SLOVENSKI STANDARD
SIST EN ISO 4267-2:1998

01-maj-1998

Nafta in tekoči naftni proizvodi - Izračun količin olja - 2. del: Dinamična meritev (ISO 4267-2:1988)

Petroleum and liquid petroleum products - Calculation of oil quantities - Part 2: Dynamic measurement (ISO 4267-2:1988)

Mineralöl und flüssige Mineralölerzeugnisse - Berechnung von Ölmengen - Teil 2: Dynamische Messung (ISO 4267-2:1988)

Pétrole et produits pétroliers liquides - Calcul des quantités de pétrole - Partie 2: Mesurage dynamique (ISO 4267-2:1988)

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75.180.30	Oprema za merjenje prostornine in merjenje	Volumetric equipment and measurements

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EUROPEAN STANDARD

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English version

Petroleum and liquid petroleum products - Calculation of oil quantities - Part 2: Dynamic measurement (ISO 4267-2:1988)

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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.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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

Foreword

The text of the International Standard from Technical Committee ISO/TC 28 "Petroleum products and lubricants" of the International Organization for Standardization (ISO) has been taken over as an European Standard by Technical Committee CEN/TC 19 "Petroleum products, lubricants and related products", the secretariat of which is held by NNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 1996, and conflicting national standards shall be withdrawn at the latest by August 1996.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 4267-2:1988 has been approved by CEN as a European Standard without any modification.

NOTE: Normative references to International Standards are listed in annex ZA (normative).

Annex ZA (normative)
Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

Publication	Year	Title	EN	Year
ISO 7278-2	1988	Liquid hydrocarbons - Dynamic measurement - Proving systems for volumetric meters - Part 2: Pipe provers	EN ISO 7278-2	1995
ISO 8222	1987	Petroleum measurement systems - Calibration - Temperature corrections for use with volumetric reference measuring systems	EN ISO 8222	1995

INTERNATIONAL STANDARD

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Petroleum and liquid petroleum products — Calculation of oil quantities —

Part 2: Dynamic measurement

Pétrole et produits pétroliers liquides — Calcul des quantités de pétrole —

Partie 2 : Mesurage dynamique

Reference number
ISO 4267-2 : 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 4267-2 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants.*

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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Contents

Petroleum and liquid petroleum products — Calculation of oil quantities —

Part 2: Dynamic measurement

0 Introduction

Before the compilation of this publication, words and expressions employed in dynamic measurement calculations were interpreted slightly differently by different people, and there was a lack of coherence in their use. In addition, because data were spread over so many standards, there was difficulty in readily comparing the finer points of calculations.

Rules for rounding, and the choice of how many significant figures entered each calculation, were open to a variety of interpretations. For different operators to obtain identical results from the same data, the rules for sequence, rounding and significant figures have to be defined. This International Standard aims, among other things, at defining the minimum set of rules required. Nothing in this International Standard precludes the use of more precise determinations of temperature, pressure and density or the use of more significant digits, by mutual agreement among the parties involved.

This International Standard aims at consolidating and standardizing calculations pertaining to the metering of petroleum liquids, and at clarifying terms and expressions by eliminating local variations of such terms. The purpose of standardizing calculations is to produce the same answer from the same data regardless of the computing system used.

Although ISO/TC 28 standards use 15 °C as a standard reference temperature, it is recognized that individual countries may use other reference temperatures, for example 20 °C, 12 °C or 60 °F.

This standard sets minimum levels of accuracy for industrial calculations, but, if parties consider agreeing to set tighter requirements, it is important to demonstrate whether such requirements can be met. Future technological progress in meter proving and operation may justify a tighter specification for calculation procedures.

1 Scope and field of application

This International Standard defines the various terms (be they words or symbols) employed in the calculation of metered petroleum quantities. Where two or more terms are customarily employed in the oil industry for the same quantity, a preferred term is selected.

This International Standard also specifies the equations which allow the values of correction factors to be computed. It also gives rules for the sequence, rounding and significant figures to be employed in a calculation. It provides tables which may be used to look up specific correction factors should it not be desired to calculate them by manual as well as computer methods. The calculation of prover base volumes, meter factors and measurement tickets is also covered.

The field of application of this International Standard is the volumetric measurement of liquid hydrocarbons, including liquefied petroleum gases, by meter and prover. It does not include two-phase fluids (though it may be found useful in such situations) except in so far as sediment and water may be mixed in with crude oil.

