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Petroleum liquids — Automatic pipeline sampling

Produits pétroliers liquides — Échantillonnage automatique en oléoduc

Reference number
ISO 3171 : 1988 (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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 3171 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*.

This second edition cancels and replaces the first edition (ISO 3171 : 1975) of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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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.