Petroleum liquids - Automatic pipeline sampling

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EESTI STANDARDI EESSÕNA **NATIONAL FOREWORD**

Käesolev Eesti standard EVS-EN ISO 3171:2001 sisaldab Euroopa standardi EN ISO 3171:1999 ingliskeelset teksti. Käesolev dokument on jõustatud 18.06.2001 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN ISO 3171:2001 consists of the English text of the European standard EN ISO 3171:1999. This document is endorsed on 18.06.2001 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: This standard recommends procedures to be used for obtaining, by automatic means, representative samples of crude oil and liquid petroleum products being conveyed by pipeline.	**Scope:** This standard recommends procedures to be used for obtaining, by automatic means, representative samples of crude oil and liquid petroleum products being conveyed by pipeline.

ICS 75.080

Võtmesõnad: definitions, liquids, petroleum products, safety measures, sampling, sampling equipment

EUROPEAN STANDARD
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English version

Petroleum liquids – Automatic pipeline sampling
(ISO 3171 : 1988)

Produits pétroliers liquides – Echantillonnage automatique en oléoduc (ISO 3171 : 1988)

Flüssige Mineralölerzeugnisse – Automatische Probenahme aus Rohrleitungen (ISO 3171 : 1988)

This European Standard was approved by CEN on 1999-02-18.

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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
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Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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Foreword

International Standard

ISO 3171 : 1988 Petroleum liquids – Automatic pipeline sampling,

which was prepared by ISO/TC 28 'Petroleum products and lubricants' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 19 'Petroleum products, lubricants and related products', the Secretariat of which is held by NNI, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by September 1999 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 3171 : 1988 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative).

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0 Introduction

The purpose of collecting a sample of the material flowing through a pipeline is to determine the mean composition and quality of the bulk quantity. Samples of the bulk quantity in the line may be analysed to determine composition, water and sediment content, or any other important attributes such as density, viscosity or, with special precautions, vapour pressure.

Manual methods of pipeline sampling are adequate for homogeneous liquids whose composition and quality do not significantly vary with time. If this is not the case, automatic sampling is the recommended procedure since the continuous or repetitive extraction of small samples from a pipeline ensures that any changes in the bulk contents are reflected in the collected sample. In order that the sample shall be as representative as possible it is essential to ensure that the recommendations of this International Standard with respect to the required homogeneity of the liquid at the sampling location and to the required frequency of extraction of the small samples are met.

Consideration should be given to having standby samples provided by manual methods that may be referred to if the automatic sampler fails to perform satisfactorily; however, manual sampling will be subject to uncertainty if pipeline conditions are varying. (See ISO 3170.)

The equipment and techniques described have generally been used for sampling stabilized crude oil, but may also be applied to unstabilized crude oil and refined products provided consideration is given to the relevant safety precautions and the difficulties of sample handling.

Representative sampling of crude oil for density and water and sediment content is a critical process. Extensive studies have shown that, in crude oil transfers, four distinct steps are required for determining representative values:

a) adequate stream conditioning of the pipeline contents;

b) reliable and effective sampling, ensuring proportionality between sampling ratio and flow rate in the line;

c) adequate conservation and transporting of the sample;

d) adequate conditioning and dividing into parts for accurate laboratory analysis.

This International Standard refers to existing methods of sampling and the type of equipment presently in use. It is, however, not intended that it should exclude new equipment not yet developed for commercial use, provided that such equipment enables samples to be obtained that are representative, and is in accordance with the general requirements and procedures of this International Standard.

The annexes to this International Standard contain calculation procedures about pipeline mixing theory and profile testing and also give basic guidelines for sampler location.

It is realized that in many countries some or all of the items covered by this International Standard are subject to mandatory regulations imposed by the laws of those countries; such regulations must be rigorously observed. In cases of conflict between such mandatory regulations and this International Standard, the former should prevail.

1 Scope and field of application

1.1 This International Standard recommends procedures to be used for obtaining, by automatic means, representative samples of crude oil and liquid petroleum products being conveyed by pipeline.

NOTE — Although throughout this International Standard the term crude oil is used, this should be taken to include other petroleum liquids where the technique and equipment are also applicable.