2 References

ISO 91-1, *Petroleum measurement tables — Part 1: Tables based on reference temperatures of 15 °C and 60 °F.*

ISO 2715, *Liquid hydrocarbons — Volumetric measurement by turbine meter systems.*

ISO 5024, *Petroleum liquids and gases — Measurement — Standard reference conditions.*

ISO 7278-2, *Liquid hydrocarbons — Dynamic measurement — Proving systems for volumetric meters — Part 2: Pipe provers.* [1)]

ISO 8222, *Petroleum measurement systems — Calibration — Temperature corrections for use with volumetric reference measuring systems.*

ISO 9770, *Petroleum products — Compressibility factors for hydrocarbons in the range 638 kg/m³ to 1 074 kg/m³.* [1)]

1) At the stage of draft.

3 Definitions

For the purposes of this International Standard, the following definitions apply to the terms used herein:

3.1 base volume: The volume of a prover under standard conditions.

3.2 indicated volume: The change in meter reading that occurs during a transfer through the meter.

3.3 K-factor: The number of pulses generated by a meter for a unit of volume delivered.

$$K\text{-factor} = \frac{\text{pulses generated by meter}}{\text{volume delivered by meter}}$$

3.4 measurement ticket: A generalized term for the written acknowledgment of the receipt or delivery of a quantity of crude oil or petroleum product, including a record of the measurement data (see clause 9). It may be a form to be completed, a data print-out or a data display depending on the degree of automation, remote control, or computerization. Previously described as "run ticket" and "receipt and delivery ticket".

3.5 meter factor: The ratio of the actual volume of liquid passed through a meter to the volume indicated by the meter.

$$\text{Meter factor} = \frac{\text{volume passed through a meter}}{\text{volume indicated by the meter}}$$

3.6 net standard volume: The total standard volume (see 3.9) minus the volume of water and sediment transferred through the meter.

NOTE — For clean, refined products, the total standard volume and net standard volume are usually equal.

3.7 reading; meter reading: The instantaneous display of meter volume (see *indicated volume*).

3.8 standard (reference) conditions: For the measurement of petroleum and its products, these are a pressure of 101,325 kPa (1,013 25 bar) and a temperature 15 °C, with the exception of liquids having a vapour pressure greater than atmospheric pressure at 15 °C, in which case the standard pressure is the equilibrium vapour pressure at 15 °C (see ISO 5024).

3.9 total standard volume: The total volume at standard temperature, also corrected to standard pressure.

3.10 total volume: The indicated volume multiplied by the appropriate meter factor for the liquid and flow rate concerned, without correction for temperature and pressure. It includes all water and sediment transferred through the meter.

4 Hierarchy of accuracies

4.1 Purpose and implications

4.1.1 There is an inevitable, or natural, hierarchy of accuracies in petroleum measurement. At the top are volume standard measures which are certified by a government agency or laboratory traceable to the appropriate national standard. From this level downwards, any uncertainty at a higher level must be reflected in all the lower levels as a systematic error. Whether such systematic error will be positive or negative is unknown; either is possible.

4.1.2 To expect equal or less uncertainty at a lower level of the hierarchy than exists in a higher level is unrealistic. The only way to decrease the random component of uncertainty in a given measurement system or method is to increase the number of determinations, and calculate the mean value. The number of significant digits in intermediate calculations of a value can be larger in the upper levels of the hierarchy than in the lower levels.

4.2 Hierarchy

4.2.1 The hierarchy of accuracies in this standard is structured, in general, as shown in table 1.

4.2.2 This standard gives rules for rounding, truncating and reporting final values for each level of the hierarchy.

5 Principal correction factors

5.1 Purpose and implications

5.1.1 Designation of correction factors by symbol rather than by words is recommended because, first, it abbreviates their expression; second, it allows algebraic manipulations; third, it indicates their similarity subject only to the particular liquid or metal involved; and fourth, it can more readily eliminate confusion, as for example the difference between the compressibility factor F of a liquid and the correction factor C_{pl}, which is a function of F.

There are six principal correction factors employed in calculations of liquid quantities.

5.1.2 The first of these six correction factors is the meter factor MF, a non-dimensional value which corrects the volume indicated on a meter or meter accessory to the actual volume, be that volume a raw or corrected volume (see clause 7). In some instances, the K-factor is used in place of or along with the meter factor (see clause 8).