eea-4beb-ac5e-a93f1b9aabf8/osist-pren-iso-3170-2023>

ISO/DIS 3170:2023(E)**Foreword**

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 3170 was prepared by Technical Committee ISO/TC 28, Petroleum products and lubricants, Subcommittee SC 2, *Measurement of petroleum and related products*.

This fourth edition cancels and replaces the third edition (ISO 3170:2004), which has been technically revised, the main change was a complete re-write to include an equal representation of the closed and restricted sampling devices to the traditional open sampling devices.

(standards.iteh.ai)

[oSIST prEN ISO 3170:2023](https://standards.iteh.ai/catalog/standards/sist/422a4141-3eea-4beb-ac5e-a93f1b9aabf8/osist-pren-iso-3170-2023)

<https://standards.iteh.ai/catalog/standards/sist/422a4141-3eea-4beb-ac5e-a93f1b9aabf8/osist-pren-iso-3170-2023>

Introduction

This International Standard may be applied in combination with ISO 3171.

This International Standard specifies standard conditions and methods for obtaining samples of liquid/semi-liquid hydrocarbons from a tank, drum or pipeline by manual means. If the hydrocarbon to be sampled is non-homogeneous, showing significant variations in composition or containing sediments and water, samples taken manually should not be expected to be representative, but may enable the degree of non-homogeneity to be assessed and estimates of quality and quantity to be made.

Procedures are specified which minimize or eliminate losses of light ends from samples. Such losses can occur during handling or transfer of samples, thereby making them non-representative of the bulk.

The procedures specified provide samples for:

- a) the determination of the liquid/hydrocarbon quality;
- b) the determination of the water content;
- c) the determination of other contaminants that are not considered to be part of the liquid hydrocarbon.

If the sampling conditions for purposes a), b) and c) are in conflict, separate samples are required.

Sampling procedures for tank contents that are not homogeneous are specified that enable the degree of non-homogeneity to be assessed and estimates of quality and quantity to be made.

Procedures for the sampling of liquid hydrocarbons from tanks under inert gas pressure are included, together with techniques for sampling from tanks which are equipped with vapour emission control systems.

It is recognized that, in many countries, some or all of the items covered by this International Standard are the subject of mandatory regulations imposed by the laws of those countries. In cases of conflict between such mandatory regulations and this International Standard, the former prevail.

Petroleum liquids — Manual sampling

1 Scope

This International Standard specifies the manual methods to be used for obtaining samples of liquid or semi-liquid hydrocarbons, tank residues and deposits from fixed tanks, railcars, road vehicles, ships and barges, drums and cans, or from liquids being pumped in pipelines.

It applies to the sampling of liquid products, including crude oils, intermediate products, synthetic hydrocarbons and bio fuels, which are stored at or near atmospheric pressure or transferred by pipelines as liquids at elevated pressures and temperatures.

The sampling procedures specified are not intended for the sampling of special petroleum products which are the subject of other International Standards, such as electrical insulating oils (IEC 60475), liquefied petroleum gases (ISO 4257), liquefied natural gases (ISO 8943) and gaseous natural gases (ISO 10715).

This International Standard refers to methods of sampling and sampling equipment in use at the time of writing. It does not exclude the use of new equipment, provided that such equipment enables samples to be obtained in accordance with the requirements and procedures of this International Standard.

NOTE For the purposes of this International Standard, the term "% (m/m)" is used to represent the mass fraction.

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.

ISO 1998 (all parts), *Petroleum industry — Terminology*

ISO 2859-1:1999, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 3171, *Petroleum liquids — Automatic pipeline sampling*

IP461 Bitumen and bituminous binders - *Preparation of test samples*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1998 and the following apply.

3.1

acceptable quality limit

AQL

maximum per cent defective (or the maximum number of defects per hundred units) that, for purposes of sampling inspection, can be considered satisfactory as a process average.

ISO/DIS 3170:2023(E)**3.2****all-level sample**

Sample obtained with an apparatus which accumulates the sample at a uniform rate whilst passing in one direction only through the total liquid height, excluding any free water. Only bottom-up sampling is appropriate for aviation fuels. This is to ensure that the sample is satisfactorily taken. A bottom-up all-level sample must have some ullage left in the sampling container to be valid. The disadvantage of bottom-up sampling is that the liquid column has been disturbed as the sampling apparatus is lowered.

3.3**automatic sampler**

A device used to extract a representative sample from the liquid flowing in a pipe. The automatic sampler generally consists of a probe, a sample extractor, an associated controller, a flow measuring device, and a sample receiver.

3.4**batch**

Identified quantity of product, the quality of which is covered by a single certificate of quality or certificate of analysis.

3.5**bottom sample**

A spot sample collected from the material at the bottom of the tank, container, or line at its lowest point. In practice, the term bottom sample has a variety of interpretations. It is therefore recommended that the exact sampling location (e.g. 150 mm from the bottom) should be specified when using this term.

3.6**dead bottom sample**

A sample taken of the liquid (fuel, water, mixture in contact with the bottom surface of a tank or container)

3.7**bottom water sample**

spot sample of free water taken from beneath the hydrocarbon in a tank

3.8**closed sampling**

process of taking samples within a tank under closed conditions, which does not permit the release of any tank contents or vapour to the atmosphere

3.9**composite sample**

Sample obtained by combining a number of individual samples in defined proportions with the aim of obtaining a sample representative of the bulk of the product.

