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STN	**Systémy na meranie ropy Časť 2: Navrhovanie, kalibrácia a prevádzkovanie potrubných meračov (ISO 7278-2: 2022)**	**STN EN ISO 7278-2** 65 6052

Petroleum measurement systems - Part 2: Pipe prover design, calibration and operation (ISO 7278-2:2022)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 02/23

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EUROPEAN STANDARD

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Supersedes EN ISO 7278-2:1995

English Version

Petroleum measurement systems - Part 2: Pipe prover design, calibration and operation (ISO 7278-2:2022)

Systèmes de mesurage des produits pétroliers - Partie 2: Conception, étalonnage et fonctionnement des tubes étalons (ISO 7278-2:2022)

Flüssige Kohlenwasserstoffe - Dynamische Messung - Prüfsysteme für volumetrische Messgeräte - Teil 2: Rohrprüfer (ISO 7278-2:2022)

This European Standard was approved by CEN on 28 October 2022.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN ISO 7278-2:2022 E

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European foreword

This document (EN ISO 7278-2:2022) has been prepared by Technical Committee ISO/TC 28 "Petroleum and related products, fuels and lubricants from natural or synthetic sources" in collaboration with 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 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of an identical text or by endorsement, at the latest by May 2023, and conflicting national standards shall be withdrawn at the latest by May 2023.

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

This document supersedes EN ISO 7278-2:1995.

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Endorsement notice

The text of ISO 7278-2:2022 has been approved by CEN as EN ISO 7278-2:2022 without any modification.

INTERNATIONAL STANDARD

ISO 7278-2

Second edition
2022-11

Petroleum measurement systems —

Part 2: Pipe prover design, calibration and operation

Systèmes de mesurage des produits pétroliers —

Partie 2: Conception, étalonnage et fonctionnement des tubes étalons

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 28, *Petroleum and related products, fuels and lubricants from natural or synthetic sources*, Subcommittee SC 2, *Measurement of petroleum and related products,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 19 *Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 7278-2:1988), which has been technically revised. It also cancels and replaces the first edition of ISO 7278-4:1999, the content of which has been incorporated.

The main changes are as follows:

— The content and scope now covers the design of pipe provers given in ISO 7278-2:1988 and the guidance for operators given in ISO 7278-4:1999, which will be withdrawn.

— The different types of pipe prover designs and operating methods have been defined and described.

— The variety of operational methods and the means to apply them to flowmeter calibration of different relative sizes has been described.

— The design, calibration and use of small volume (compact) prover designs has been included.

— The document has been changed from a normative document to a guidance document to reflect best practices.

— The document takes into account changes in practice described in alternative standards produced by the American Petroleum Institute (API) and the Energy Institute (EI).

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In the petroleum industry the term “proving” is used to refer to the calibration of devices used in the measurement of quantities of crude oils and petroleum products. Proving uses specified methods to show, or prove, that the result falls within specified acceptance criteria. Proving provides an assurance that the resultant measurement provides an acceptable uncertainty for the duty.

A pipe prover, otherwise called a displacement prover, is a volumetric reference device providing a calibration reference standard for flowmeters with an electronic pulsed output. The fluid remains contained within the piping system and proving can be carried out dynamically at various flowrates and pressures without interruption to the flow.

Pipe provers are used extensively within petroleum industry to provide in situ calibration of flowmeters used for fiscal, custody transfer and pipeline integrity applications. They are used with both crude and refined oils and products but may be used with many other fluids within and outside the petroleum industry.

A pipe prover consists of a length of pipe, a section of which has had its internal volume determined by calibration. A displacer, usually a piston or a tightly fitting sphere or ball, travels along this section of pipe displacing an accurately determined volume of liquid. This volume can be compared with an equivalent volume measured by the flowmeter under test.

The calibrated volume of the prover is established by the detection of the displacer passing along the calibrated section of pipe. Detectors sense the passage of the displacer indicating the start and end of travel through the calibrated section. The detectors trigger the counting of pulses produced by a flowmeter using electronic counters or counters within a flow computer. As the pulses represent the volume measured by the associated flowmeter, a calibration is achieved through the relationship with the calibrated volume of the pipe prover.

Pipe provers are of different designs and are manufactured with a wide range of pipe diameters and volumes. They are available for use as part of a fiscal measurement system in fixed locations and as mobile reference devices.

Any type of flow meter giving a pulsed output may be calibrated however the volume, design and type of the prover may impose limitations on the type and size of meter which would be compatible.

This document describes the design, construction, calibration and use of pipe provers primarily used for the calibration, proving and verification of flowmeters used for liquid petroleum products and may be applied to other liquid applications requiring a high standard of measurement accuracy.

INTERNATIONAL STANDARD ISO 7278-2:2022(E)

Petroleum measurement systems —

Part 2:
Pipe prover design, calibration and operation

WARNING — The use of this document may involve hazardous materials, operations and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices.

1 Scope

This document provides descriptions of the different types of pipe provers, otherwise known as displacement provers, currently in use. These include sphere (ball) provers and piston provers operating in unidirectional and bidirectional forms. It applies to provers operated in conventional, reduced volume, and small volume modes.

This document gives guidelines for:

— the design of pipe provers of each type;

— the calibration methods;

— the installation and use of pipe provers of each type;

— the interaction between pipe provers and different types of flowmeters;

— the calculations used to derive the volumes of liquid measured (see Annex A);

— the expected acceptance criteria for fiscal and custody transfer applications, given as guidance for both the calibration of pipe provers and when proving flowmeters (see Annex C).

This document is applicable to the use of pipe provers for crude oils and light hydrocarbon products which are liquid at ambient conditions. The principles apply across applications for a wider range of liquids, including water. The principles also apply for low vapour pressure, chilled and cryogenic products, however use with these products can require additional guidance.

2 Normative references

There are no normative references.