1.2 This International Standard does not apply to the sampling of liquefied petroleum gases and liquefied natural gases.

1.3 The principal purpose of this International Standard is to give guidelines for specifying, testing, operating, maintaining and monitoring crude oil samplers.

1.4 The sampling procedures for crude oil are intended to provide representative samples for the determination of

a) the oil composition and quality;

b) the total water content;

c) other contaminants that are not considered to be part of the crude oil transferred.

If the sampling procedures for a), b) and c) are in conflict, separate samples may be required.

NOTE — The results of the laboratory analysis may be used for calculating adjustments to the declared quantity of crude oil transferred. The procedure for carrying out the adjustments does not form part of this International Standard.

1.5 Sample handling is included, covering all aspects following collection to the transfer of the sample to laboratory apparatus.

1.6 This International Standard describes the practices and procedures believed at the present time to be the most likely to lead to representative sampling and hence to accurate water determination. However, the accuracy of the water determination on pipeline samples obtained using automatic samplers will depend upon the arrangement and characteristics of all the various elements making up the sampling system, and on the accuracy of the subsequent analytical procedures.

A theoretical technique for evaluating the combined accuracy of the automatic sampling system and the analytical test is given in clause 16. A practical test procedure for field use is described in clause 15.

Normally, the acceptable accuracy limits for a particular automatic sampling system will be specified in agreement between the interested parties.

Table 4 of clause 15 classifies the performance of automatic sampling systems by ratings based on the accuracy of practical test results. These ratings may be used as a guide to possible performance and as a basis for individual agreement.

2 References

ISO 3165, *Sampling of chemical products for industrial use — Safety in sampling.*

ISO 3170, *Petroleum products — Liquid hydrocarbons — Manual sampling.*

NOTE — See also clause 17, Bibliography.

3 Definitions

For the purpose of this International Standard, the following definitions apply.

3.1 acceptable (accuracy) limits: The limits within which the determined concentration of water in a sample is acceptable relative to the true value or other specified value, at the 95 % probability level.

3.2 automatic sampler: A system capable of extracting a representative sample from the liquid flowing in a pipe. The system consists of a sampling probe and/or a separating device, an associated controller and a sample receiver.

3.2.1 intermittent sampler: A system for extracting liquid from a flowing stream, a sample receiver to contain the sample grabs taken from the stream, and a means for controlling the amount of sample taken by varying the sampling frequency or grab volume in relation to flow rate.

3.2.2 continuous sampler: A system for extracting liquid from a flowing stream which has a separating device which continuously withdraws liquid from the main pipeline in relation to flow rate, an intermediate sample receiver, and a means for controlling secondary withdrawal to a final sample receiver.

3.3 calculated sample volume: The theoretical sample volume obtained by multiplying the sample grab volume by the number of actually collected grabs.

3.4 competent person: A person who by reason of his or her training, experience, and theoretical and practical knowledge is able to detect any defects or weaknesses in the plant or equipment and to make an authoritative judgement as to its suitability for further use.

NOTE — This person should have sufficient authority to ensure that the necessary action is taken following his or her recommendation.

3.5 controller: A device which governs the operation of the automatic sampler in order to provide a representative sample.

3.6 fixed-rate sample; time-proportional sample: A sample taken from a pipeline during the whole period of transfer of a batch, composed of equal increments at uniform time intervals.

3.7 flow-proportional sample: A sample taken from a pipeline during the whole period of transfer of a batch, at a rate which is proportional to the rate of flow of the liquid through the pipeline at any instant.

3.8 grab: The portion of liquid extracted from the pipe by a single actuation of the separating device. The sum of all the portions results in a sample.

3.9 homogeneous mixture: A liquid is homogeneous if the composition is the same at all points. For the purposes of this International Standard a liquid is homogeneous if the variation in composition does not exceed the limits provided in 4.4.

3.10 integrity of the sample: The 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 isokinetic sampling: Sampling in such a manner that the linear velocity of the liquid through the opening of the sampling probe is equal to the linear velocity of the liquid in the pipeline at the sampling location and is in the same direction as that of the bulk of the liquid in the pipeline approaching the sampling probe.