3.10**sample integrity**

condition of being complete and unaltered, i.e. the sample being preserved with the same composition as when it was taken from the bulk of the liquid

3.11**skim sample**

spot sample taken from the surface of the liquid

3.12**lower sample**

spot sample taken at a level of five-sixths of the depth of liquid below the top surface

3.13**middle sample**

spot sample taken at a level of one-half of the depth of liquid below the top surface

3.14**meter Interval Sample**

spot sample taken at meter intervals throughout the depth of the liquid

3.15**mixer**

device which provides a homogeneous mixture of the liquid within a pipeline or container in order to obtain a representative sample.

3.16**open sampling**

process of taking traditional samples from a tank via an open gauge hatch or gauging access point

Note 1 to entry: If the tank ullage space is pressurized, it will normally be necessary to use other (closed or restricted) procedures to avoid de-pressurizing the tank and the consequent loss of volatile organic compounds (VOCs).

3.17**per cent defective**

one hundred times the number of defective units of product contained in any given quantity of units of product divided by the total number of units of product inspected, i.e.:

$$\text{per cent defective} = \frac{\text{number of defectives}}{\text{number of units inspected}} \times 100$$

3.18**portable sampling device****PSD**

housing designed to connect to a vapour lock valve, which contains a restricted or closed system sampler and is fitted with a tape or cable winding mechanism for lowering and retrieving the sampler

3.19**representative sample**

A representative sample is a portion extracted from the total volume that is deemed to have the constituents in the same proportions that are present in that total volume.

3.20**residues and deposits**

organic and inorganic matter, together with any water dispersed within it, which has separated from the liquid and either fallen to the bottom of the tank containing the liquid, or been left in the tank after the liquid has been pumped out

3.21**restricted sampling**

process of taking samples within a tank using equipment which is designed to substantially reduce or minimize the vapour losses that would occur during open sampling, but where the equipment is not completely gas-tight

3.22**running sample**

sample obtained with an apparatus which accumulates the sample at a uniform rate while passing in both directions through the total liquid height, excluding any free water.

3.23**sample conditioning**

mixing necessary to homogenize the sample during sample handling in preparation for subsampling and/or analysis

ISO/DIS 3170:2023(E)**3.24****sample handling**

any conditioning, transferring, dividing, and transporting of the sample. Sample handling includes transferring the sample from the primary sampling device to any secondary container, and the transferring of subsamples to the laboratory apparatus in which it is to be analyzed.

3.25**sample size**

number of samples to be drawn from a batch to determine its acceptability as given in sampling plans

3.26**spot sample**

sample taken at a specific location in a tank or from a pipeline

3.27**static mixer**

mixing device having no moving parts and located within a pipe or tube. The effectiveness of the static mixer depends on the kinetic energy of the moving liquid for the energy required to mix the liquid.

3.28**still-well****still-pipe****sounding-pipe****stand pipe**

vertical cylindrical pipe built into a tank to permit gauging operations while reducing errors arising from turbulence or agitation of the liquid. Samples taken from unperforated or unslotted still-wells should not be used for custody transfer applications, Still-wells may be found in static tanks and in ship and barge tanks.

3.29**suction level sample****outlet sample**

sample taken at the lowest level from which liquid hydrocarbon is pumped from the tank. On determining this level, appropriate allowance is made for any fittings within the tank such as swing-arms, suction baffles or internal bends.

3.30**sump sample**

spot sample taken from within a sump

3.31**suspended water**

water contained within the oil that is finely dispersed as small droplets.

Note 1 to entry: It may over a period of time, either collect as free water or become dissolved water, depending on the conditions of temperature and pressure prevailing.

3.32**tap sample**

spot sample taken via a tap, typically located on the side of a shore tank.

3.33**test portion**

portion of a sample or subsample that is introduced into the analytical test apparatus

3.34**top sample**

spot sample obtained 150 mm below the surface of the liquid.

3.35**total water**

sum of all the dissolved, suspended, and free water in a cargo or parcel of liquid hydrocarbon

3.36**ullage**

empty capacity left in a fixed volume sample receiver/container above the liquid surface

3.37**upper sample**

spot sample taken at a level of one-sixth of the depth of the liquid below the top surface.

3.38**vapour lock valve****vapour control valve**

valve, usually with connector above it, fitted to the top of vapour tight or pressurised tanks to permit manual measurement and/or sampling operations to be carried out with little or no loss of vapour.

3.39**zone sample****core sample****flow-through sample**

sample taken as that part of the liquid column which is contained within the whole height of the sampler when it is sealed at a single spot location within a tank.

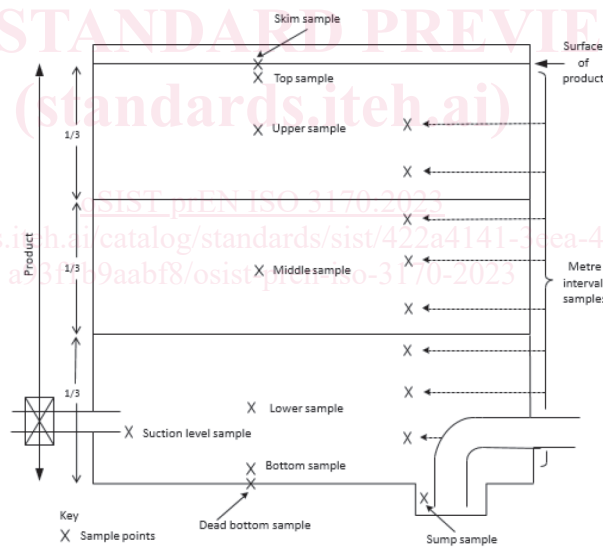


Figure 1 — Examples of spot sample positions in tank