

---

---

**Petroleum and natural gas industries —  
Field testing of drilling fluids —**

**Part 2:  
Oil-based fluids**

*Industries du pétrole et du gaz naturel — Essais in situ des fluides de forage —*

*Partie 2: Fluides à base d'huiles*



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS

© ISO 2002

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
Web [www.iso.ch](http://www.iso.ch)

Printed in Switzerland

# Contents

Page

Foreword.....	v
Introduction.....	vi
1 Scope .....	1
2 Term and definition .....	2
3 Abbreviated terms .....	2
4 Determination of drilling fluid density (mud weight) .....	2
4.1 Principle.....	2
4.2 Apparatus .....	2
4.3 Procedure .....	3
4.4 Calculation .....	3
5 Alternative method for determination of drilling fluid density.....	4
5.1 Principle.....	4
5.2 Apparatus .....	5
5.3 Procedure .....	5
5.4 Calculation .....	5
6 Viscosity and gel strength .....	6
6.1 Principle.....	6
6.2 Determination of viscosity using the Marsh funnel.....	6
6.3 Determination of viscosity and/or gel strength using a direct-indicating viscometer .....	6
7 Filtration.....	9
7.1 Principle.....	9
7.2 High temperature/high pressure test up to 175 °C (350 °F) .....	9
7.3 High temperature/high pressure test 175 °C (350 °F) up to and including 230 °C (450 °F).....	11
8 Retort test for oil, water and solids contents .....	13
8.1 Principle.....	13
8.2 Apparatus .....	14
8.3 Procedure .....	14
8.4 Calculation .....	15
9 Chemical analysis of oil-based drilling fluids .....	16
9.1 Principle.....	16
9.2 Reagents and apparatus .....	17
9.3 Whole-drilling-fluid alkalinity .....	17
9.4 Whole-drilling-fluid chloride content.....	18
9.5 Whole-drilling-fluid calcium content .....	19
10 Electrical stability test.....	20

10.1	Principle .....	20
10.2	Apparatus .....	20
10.3	Equipment calibration/performance test.....	21
10.4	Electrical stability measurements .....	21
11	Lime, salinity and solids calculations .....	22
11.1	Principle .....	22
11.2	Apparatus .....	22
11.3	Whole-drilling-fluid calculations .....	23
11.4	Aqueous phase calculations .....	24
11.5	Solids calculations .....	27
Annex A (informative)	Measurement of shear strength using shearometer tube .....	32
Annex B (informative)	Determination of oil and water content of cuttings.....	34
Annex C (informative)	Determination of aqueous-phase activity of emulsified water using an electrohygrometer.....	37
Annex D (informative)	Determination of aniline point .....	41
Annex E (informative)	Lime, salinity and solids calculations.....	44
Annex F (informative)	Sampling, inspection and rejection of drilling materials .....	56
Annex G (informative)	Rig-site sampling .....	58
Annex H (informative)	Determination of cutting activity by the Chenevert method .....	60
Annex I (informative)	Chemical analysis of active sulfides by the Garrett gas train method .....	63
Annex J (informative)	Calibration and verification of glassware, thermometers, retort kit cup and drilling fluid balances .....	67
Bibliography	.....	72

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 part of ISO 10414 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10414-2 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum and natural gas industries*, Subcommittee SC 3, *Drilling and completion fluids and well cements*.

ISO 10414 consists of the following parts, under the general title *Petroleum and natural gas industries — Field testing of drilling fluids*:

- *Part 1: Water-based fluids*
- *Part 2: Oil-based fluids.*

Annexes A to J of this part of ISO 10414 are for information only.

## Introduction

This part of ISO 10414 is based on API RP 13B-2, third edition, February 1998.

As with any laboratory procedure requiring the use of potentially hazardous chemicals, the user is expected to have received proper knowledge and training in the use and disposal of these chemicals. The user is responsible for compliance with all applicable local, regional, and national requirements for worker and local health, safety and environmental liability.

In this part of ISO 10414, where practical, US customary units are included in brackets for information.

This document is a preview generated by EVS

# Petroleum and natural gas industries — Field testing of drilling fluids —

## Part 2:

## Oil-based fluids

### 1 Scope

This part of ISO 10414 provides standard procedures for determining the following characteristics of oil-based drilling fluids:

- a) drilling fluid density (mud weight);
- b) viscosity and gel strength;
- c) filtration;
- d) oil, water and solids contents;
- e) alkalinity, chloride content and calcium content;
- f) electrical stability;
- g) lime and calcium contents, calcium chloride and sodium chloride contents;
- h) low-gravity solids and weighting material contents.

Annexes A, B, C, D, H and I provide additional test methods that may optionally be used for the determination of

- i) shear strength,
- j) oil and water contents from cuttings,
- k) drilling fluid activity,
- l) aniline point,
- m) cuttings activity,
- n) active sulfides.

Annexes F, G and J provide procedures that may optionally be used for

- o) sampling, inspection and rejection,
- p) rig-site sampling,
- q) calibration and verification of glassware, thermometers, viscometers, retort kit cups and drilling fluid balances.

Annex E provides examples of calculations for

r) lime, salinity and solids content.

## 2 Term and definition

For the purposes of this part of ISO 10414, the following term and definition applies:

### 2.1

#### **ACS reagent grade**

grade of chemical meeting the purity standards specified by the American Chemical Society (ACS)

## 3 Abbreviated terms

ACS	American Chemical Society
CAS	Chemical Abstracts Service
EDTA	ethylenediaminetetraacetic acid
ES	electrical stability
HT/HP	high temperature, high pressure
OCMA	Oilfield Chemical Manufacturer's Association
PNP	propylene glycol normal-propyl ether
PTFE	polytetrafluoroethylene
TC	to contain
TD	to deliver
USC	United States Customary (units)

## 4 Determination of drilling fluid density (mud weight)

### 4.1 Principle

A procedure is given for determining the mass of a given volume of liquid (= density). The density of drilling fluid is expressed as grams per cubic centimetre, or kilograms per cubic metre.

### 4.2 Apparatus

**4.2.1** Any **density-measuring instrument** having an accuracy of  $\pm 0,01 \text{ g/cm}^3$  or  $10 \text{ kg/m}^3$ .

The mud balance is the instrument generally used for drilling fluid density determinations. The mud balance is designed such that the drilling fluid holding cup, at one end of the beam, is balanced by a fixed counterweight at the other end, with a sliding-weight rider free to move along a graduated scale. A level-bubble is mounted on the beam to allow for accurate balancing. Attachments for extending the range of the balance may be used when necessary.