SLOVENSKI STANDARD
SIST EN ISO 13503-1:2005

01-junij-2005

Industrija za predelavo nafte in zemeljskega plina - Tekočine in materiali za zaključna dela - 1. del: Merjenje viskoznosti tekočin za zaključna dela (ISO 13503-1:2003)

Petroleum and natural gas industries - Completion fluids and materials - Part 1: Measurement of viscous properties of completion fluids (ISO 13503-1:2003)

Erdöl- und Erdgasindustrie - Komplettierungsflüssigkeiten und Materialien - Teil 1: Messung der Fließeigenschaften von Komplettierungsflüssigkeiten (ISO 13503-1:2003)

Industries du pétrole et du gaz naturel - Fluides de complétion et matériaux - Partie 1: Mesures des propriétés visqueuses des fluides de complétion (ISO 13503-1:2003)

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ICS:

75.180.30	Oprema za merjenje prostornine in merjenje	Volumetric equipment and measurements

SIST EN ISO 13503-1:2005 **en,fr**

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Petroleum and natural gas industries - Completion fluids and materials - Part 1: Measurement of viscous properties of completion fluids (ISO 13503-1:2003)

Industries du pétrole et du gaz naturel - Fluides de complétion et matériaux - Partie 1: Mesures des propriétés visqueuses des fluides de complétion (ISO 13503-1:2003)

Erdöl- und Erdgasindustrie - Komplettierungsflüssigkeiten und Materialien - Teil 1: Messung der Fließeigenschaften von Komplettierungsflüssigkeiten (ISO 13503-1:2003)

This European Standard was approved by CEN on 7 February 2005.

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

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Foreword

The text of ISO 13503-1:2003 has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum and natural gas industries" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 13503-1:2005 by Technical Committee CEN/TC 12 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by September 2005, and conflicting national standards shall be withdrawn at the latest by September 2005.

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Endorsement notice

The text of ISO 13503-1:2003 has been approved by CEN as EN ISO 13503-1:2005 without any modifications.

INTERNATIONAL STANDARD

ISO 13503-1

First edition
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Petroleum and natural gas industries — Completion fluids and materials —

Part 1: Measurement of viscous properties of completion fluids

Industries du pétrole et du gaz naturel — Fluides de complétion et matériaux —

Partie 1: Mesures des propriétés visqueuses des fluides de complétion

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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.

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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 13503-1 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 3, *Drilling and completion fluids, and well cements*.

ISO 13503 consists of the following parts, under the general title *Petroleum and natural gas industries — Completion fluids and materials*:

— *Part 1: Measurement of viscous properties of completion fluids*

The following part is under preparation:

— *Part 2: Measurement of properties of proppants used in hydraulic fracturing and gravel-packing operations*

Introduction

For the purpose of this part of ISO 13503, completion fluids are defined as viscosified treating fluids used during the completion or workover of a petroleum- or natural gas-producing well. The objective of this part of ISO 13503 is to provide a standard procedure for measuring the viscous properties of single-phase, non-particulate-laden completion fluids. These fluids are viscosified brines, gravel-pack carrier fluids, and fracturing fluids. These fluids can be either crosslinked or non-crosslinked (aqueous, hydrocarbon- or acid-based).

An optional shear-history simulation procedure is provided for fluids that are potentially shear-sensitive. This procedure is designed to simulate the shearing effects experienced by a fluid in surface apparatus and during the time it is being conveyed down the welbore. Shear-history simulation is most often used during the development of new fracturing fluids to characterize their sensitivity to shear.

These standard procedures were compiled on the basis of several years of comparative testing, debate, discussion, and continued research by the industry.

This standard procedure is largely based on API RP 39, third edition, May 1998 [1].

In this part of ISO 13503, where practical, U.S. Customary units are included in parentheses for convenience.

Petroleum and natural gas industries — Completion fluids and materials —

Part 1: Measurement of viscous properties of completion fluids

1 Scope

This part of ISO 13503 provides consistent methodology for determining the viscosity of completion fluids used in the petroleum and natural gas industries. For certain cases, methods are also provided to determine the rheological properties of a fluid.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
bob
fixed inner cylinder of a concentric-cylinder viscometer

2.2
completion fluid
any fluid used during the completion phase of a well

2.3
concentric-cylinder viscometer
rotational viscometer that consists of a concentric-cylindrical bob and a cylindrical rotor

2.4
elasticity
capability of a material to regain its original shape and condition upon removal of an acting stress

2.5
laminar flow
flow property of fluids in which all layers of the fluid move parallel to each other and no material is transferred between layers

2.6
non-crosslinked fluid
linear, polymer-viscosified solution or any fluid that does not exhibit significant elasticity leading to the Weissenberg effect (“bob climbing”)

2.7
rheology
science of the deformation and flow of matter

2.8
shear history
sequence of shear rates and temperatures applied to fluids prior to and during measurements

2.9
shear-history simulator
apparatus used to simulate shear history in a fluid

2.10
shear rate
rate at which one particle of fluid is sliding by another particle divided by the distance between those particles

2.11
shear stress
force required to sustain fluid flow

2.12
viscoelastic fluid
crosslinked polymer solution or other fluid that exhibits significant elasticity, leading to the Weissenberg effect (bob climbing)

2.13
viscosity
measure of the internal friction of a fluid when caused to flow by an external force

3 Abbreviated terms

r/min	revolutions per minute
pH	negative logarithm (to the base 10) of hydrogen ion concentration
ASTM	American Society for Testing Materials
DIN	Deutsches Institut für Normung

4 Measurement and precision

Temperatures shall be measured to an accuracy of ± 1 °C (± 2 °F); pH shall be measured to an accuracy of ± 0,1 units. All other quantitative measurements shall be made to an accuracy of ± 2 %, unless specified otherwise.

5 Fluid preparation

Certain aspects of sample preparation and handling can affect the viscosity or rheological properties of a fluid. During all procedures, steps shall be taken to minimize entraining air into the fluid. Following preparation, all fluids, except those intended to be used as fracturing fluids, shall be filtered through a filter of pore diameter 2 µm. Minimize the entrainment of air during the filtration process.

The procedure used to prepare the fluid sample shall be documented including the following information:

a) description and/or composition of the base fluid. Preparation of the fluid shall be described, starting with the fluid source, such as deionized water, tap water, seawater (location), or type of oil;

b) identification of mixing apparatus, container volume, and total volume of fluid prepared;

c) identification of each fluid component and amount added;

d) the order and method of addition of each component;